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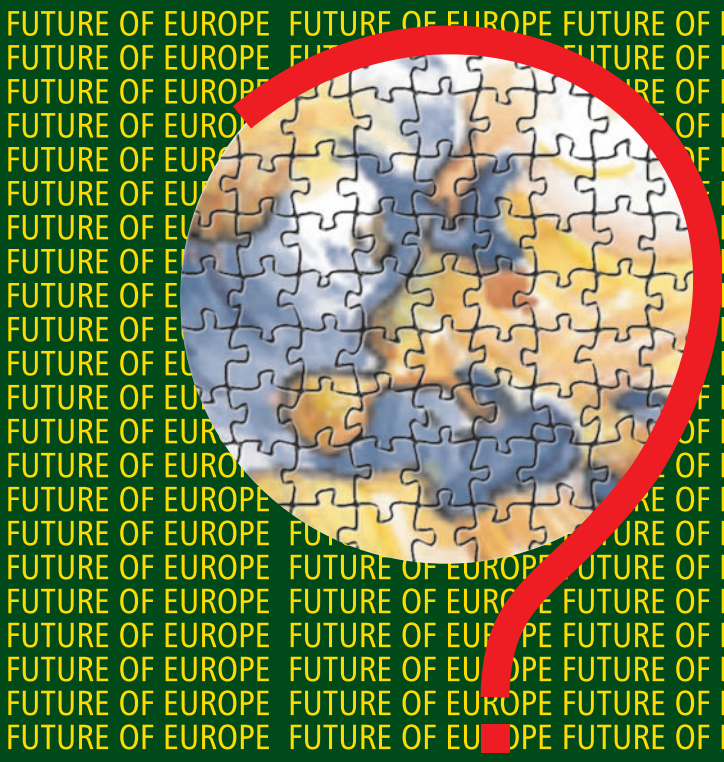
Futurology—The Challenges of the XXI Century



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Futurology—The Challenges of the XXI Century

WYŻSZA SZKOŁA BIZNESU
NATIONAL-LOUIS UNIVERSITY

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REUPUS

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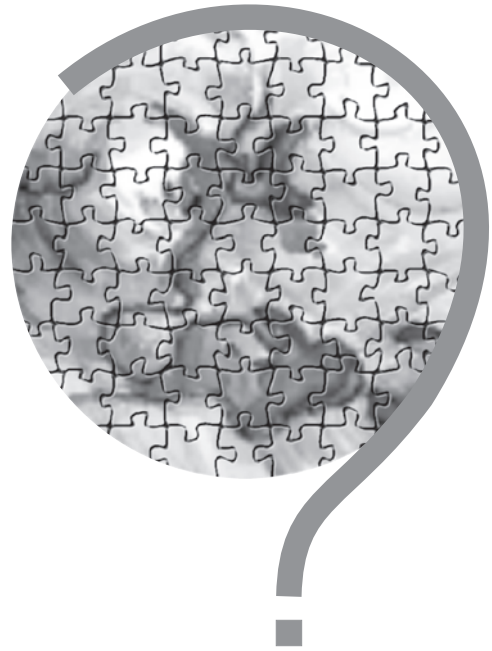
Futurology—The Challenges of the XXI Century



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Contents

PREFACE

It is a great honour and pleasure for me to introduce the fourth volume of REUPUS—Futurology—The Challenges of the 21st century.

Now it is possible to consider the five volumes of REUPUS as an consistent input into the interpretation of global nad European experiences of the 20th and 21st centuries.

Let me acknowledge in this place the grant of the Ministry of Science and Higher Education which created the financial background for the publication of this volume.

Krzysztof Pawłowski

Nowy Sącz 20 July 2008

EDITORIAL INTRODUCTION

The volume „*Futurology—The challenges of the XXI century*" is an important element of the Recifer Eurofutures Publication Series developed by WSB-NLU in Nowy Sącz. The volume is presenting and analyzing a rich panorama of problems and approaches related to the historical experiences of the XX century and the prospective experiences of the XXI century. This is a pluralistic volume in substantial and methodological dimensions opening the perspectives for different value judgments in the interpretation of the past and in the interpretation of the enigma of the future. Some of these value judgments may be seen as controversial especially in the evaluation of the role of neoliberalism as the dominant ideology of the last decades of the XX century.

There is no doubt however, that the grand debate related to the experiences of the XX century and the prospects for the XXI century, should be a controversial debate creating an intellectual climate for the new Futurology able to survive and grow in the dramatic conditions

of the XXI century. The title and context of the volume—"*Futurology—the challenges of the XXI century*" can be seen as an inducement for creative reflexion related to the new shape of futurology as an substantial and methodological instrument useful in the interpretation of the grand interactive field linking the past, the present and the future. Never in the history of human mind the enigma of the future was more dramatic than to day. If the volume will even in a very modest scale help us to face these enigma then the mission of the volume will be accomplished.

Let us hope that the context of the volume can be seen as a modest contribution to the new grand Programme of the Club of Rome—A New Path for World Development.

* * *

The creation of the volume "*Futurology—the challenges of the XXI century*", is the result of an effective cooperation of an informal team of eminent Authors, presenting innovative contributions which open the next stages of our thinking related to the enigma of the XXI century. The editors of the volume welcome the possibility to formulate a warm "Thank You" note to the Authors of the volume and to the Authors of the prepublication review the volume.

Antoni Kukliński, *Krzysztof Pawłowski*

Nowy Sącz – Warsaw
20 July 2008

Part I:

Education—Knowledge—Civilization

RICHARD R. ERNST

GOALS OF HIGHER EDUCATION: KNOWLEDGE AND CRITICAL FORESIGHT, LEADING TO SOCIETAL RESPONSIBILITY

Abstract

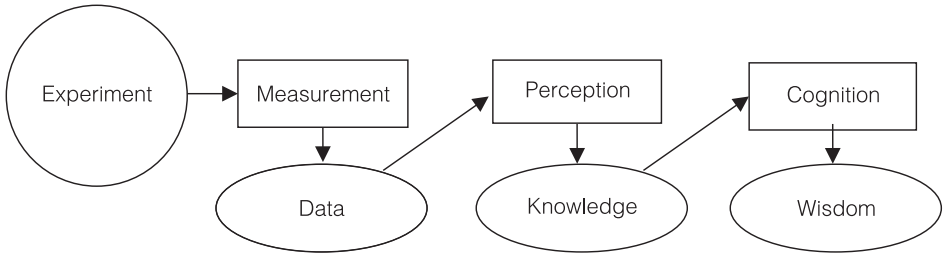
The lecture summarizes the author's view on the role and responsibility of universities in a difficult world which seems to have lost its beneficial track, in many respects. Universities with their independence, open-mindedness, and their obligation to educate future generations of citizens, including societal leaders, possess the means to significantly influence the longer term societal development. Certainly, exploring the scientific foundations of nature is important for acquiring knowledge in order to address urgent issues of our common future. But in addition, we academics are obliged to develop wisdom for comprehending the trans-disciplinary and trans-cultural connections between issues that might determine the fate of mankind. This may help us to conceive novel avenues that may lead to long-term prosperity and happiness for all citizens on our globe.

The Lecture

Few issues receive more general agreement than the need for first class education within our schools and universities. The level of education world-wide will determine the fate of our globe and of its population. We often mention our 'Knowledge Society', emphasizing the importance of knowledge for success in business and in life. Those who know more are expected to accomplish more and to earn more. And, in the end, they are expected to live a happier life than the rest.—Is this really true?

Knowledge: At first, we need to clarify the term 'knowledge', knowledge that, apparently, is so desirable and defines the ambitious programs of our schools. What do we have in mind in this context?—In Wikipedia, The Free Encyclopedia, we read: "*Knowledge is information of which a person, organization or other entity is aware. Knowledge is gained either by experience, learning and perception, or through association and reasoning. The term knowledge is also used to mean the confident understanding of a subject, potentially with the ability to use it for a specific purpose. The unreliability of memory limits the certainty of knowledge about the past, while unpredictability of events yet to occur limits the certainty of knowledge about the future. Epistemology is the philosophical study of the nature, origin, and scope of knowledge.*"

I am not a philosopher and my knowledge in epistemology is minimal. So what entitles me to speak about knowledge? My age, my Nobel Prize, my concern about today's frightening trends, or just my naivety? Probably the latter two!



Following the scheme by John Jan Popovic (modified from Wikipedia), knowledge is gained from experiments and measurements, followed by a process of perception. Knowledge is just 'known information'. It fills heads, books, or computer memories, and can be retrieved by sophisticated information retrieval systems.

However, the ultimate goal is not knowledge but attaining wisdom. The term wisdom is much harder to comprehend than knowledge. It also can not easily be measured and quantified.

Wisdom is defined in Wikipedia as follows: *"Wisdom is the ability, developed through experience, insight and reflection, to discern truth and exercise good judgment. It is sometimes conceptualized as an especially well developed form of common sense. Most psychologists regard wisdom as distinct from the cognitive abilities measured by standardized intelligence tests. Wisdom is often considered to be a trait that can be developed by experience, but not taught. When applied to practical matters, the term wisdom is synonymous with prudence. The status of wisdom or prudence as a virtue is recognized in cultural, philosophical and religious sources. Some define wisdom in a utilitarian sense, as foreseeing consequences and acting to maximize the long-term common good."*

The Function of Schools: In our schools and universities, we carry the ambition to convey more than just knowledge. Our goal is to render the students fit for life, hopefully for a happy and rewarding life. We know that intelligence, brainpower, and factual knowledge are insufficient for behaving as a human being. Hopefully, we can convey at least parts of what wisdom encompasses, according to the definition above.

To me, the definition of wisdom, given above, is not comprehensive yet and demonstrates how difficult it is to be attained. It becomes evident that wisdom must be developed through years of personal experience. One might argue that such experience can not be gained in formal schooling, and that schools may safely restrict their function to providing knowledge and skills, in other words, to the training of well functioning professionals. Indeed, this is what is being pursued all too often at universities by educating specialists who know an incredible amount of details about very little. This seems to be indispensable in many professions, particularly in the scientific world, if one wants to succeed and to advance to the front line where the current innovation takes place.

I would like to argue differently: Life is too short and too precious that one can afford to spend preparatory twenty or even twenty five years in school, just memorizing facts and recipes, in the hope that they can once, in the future, be applied fruitfully to 'real life'. One often uses the metaphor of tying up a backpack of knowledge for life. The backpack contains plentiful seeds of knowledge, fertilizers, and prescriptions describing their proper usage.

I am convinced that the schools shall not be merely preparatory stages for life; they must be regarded as an integral part of life itself where a lively community of students and teachers is

the source of enjoyable, despairing, and lasting experiences. These will help shaping the student's personality. Even fragments of wisdom could be acquired. In this sense, the schools shall provide a realistic setting for gaining experience valuable for life.

It is well-known that experience can not be gained without doing experiments. **'Learning by doing'** is in this context of utmost importance. The learning efficiency in a lecture room with unidirectional teaching can be frightfully low. It is advisable to reduce class room activities to a minimum. Lectures might be useful for conveying fascination and enthusiasm to the students in view of what they are supposed to learn, but the learning must be done by the students themselves in the laboratory, in nature, in discussion groups, in the library, or in a quiet room by reading and writing.

Project-oriented learning has a particularly high efficiency. Projects provide a realistic environment where many unforeseeable incidences can occur, just as in real life. In project-oriented learning, the students select themselves those study subjects that are relevant for solving the problems encountered in the course of the project. In this way, student researchers are naturally filled with motivation to study in depth the relevant subjects. They develop personal initiative to structure their own learning process. Frequently, the curiosity, excited in this way, carries the researcher to completely different subjects, off the main road, and might even lead to an unexpected invention or to novel insights. Here, serendipity might take place, indeed.

It is old teaching wisdom that the best education motivates the student, stimulates his curiosity, and the learning will follow by itself. Many students learn exclusively what they have become fascinated by. Other subjects have no chance to enter their brains. Frequently, one's own children put this fact clearly into evidence, often to the dismay of inexperienced parents with preconceived ambitions, trying to teach their children a particular subject with nearly zero effect. Later, they might be surprised how eagerly the same children learn topics they had selected themselves.

Project-oriented activities and learning are invariably inter-disciplinary and often go beyond the scope of a single faculty. Nature does not classify the problems to be solved by man according to anthropomorphic disciplines! Innovation and creative problem solving happen most frequently at interdisciplinary borders.

Nuclear Magnetic Resonance, an Example: The field of science in which the author was active before his retirement, nuclear magnetic resonance, is an excellent example for the importance of an inter-disciplinary approach. Many atomic nuclei possess a built-in magnetic moment. Applying a strong external magnetic field leads to a precessional motion of the magnetic moments about the direction of the field with rates determined by the magnetic field strength. The precession of atomic nuclei in a magnetic field is called nuclear magnetic resonance (NMR). It is a fundamental phenomenon of physics that reveals most enlightening applications of quantum mechanics for demonstrating basic principles.

By pure accident, it was found 1950 that the chemical environment of the nuclei has a magnetic shielding effect on the magnetic field at the nuclei and is reflected in the measured NMR frequencies. Each nucleus exhibits a different resonance frequency, and each molecule shows a characteristic spectrum of frequencies. This allows for powerful applications to the chemical analysis of substances. Each of them leaves its 'fingerprint'. In this way, NMR became an indispensable analytical tool in chemistry.

Experimental NMR became truly a high-tech field, in many respects at the limits of current possibilities. Extremely high and stable magnetic fields are needed. The emitted NMR signals are very weak and require advanced high-frequency electronics for their reception. In addition, complex computer routines became indispensable for the analysis of the highly informative experimental data.

Fourier spectroscopy has lead to a revolution in the experimental NMR procedures. The Nobel Prize citation of the author mentions this achievement as a major breakthrough. The recording of the inherently low sensitivity NMR spectra could be speeded up several orders of magnitude by a pulsed excitation of all resonances in parallel. With a mathematical Fourier transformation, the various resonance frequencies can then be disentangled. The gained sensitivity achievement was seminal for the application to complex bio-molecules and for entering the medical field.

Later, it was found that the three-dimensional structure of biological macromolecules in solution could be determined by NMR spectroscopy, making great impact on molecular biology. Instead of one-dimensional NMR spectra, two- and three-dimensional spectra are needed for this purpose. They visualize the neighborhood of nuclei within the chemical bonding network of the molecules. Also inter-nuclear distances can be determined in this way. Based on two complementary types of two-dimensional spectra, it is possible to triangulate the positions of the magnetic atomic nuclei within a biological macromolecule. This allows then the determination of accurate three-dimensional models of biological macromolecules. The obtained molecular structures became indispensable for studying the function of many biologically relevant molecules.

Three decades ago, an exciting possibility was discovered for medical applications. Magnetic resonance imaging (MRI) beautifully reveals the inner secrets of patients in a clinical environment. By the application of magnetic field gradients, it is possible to localize the origin of an NMR signal emitted from an organ in a human body and to derive fascinating images that reveal much about healthy or diseased tissue. This is invaluable information for a clinician planning surgery. Today, MRI provides the most powerful and universal diagnostic tool for clinicians being interested in the health condition of soft tissue. Especially in the context of cancer diagnosis, the method is of undisputed value.

Most recently, functional MRI (fMRI) procedures were developed that allow a detailed study of brain functions. Today, most of the functions of a brain can be localized accurately in the brain matter. This allows for revealing insights for psychologists who can study in great detail the human reactions and the interplay of various senses. For numerous brain diseases, diagnostic markers have been developed already. Much further development can be expected in the near future, improving our understanding of the most complex and most fascinating human organ, the brain.

In this way NMR has taken advantage of mathematics, physics, and electronics for solving problems in chemistry, biology, and clinical medicine. And in the near future, even clinical psychology becomes unthinkable without access to functional MRI. Indeed, NMR became truly a multi-disciplinary enterprise.

A close interaction between academic institutions and industry was seminal for the design of the required sophisticated NMR spectrometers. The development started in the 1950ies within the Stanford Industrial Park that was the birth place of the famous Silicon Valley. The latter became a metaphor for the benefits of university-industry collaboration. The development of NMR spectrometers at Varian Associates in Palo Alto, California, presents an excellent example for such fruitful interaction. The author was personally involved in the 1960ies. He also took advantage of the stimulating environment for his own personal development. A similar collaboration between academia and industry, on a somewhat smaller scale, took place a little bit later in Switzerland between ETH Zürich and the company Trüb-Täuber, leading, finally to the foundation of Bruker-BioSpin, the present worldwide market leader in NMR. The author was also actively involved in this interaction.

Multi-disciplinarity: NMR is a particularly spectacular example of multi-disciplinary research activities. But many other examples spring to one's mind, as well. In this context, it turns out that collaboration between narrow-minded experts, knowledgeable in one field only, is futile.

Collaboration is efficient only when the involved researchers are acquainted themselves with several fields. Without a strong overlap of knowledge, interaction will be difficult or impossible.

The consequences for university teaching are obvious. Multi-disciplinary education is a must for those who desire to work at the frontier of science. Obviously, the wide range of inter-disciplinary demands on the students and researchers is enormous. Nevertheless, disciplinary detail knowledge, in at least on field, is indispensable. All-rounders without depth will achieve little or nothing. One may summarize the situation in the aphorism: Focusing is indispensable for understanding, while widening the scope is needed for comprehension.

The Quest of Wisdom: We may ask, at this moment, whether multi-disciplinary competence has something to do with the 'wisdom' we are longing for, as mentioned at the beginning of the lecture. Remotely, perhaps yes, but in reality there is rather little connection!—Instead of creating more explanatory prose on 'wisdom', let us resort to the visions of a few sages:

> *Wisdom ceases to be wisdom when it becomes too proud to weep, too grave to laugh, and too selfish to seek others than itself.* Khalil Gibran
>
> * * *
>
> *In eloquence there is magic, in knowledge ignorance, in poetry wisdom, and in speech heaviness.* Muhammad
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> * * *
>
> *Knowledge is proud that it knows so much;*
> *wisdom is humble that is knows no more.* WilliamCowper
>
> * * *
>
> *Knowing others is intelligence; knowing yourself is true wisdom. Mastering others is strength; mastering yourself is true power. If you realize that you have enough, you are truly rich.* Tao Te Ching
>
> * * *
>
> *Great doubts deep wisdom. Small doubts little wisdom.* (Chinese proverb)

What could we ever add to these sayings for answering the quest of 'wisdom'?—Sages often remain silent for the remainder of their life.—*Wisdom does not brag*.—Fortunately, I am far from being a sage, and I am not forced to stop my lecture at this point! I would regret a premature ending because I did not convey yet my message on academic responsibility in today's world that burns on my tongue.

Humanities and Social Sciences: We should not forget how much in our world is beyond the realities explored by the exact, natural sciences. The sciences impose on themselves restrictions for exploring exclusively phenomena of nature that can reproducibly and quantitatively be measured. The humanities have a wider scope and deal with all conceivable human and inter-human aspects. They try to comprehend human reactions and thoughts, our feelings, our anxieties and our happiness, perhaps even love and hatred. And the social sciences provide clues for understanding the functioning and malfunctioning of human communities. Their fascinating conclusions can not be disregarded, when seeking wisdom.

Many phenomena in the human sciences can not be quantified accurately. Nevertheless, the human sciences are under pressure to apply methods similar to the ones of the natural sciences in order to be taken serious. Sometimes, one is struck by the feeling that the powerful methodology of the natural sciences is running like a steamroller over the human sciences. Many of the relevant subtleties of the humanities are swept under the carpet in this way. A stronger resistance against

the rational and materialistic attitudes of the natural sciences is probably in order to save some of the humanistic spirit.

There is little doubt that we, 'the exact scientists', can learn much from the humanities and social sciences. On the other hand, they are dependent on our discoveries and insights for their functioning and their personal survival. Obviously, there is an urgent need for breaking the long-standing barriers between natural sciences, humanities, and social sciences in our universities. We need combined projects addressing questions that can not be solved by one discipline alone; and many questions concerning our global future are of this kind. In addition, we need discussion groups and think tanks that combine the knowledge of all faculties in order to progress, perhaps, towards the 'wisdom' necessary for developing visions of our, hopefully beneficial, future. I am coming back to this point a little bit later.

The Arts: Sometimes, the humanities attempt to encompass the arts as well. We know fields such as musicology, art history, literature, and many more related disciplines. But in fact, the humanities rather act as external observers of the arts and concentrate on a descriptive view and classification of their products. This may open avenues to access art. But the essence of the artistic miracles is not touched nor revealed. The most inner artistic message can only be emotionally experienced by a devout, patient, and humble observer and by artists themselves.

Art is beyond a down-to-earth scientific analysis. Let us read, as an example, some beautiful words, written by Jalaluddin Rumi:

The morning wind spreads its fresh smell.
We must get up and take that in,

that wind that lets us live.
Breathe before it's gone.

Twenty five unpretentious words that span a poetic world, full of life! A true revelation! Here, we seem to be not far from what we aspire by the term 'wisdom'.

How shall we scientists deal with the arts? Shall we just ignore them or try to integrate them into our scientific edifice? Shall we take advantage of artists' gifts to enhance the appeal of our products and revelations for better performance on the intellectual market? I am convinced that true art can never be "useful" in this sense. The points of contact between the arts and the sciences happen very deeply within our personal sense of life, which we might call our soul, the domain where all experiences and emotions unite to our self; the self that defines our identity and that renders our life meaningful and unique. Here in the union of arts, humanities, and science, finally, we find the true origin of all encompassing wisdom. Wisdom is often transitory. It may be experienced just as brief glimpses or flashes of revelations that reveal eternal insights and lead to moments of comprehension. Devout people might experience these rare events as the opening of a door to a supernatural world, speaking then of a revelation of divine wisdom. Such mental experiences have enormously stimulated the development of all human activities from the arts to religion, and to science.

In fact science and the arts have much in common. It is being said that those humans who maintain some of their youthful curiosity and spontaneity become later scientists, or in the best case artists.

The Two-Legged Person: In this context, I am invoking sometimes the metaphor of a two-legged person for describing my vision of a well-balanced human being. The first leg stands for his (or her) professional activities which might have been developed to near perfection. But still, it remains difficult for a professional to hop on a single leg towards a distant goal along the long and dusty road. Indeed, he needs symbolically a second leg, representing his complementary passions.

They may be and should be centered far outside the professional realm, forcing him into a nearly painfully wide spreading of his legs—painful, for example, due to the lack of time needed to pursue all interests simultaneously. His passions, irrespective of their particularities—they must not be artistic—provide him a safe stand.

The spare-time passions provide more than just relaxation and enjoyment. They are often a rewarding source of professional and human creativity. Analogies between remote subjects, brought into juxtaposition within our mind, are most inspiring and invaluable for inventive searchers and researchers.

Indeed, I consider myself also as a two-legged, perhaps even a three-legged person. My early personal interest for science, particularly for experimental chemistry, developed during my teens in parallel to my active enthusiasm for music, having played the violoncello and composed music. Chemistry and music formed my indispensable legs for my first 35 years. And indeed, they were complementary in many respects; my knowledge of NMR opened the avenues to the wide world; and music laid the foundation to a very harmonious family life, my wife playing the violin and me the cello already on our very first encounter. In addition, I experienced how mentally similar the activities of a scientific author and of a musical composer are. Having written a piece of complex music is equally rewarding as writing a complex scientific paper. Both evoke a mix of pride and inadequacy; in retrospection, I was hardly ever satisfied with my own products.

There are indeed close analogies between science and writing music. For example, a sonata and a scientific paper are similarly structured with 'introduction', 'exposition', 'development', 'recapitulation', and 'coda'. The parallel voices in a musical composition find their analogy in the harmonious or disharmonious cooperation of several authors on a research work. Musical compositions are full of symmetries and broken symmetries that are so essential in fundamental physics as well as in nature. Symmetries radiate special appeal to the human mind. They act on us like rhymes in poetry.

We all know that three legs are needed for a stable stand. Indeed, I acquired in the later sixties a third leg that became very precious and important to me. I discovered my love for Tibetan painting art. Tibetan painting art is unique in the way it blends with the entire daily and spiritual life of Tibetans. Through fascinating and most colorful paintings, called thangkas, one easily gains access to virtually all aspects of their culture and habits. Everything is represented highly skillfully in this great art of Central Asia. Tibet is special by its position between the different Asian cultures originating from India, China, Persia, and Mongolia. All these cultures left their traces in Tibetan painting art. Nevertheless, the latter developed a very particular style of its own kind.

Tibetan painting art can not be separated from Buddhist philosophy and spirituality. Even for a rational Western scientist, Buddhism is easy to comprehend due to its simple philosophical and ethical rules that are in no contradiction to our basic scientific principles. The colorful surface of Tibetan painting art and the complexity of the Tibetan pantheon might be disturbing (and fascinating) on the first sight. But soon one realizes that the multitudes of displayed deities have been conceived as metaphors for philosophical principles and are in no way assuming or even frightening.

It is the author's experience that the deeper one digs into the fundamentals of a particular religion, the more similarities between religions one discovers. In fact, all the great religions have common foundations and only their superficial and, after all, irrelevant manifestations differ. Such irrelevancies are indeed responsible for many of our sad clashes of cultures. If we would take them less serious in claiming infallibility, the coexistence of cultures could be much more harmonious.

Societal responsibility of academics: Based on the thoughts presented so far, one might get the impression that the attainment of a comprehensive view on the way towards wisdom has, so to say, an end in itself. It helps individuals, and we are speaking her particularly about academics, to become well balanced human beings.—But nobody, least the academics, are just luxury plants, nurtured by society, for their own pleasure.

The candle is not there to illuminate itself. Nawab Jan-Fishan Khan

The academic community has a mission and a function within human society that alone justifies the great public expenses for universities. First of all and most importantly, the universities have an educational function, educating a next generation of citizens, specialists and functionaries. Education is by far the major obligation of universities. Students shall be educated in as broad and comprehensive manner as explained above. We do not need mere experts knowing everything about very little. Those are better replaced by computers or computerized robots. Society is in need of creative citizens who are ready to assume responsibility.

Before going into more details, let us have a candid look at today's world.

A Sober View of our World Today: Our world seems to be in a process of disintegration, despite all available means of communication and inexpensive means of transport. In our world, fairness and compassion are ebbing, leaving behind plain ruthless egoism and shroud money-mindedness.

Perhaps, the most frequently declared political goal today is to install universal 'human freedom' for all in all countries, freedom from all conceivable restraints. Its attainment appears to sanctify nearly all, even detestable means to reach this goal. No question, freedom is one of the most precious human rights. In the Universal Declaration of Human Rights of the United Nations of the 10^{th} December 1948, the term 'freedom' appears fourteen times in the thirty Articles and seven times in the Preamble.

Article 1.

> All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood.

Article 2.

> Everyone is entitled to all the rights and freedoms set forth in this Declaration, without distinction of any kind, such as race, color, sex, language, religion, political or other opinion, national or social origin, property, birth or other status. Furthermore, no distinction shall be made on the basis of the political, jurisdictional or international status of the country or territory to which a person belongs, whether it be independent, trust, non-self-governing or under any other limitation of sovereignty.

Article 3.

> Everyone has the right to life, liberty and security of person.

.....

Quoting this invaluable document, a number of major wars have recently been started and, unfortunately, not yet ended. It is claimed that bringing freedom to an alien country gives the aggressor limitless blessings!—But by whom? Certainly not by the UN or by the World community! Or by God? It would have to be a very oddly conceived God, just tailored to suit the purpose, if he would give aggressors his blessing for committing crimes against humanity!

But in most cases, 'bringing freedom' is just a pretext for extending the domain of influence and power. Often, power is disguised in a rather sweet and seducing form, leading to commercial dominance, opening new markets for otherwise unsaleable products. The argument is also being used today for getting access to scarce energy resources.

Today's events have their history. Often, the chain of arguments, based on past accidents for justifying the present situation, is broken at an instance suitable to leave all guilt in the bad intents of an adversary, in order to justify committing another crime. Instead of listening to our politicians, better listen to Mahatma Gandhi:

An eye for an eye—makes the whole world blind. Mahatma Gandhi

A most powerful weapon in this context is the ideology of 'free market economy. It is related to a misunderstood interpretation of 'freedom'. It implies freedom for the stronger, the more successful entrepreneurs. It gives the stronger ones the 'freedom' to dominate by all legal means the weaker ones, making their grandiose profits on the account of the needy. This process further enriches the rich and impoverishes the poor. Today, success of business is measured exclusively in monetary units, using the shareholder value as a well accepted indicator.—Right is what pays out!

Free market economy is conceived as a freely running system under the only constraint of optimizing profits. The principle is highly functional, and, at first sight, also to the advantage of the consumer when, under competitive pressure, prices drop (usually, quality drops as well!). But the consumer's advantages are illusionary because the large and powerful international companies decide on the products the consumer has to consume. Psychological marketing, exploiting the naivety of the consumer, is of enormous importance. Conscientiously or sub-conscientiously, we became obedient consuming slaves, following the advertisements and the role models set by our, even more obedient, neighbors.

Perhaps the most disturbing aspect of the free market system is the disrespect of possible long-term damage of the environment and the plundering of the finite natural resources. Well before the damaging effects of our selfish misusage become apparent, the gains are dissipated in luxury. The claimed self-correcting features of a free-market system are ineffective in the longer term; they just serve to optimize the short-term profits. Here control mechanisms by impartial authorities are indispensable.

The consequences of the ruthless usage of misunderstood 'freedom' become frightfully apparent today. Our world splits in two halves, the affluent half and the suffering, turbulent, despaired, and violent poor half. Obviously, a split world is inherently unstable. The strong gradient of wealth and (apparent) happiness leads to a strong surge to commit crimes caused by anger and suffering. This gradient can only be maintained by brute force, for example by the building of separating walls and barbed wire fences. The first known example is the Great Wall in China, the most recent one the wall between Israel and the deplorable remainders of Palestine. Many real walls have been erected in the time between these two events, but even more mental walls existed and still exist, separating social groups, such as the Segregation in South Africa or a little earlier in the US. And certainly, the worst walls are those in our own heads. They lead to preconceived notions and to racial hatred. Even in peaceful Switzerland, much hatred is being spread by the right-extreme parties which would be most pleased if they could get rid of all foreigners. A very recent public vote demonstrated the adverse feelings of the average Swiss towards refugees.

A Sober View of Our Lives: Our daily lives become more hectic every day. In order to succeed, we have to run faster. We scientists have to produce more inventions and to write more papers per unit time in order that industry can produce more (often useless) consumer products. The

consumer has to buy and consume more to keep industrial productivity up. Indeed, the term 'consumer' is a very ugly, but accurate designation of our function. We just serve as black holes to consume in order to empty the shelves in the supermarket. Occasional abdominal pains are quite natural and further stimulate the sales of pharmacies and the visits of medical doctors. A well functioning feedback system!—We produce in this way an awful lot of waste, and in the evening before sleeping, we ask ourselves: what sense do all these busy activities make? We hardly will find a reassuring answer. But nevertheless, next morning, we continue to operate our senseless treadmill.

Ethics has no longer a place in our world, except when it can be exploited for money-making purposes. Even ethical principles serve today a handsome purpose.

Our Academic Mission: In this sick world, the academic community is obliged to fulfill a rescue mission. It is essential to realize that this mission is truly long-term. An immediate beneficial result can hardly be expected. Universities and their community possess no executive power. Their influence is through conviction, through public teaching, and by giving good advice.

By far, the most powerful means universities possess to steer our global space ship is through education of students. Today's students are tomorrow's leaders in politics and in industry. The positive seeds that are implanted into their brains might germinate after one or two decades.—But many more societal obligations have to be satisfied by our universities:

Life-Long-Learning: We all know how essential learning and re-learning remains during the entire life span. Obviously, everybody has his personal responsibility to remain up-to-date. But the universities encouraged for offering opportunities to refresh one's own knowledge. Academics in industry and public life shall obtain opportunities to return regularly to the university to refill their back-pack, to get acquainted with most modern technology, and, particularly, to critically reflect on the present course of industry, society, and our world today. The preparation of suitable courses and seminars by the faculty is quite demanding. Often, the academics in industry have gained more experience and know more than the university professors, detached in their ivory towers. For this reason, it is indispensable that all university professors spend at least once in their career an extended time period in industry or in a public institution outside of the university. Only in this way, they can develop a proper understanding of life outside of their realm.—I have spent nearly five years in industry in the US after finishing my studies, and I profited enormously for my entire career. Without, I would not have received even my little prize in Stockholm!

Life-Long-Learning applies to everybody, and universities shall offer courses also for non-professional citizens. Many possibilities exist for implementing this demand: from TV broadcasts to articles in the daily, weekly, or monthly press, to public lectures, courses on special subjects, and days of Open House at university institutes. In this context, let me just mention two recent activities at ETH Zürich in which I was personally involved.

Last year, ETH Zürich celebrated its 150 years jubilee. On this occasion, 150 professors were asked to talk to the public in the streets of Zürich. Small pavilions were erected at some busy crossings in downtown, equipped with PowerPoint projection and screens, and seats for about 80–100 participants. Here, 430 lectures were presented in three weeks on subjects freely selected by the professors. Most of the lecture events were overcrowded. The public interest was enormous and the response very positive. I hope that we will be able to continue this kind of teaching activity in the near future. A major goal was to stimulate the discussion with the public in order to provide also valuable input to the university faculty and to give the public the certainty that its opinions are taken seriously. And it functioned very well. The professors were excited about their positive experiences. Surely, they would do it again!

Another, still on-going activity is "ETH in Dialogue". It consists of an open-ended offer of ETH faculty members to present lectures at varied occasions all around Switzerland. For this purpose, an internet access exists where the list of possible lectures is publicized, and at which requests for (free) lectures can be placed (http://www.ethimdialog.ethz.ch/dienstleistung/index_EN). In this way, it becomes possible to adorn any planned event with a fascinating lecture by an ETH faculty member, perhaps even a birthday party for Grandma! This is an attractive way of spreading knowledge and reflection to the general public. Last but not least, it presents good opportunities to stimulate young people for studying sciences.

Conceiving a Beneficial and Sustainable Future: Who else, if not the universities and the academic community, has an obligation to reflect on our common global future? We can not expect much long-term reflection from our operators, the politicians and business leaders. They are busily solving today's problems in the hope of surviving themselves on their chairs and of making short-term profits for their companies (and for themselves). The short-term responsibilities on their shoulders weigh heavily and leave them little room for impartial planning of a global future.

The academic community at universities does not suffer under this kind of constraints. They are not only free to conceive novel, unheard ideas; it is one of their primary obligations. To some extent, they are paid for serving as critical voices that, at the same time, offer alternative visions of a better world.

The universities shall serve not as ivory towers of knowledge, but rather as incubators of novel concepts. From the outside, they shall be regarded as radiating cultural centers that stimulate the discussion in the general public and that offer solutions to the world's major problems. Let me mention a few issues of global importance that should be discussed in university circles:

Cooperation and Regional Unions: International collaboration is functioning rather poorly today. The European Union, however, is a shining positive exception in a dark world. Just compare the state of Europe sixty years ago with the presence! Nobody could have imagined that a peaceful cooperation and coexistence of former enemies would ever be possible. Despite all difficulties, the European Union functions very well, and another major war in Central Europe is virtually inconceivable. The origin was an economic collaboration in a competitive world, but slowly, also a political unification is taking place. Europeans consider themselves truly as 'Europeans'. The experiment has worked better than was to be expected.

Why not use the EU as a role model also in other regions of the globe? In none of the regions, it will be simple to find a common denominator, but the example 'Europe' shows that it is not impossible. For example, an East Asian Union is imaginable, unifying Japan, Korea, Mongolia, and hopefully also China. A South Asian Union could bring together peacefully India, Bangladesh, Nepal, Bhutan, Sri Lanka, and even Pakistan.

In today's context, nothing lies nearer than to conceive an Islamic Union in the Middle East. As is well-known, it had its predecessors with the United Arab Republic and some other minor attempts to unify. Their failure is no excuse for not trying it again. Indeed, there is an urgent need of collaboration among Islamic or Arabic countries. Without a unified voice, the area has no chance of facing the devastating pressure from outside, mostly from the US. Unless the Arabic countries take coordinated action, they make themselves co-responsible for today's tragedies in and around their countries.

Such thoughts might be worth discussing in conscientious university circles in order to prepare the public opinion for moves in the proper direction.

International Organizations: Regional unions would be beneficial but are insufficient. Strong international organizations and binding international agreements are needed, in addition, to define the rules of peaceful cooperation and problem solving.—Democracy is advocated as the best system for internally organizing a State. Each individual has the same rights and obligations, defined and guaranteed by the State laws.—On the international level, similar principles should apply as well. Each State should be entitled to the same rights and obligations, warranted by international laws.

Unfortunately, the most powerful State on our globe blocks the installment of an efficient network of international laws and organizations that implement these laws. Selfishness prevails in the international relations that seem to reflect a state of development several hundred years behind the rules well accepted within modern democratic States. The US is the most active promoter of inner democracy, but at the same time the greatest stumbling block for reshaping, in a democratic manner, international relations. It is urgent to develop at universities a new spirit that, finally, may swap over also to political bodies.

Let me mention just a few cases of international regulatory agreements that have been rejected by the US: Resistance against Kyoto Protocol, Vote against Human Rights Council, Vote against Convention on Cultural Diversity, Violating Agreement on Reduction of Nuclear Weapons, Blocking of Anti-Landmine-Conference, ABM Withdrawal, Rejecting Convention on Rights of the Child, Rejecting an International Criminal Court. The most recent rejection occurred on March 15 with a vote against the UNCouncil on Human Rights Abuse. The difficult relations between the US and the UN are well known, indeed.

Joseph E. Stiglitz, a US Nobel Laureate in economic of 2001 said: *"We can not go back on globalization, it is here to stay. The issue is how we can make it to work. And if it is to work, there have to be global institutions to help set the rules."*

Energy Problem: Finding solutions for the threatening Global energy problem is of immediate academic concern. Our future may crucially depend on a conscientious usage and fair distribution of available energy resources, and on making new sustainable energy sources available. Major technological breakthroughs are needed towards this goal, but, in addition, the present misusage of energy must be minimized. Again, gripping international agreements are needed, together with an energy-conscientious education of the population. Indeed, universities have a great responsibility in this respect.

Converting the Free Market Economy into a Responsible Market Economy: It is apparent that an unlimited free market can not solve the long-term problems of mankind. Short-term thinking and egoistic reasoning prevail. Adam Smith characterizes the human motives by his well-known saying:

> *"It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our necessities but of their advantages."* (The Wealth of Nations, Book I Chapter II)

Indeed, his words reflect facts about 'natural' human behavior that we experience daily. But he seems to disregard the constraints imposed by society and by our responsibility for their beneficial long-term development. This responsibility can not result from human instincts to which his words refer. Only by conscientious education and by convincing role models, it is possible to motivate people to behave in a compassionate and unselfish way to help others.

My preferred (perhaps utopian) model of an economic system is a 'responsible market economy'. In contrast to the 'free market economy', where the personal profits or the shareholder value are the driving forces, in a responsible market economy, the actor acts out of conviction that certain actions are needed for the sake of society today or tomorrow. And he does not ask for his own personal gains, whether directly or indirectly. Altruistic behavior is the basic drive in such a model. May be, this sounds too idealistic, but still I think it is a goal that is worth pursuing. Certainly, universities are the proper place to further discuss the consequences and how to reach such a goal.

Help for the Poorest on the Globe: For easing the fate of the poorest people on the globe, it seems to me indispensable to implement a responsible market economy. Indeed, they need help and support to be able to live a humane life. A free market economy can not provide this perspective. It invariably leads to exploitation.

Joseph Stiglitz, Nobel Laureate in economics of 2001, writes: *"International humanitarian assistance is a form of collective action that springs from a shared compassion for others. As efficient as markets may be, they do not ensure that individuals have enough food, clothes to wear, or shelter. Poverty can lead to environmental degradation, and environmental degradation can contribute to poverty."*

Helping the poorest has much to do with ethics. I think that ethical principles should be articulated more in our university courses. They are the basis of a well functioning human society. After all, it is immaterial where we draw our ethical principles from. They are virtually identically found in the foundations of all our diverse philosophical and religious systems. From Christian to Islamic, to Buddhist, and Hindu thoughts, the same principles of charity and compassion prevail in all great traditions.

Respecting Cultural Diversity: The Clash of Civilizations is in full swing today, partially because of the short-sightedness of certain leading politicians and their self-centered advisors, leading to the disastrous consequences that we experience today.—Following the theme touched above, indeed our world cultures have more in common than is apparent on the first sight, and their coexistence and mutual enrichment should cause no major difficulties. This is also what we experience daily in our universities where fruitful collaboration is easily possible across all racial and cultural barriers. In this sense, the life at universities might serve as a metaphor for peaceful human coexistence. The university is an ideal meeting place for different cultures, for becoming acquainted with each other, and for understanding each other. When we actively take advantage of this unique situation, we could contribute significantly to the inter-cultural understanding and to world peace.

We should not forget that our cultures are treasures of heritage that we must preserve. Cultures are our living grounds that give us confidence and stability. Some of those who have lost their cultural roots might become terrorists, as they have nothing left that they could lose, except for their own life.

Many more subjects could be mentioned that should form part of the academic obligations. We are encouraged to constantly question our value systems in the hope of finding universal values that better reflect the needs of our own and the future society.

Concluding Remarks:

When we step back and impartially observe the course which our world has taken, we might be tempted to develop a frightening doomsday scenario that leads sooner or later to a technological

and societal dead end. The energy dilemma clearly reveals that we are irreversibly depleting resources. But in many other respects, we deplete them as well. For example, we deplete goodwill and societal balance. We deplete the significance of compassion in favor of personal monetary enrichment. When all these precious resources are gone, human culture is gone, and we endanger our own existence.

In this situation, universities share co-responsibility for a beneficial and sustainable future of our globe and of the human community. Besides our basic research efforts, we need to spend time to clarify our dangerous global situation and to find avenues for improving the chances of a happy continuation of human culture and its valuable traditions. We need the courage to articulate our views, peacefully of course. And we have to sensitize and train our students in a way that they can contribute actively to a beneficial future. Our responsibility is great and unique. Let us recognize our role and improve our performance, even if the direct profits for us, teachers, might be negligibly small. Certainly, the satisfaction will remain to us that we might have contributed all we ever could to save our beautiful world and our precious living grounds.

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THE BROADER CONTEXT OF EU RESEARCH POLICY

As every policy of the European Union (EU), its research policy has been developed—and is still developing—in a highly complex political environment. It is the result of lengthy and difficult negotiations. In this process, that includes the highest political level, strengthening regional development through research and technological development has and is gaining increasing importance.

Nevertheless, certain basic principles in research policy formulation continue to be handled with a certain misapprehensions.

This paper aims to outline and address the development of the above issues and the true background of the EU's research policy. A single recommendation is made.

1. Brief History of the European Union

The motto of the EU is *In varietate concordia*[1]. The expression is also a symbol of the challenges and rewards of Europe and its unification process.

Today's EU is the result a long process of negotiations and co-operation in Europe[2]. Although the process began after the Second World War (WWII), its intellectual roots go back much further.

The major institutional steps leading to the European Union in 1992 are summarised in Table 1.

The EU is a unique supranational and intergovernmental union of 27 sovereign states. Its smooth functioning is ensured by a number of public European institutions with complementary functions[3].

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[1] United in diversity.

[2] There is a rich literature on this subject, e.g. a recent one is [Ocana, 2003]. The website of the European Union is a first-rate starting point for studying the EU's history and institution: http://europa.eu/inde_en.htm. Unless otherwise indicated, in this paper the citations in*Italic* are from this source.

[3] These are: the Council of the European Union, the European Parliament, the Council of Ministers, the European Commission, the European Court of Justice, the European Court of Auditors, the European Economic and Social Committee, the Committee of Regions, the European Central Bank, the European Investment Bank, and several decentralised EU bodies. Every six months the Presidency of the Council of the European Union rotates between the Member States. The Presidency organises the work of the institution and is the driving force in the legislative and political decision-making process.

Table 1.

Chronology of Treaties leading to the European Union.

— 1952—Treaty of Paris—established the European Coal and Steel Community (ECSC); *coal and steel related research and technological development formed part of it*;
— 1957—Treaties of Rome—established:
a) the European Economic Community (EEC); *agricultural research formed part of it*; and
b) the European Atomic Energy Community (EURATOM); *research for peaceful use of nuclear energy formed part of it*;
— 1965—Treaty of Brussels ("Merger Treaty")—consolidated the institutional structures;
— 1986—Single European Act—first major revision of Rome Treaties;*includes a whole chapter on research and technological development*;
— 1992—Maastricht Treaty—established the European Union, EU;
— 1997—Amsterdam Treaty—introduced substantive amendments to former Treaties; *includes a whole chapter on research and technological development*;
— 2001—Nice Treaty—prepared for enlargement by 10 new member states; and
— 2004—Treaty on a Constitution for Europe. Rejected by France and the Netherlands in popular referendum in 2005.
— 2007—Reform Treaty—the Member States must ratify it before the next election of the European Parliament in 2009.
— 2008—Ireland rejects the proposed Reform Treaty in popular referendum (June); other Member States continue the process of ratification.

The EU is one of the largest economic and political entities in the world. It currently sports 494 million inhabitants with a combined nominal gross domestic product (GDP) of €11.6 (US$14.5) trillion in 2006. It is a single market with common trade policy, common agriculture / fisheries policy, and common regional policy. The latter is designed to assist regions within the EU that are lagging behind the average of the EU.

Within the EU, all citizens benefit from having neighbours that are stable political democracies and prosperous market economies. This is indeed the most significant achievement in the long history of Europe.

During its evolution, the EU's main challenge has remained the same from the beginning: "*simultaneous cooperation, which unites the people; competition, which stimulates the economy; and solidarity, which protects citizens*"—as stated on various occasions by Jacques Delors, President of the European Commission during 1985–1995. He was the most outspoken and publicly visible European political personality in recent time, "grandeur" of European politics and President of the European Commission during 1985–1995.

2. Genesis and Development of European Union Research Policy

Some policy analysts question the very existence of a European research policy. At first sight, their doubt may seem understandable. For an outsider the complex bureaucracy, legal constraints and political environment within which European policies are created, developing and implemented often overshadow the sometime slow but steady progress.

The first intergovernmental Treaties that established European level co-operation limited scientific co-operation to specific fields: coal and steel; agriculture; and nuclear energy (see Table 1). This restricted research mandate remained in effect and was first broadened after thirty years.

In the absence of a mandate and corresponding research policy the effort focused on *co-operation* in selected areas. This evolved into *co-ordination* of projects with potential high value-added. Today, the EU is promoting *integration* of European research into a common "research area".

This journey of more than fifty years has been far from straightforward. It has involved lengthy and difficult negotiations, often at the highest political level. In this process the European research policy has been born and is still maturing[4].

Already during the 1960s the technology gap between Europe and the US, the brain drain from Europe to the US, and the increasing number of US high-tech companies' moving to Europe have raised concern in Europe. But there was no adequate European response to this development. Research policies had developed along different national paths and research co-operation was mainly promoted through inter-governmental agreements.

Early in the 1970s the idea of European level research policy coordination surfaced at the highest political level: "*co-ordination of national policies and the definition of projects of Community interest in the areas of science and technology*" (European Summit, October 1972). In response, Rolf Dahrendorf, European Commissioner responsible for research, suggested measures to develop a "European Science Area". The Member States reaction to this ambitious objective was lukewarm at best and therefore limited to setting up a new body—called Scientific and Technical Research Committee, (CREST)—to monitor national policies and explore what possibilities existed for co-operation. However, national research policies continued to develop along different paths.

During the early 1980s the Japanese challenge added an extra dimension to the European concern of loosing international competitiveness. On the proposal of the then Research Commissioner Etienne Davignon, the European Council allocated funds for joint high-tech programmes and later for a multi-annual RTD Framework Programme (see Chapter 4). The latter was the first important step to decrease differences in research efforts within the European Communities through the allocation and distribution of funds. Nevertheless, a coherent European research policy was still missing.

The Single European Act in 1986 (see Table 1) provided the basis to develop such a research policy for the first time in the history of the European Communities. Recognising this, and based on the proposal of Commissioner Dahrendorf, Research Commissioner Antonio Ruberti in 1994 suggested that European research co-operation should go beyond simply distribution of funds for co-operation. It should include co-ordination across national programmes. Regretfully, Member States were unwilling to listen to Ruberti and his vision sank into oblivion.

In 2000, based upon the vision of his predecessors Rolf Dahrendorf and Antonio Ruberti, Research Commissioner Philippe Busquin suggested a broad concept to develop a "European Research Area". This time EU Member States gave their support and thereby creating the conditions for a true European research policy.

The following gives the highlights of the more than fifty years of development.

After WWII, science and technology were not a major priority in the Europe of the 1940s. Europe was physically, morally and economically devastated and enervated.

[4] There is a rich literature on this subject. Guzetti [1995] gives a rather detailed description of the history of European research until mid-1990s. Examples for more recent publications are [Schregardus, Telkamp, 2001],[Banchoff, 2002] and [Györffi, 2006]. The most comprehensive recent publication about the design of EU research policy is [Muldur et al., 2006].

Pro-European intellectuals soon realised that scientific co-operation could contribute to Europe's reconstruction, promote peaceful coexistence and help mentally and morally unite the continent. The Council of Europe (created in 1949, an organisation independent from the later European Communities) explicitly encouraged such initiatives among its Member States. Nevertheless, the Council's role turned out to be largely symbolic and limited to debates. It played a marginal role in relation to scientific co-operation.

The first major achievement for scientific co-operation was the establishment of the "European Organization for Nuclear Research" (CERN, located at the Franco-Swiss border near Geneva) in 1954. It has become the world's largest particle physics laboratory and a highly successful endeavour.

In turn, the EEC and EURATOM Treaties (see Table 1) primarily had economic objectives even if they both contained scientific aspects. In the EEC Treaty science was limited to agricultural research and one had to wait until the 1970s to see any move beyond this limit.

The EURATOM Treaty stipulated a European role in the area of peaceful nuclear scientific research and technology. Unfortunately conflicting national interest didn't allow EURATOM to develop to its full potential. What should have been an ambitious joint technological project ended up as a loose network of national nuclear laboratories.

However, the EURATOM Treaty provided the legal instrument and basis to establish the so-called "Join Research Centre" (JRC). Initially, four European JRC centres were established in four countries[5].

The agreement to carry out joint research on thermonuclear fusion was yet another constructive development. The work was carried out in national laboratories in association with EURATOM and has led to major international projects such as JET and ITER[6].

Research activities and the related fund allocation were also structured in multi-annual JRC programmes. However, by mid-1960s, budgetary restrictions and political disagreement at the highest level cast the JRC into the middle of a serious crisis[7].

After some years, interest for European level research was rekindled. The JRC, that had weathered the storm, restructured and diversified its activities. The political leadership accepted that the JRC could be involved in non-nuclear research and therefore decisively influenced the following developments.

In 1971 a new form of European research co-operation was initiated. An intergovernmental scheme was agreed that would also include countries not belonging to the European Communities. The resulting "Scientific and Technical Co-operation" (COST) initiative was a scientifically entirely self-sufficient network. The permanent COST Committee was composed of senior officials from the countries that volunteered to participate in this initiative[8].

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[5] Two of these establishments made use of existing national-owned facilities (JRC Ispra in Italy, and High Flux Reactor in Petten, the Netherlands); the two others were built from scratch (Institute for Transuranium Elements in Karlsruhe, Germany, and Central Bureau for Nuclear Measurements in Geel, Belgium). Today, the JRC is organised in seven institutes: Institute for Reference Materials and Measurements, Institute for Transuranium Elements, Institute for Energy, Institute for the Protection and Security of the Citizen, Institute for Environment and Sustainability, Institute for Health and Consumer Protection, and Institute for Prospective Technological Studies. In addition to the above-mentioned locations in four countries, the Institute for Prospective Technological Studies is located in Seville, Spain and the JRC Headquarters is located in Brussels, Belgium.

[6] JET—Joint European Torus, the world's largest nuclear fusion research experiment, and ITER—International Tokamak Experimental Reactor, an international experimental fusion reactor.

[7] Discussion of this crisis goes beyond the objective of this paper.

[8] COST is one of the longest-running instruments supporting co-operation among scientists and researchers across Europe. Started with 15 members, COST has by now 35 member countries and enables scientists to collaborate in a wide spectrum of activities in research and technology.

By the mid-1970s it had become evident that there was a need to reorganize the European Communities' fragmented research efforts. The main triggers were internal pressures (the economic downturn) and external crisis (notably the oil-price shock).

The European Commission responded appropriately. It placed individual research projects in larger frame, identified areas for future research[9]and agreed on the categories[10] of research activities.

In the early 1980s a concerted effort was made to combine the so far disparate research projects in a single overall programme, called the "RTD Framework Programme" (see Chapter 4).

The concept became a success and in January 2007 the 7th multi-annual RTD Framework Programmes was successfully launched [Council of the European Union, 2006].

In 1985, responding to the US Strategic Defense Initiative[11], a pan-European network (i.e. beyond the framework of the European Communities) for market-oriented industrial R&D was created. Called EUREKA, its aim was to enhance Europe's competitiveness through supporting businesses, research centres and universities to work together in joint transnational projects. The scheme became a European success story. And from its modest beginnings of 10 projects, it today comprises some 250 projects of various sizes and in different areas. Besides the European Commission, 37 countries participate in EUREKA.

In 2000, EU leaders decided to create the European Research Area (ERA). This means creating a unified area across Europe that: "*(i) enables researchers to move freely and work with excellent networks and infrastructures; and (ii) helps to optimise and open European, national and regional research programmes for best research*". This open research environment should help to use knowledge more effectively for social, economic and policy purposes. In addition, strong links should be developed with partners around the world. In this way, "*Europe benefits from the worldwide progress of knowledge, contributes to global development and takes a leading role in international initiatives to solve global issues*".

Broadly speaking, the intellectual forming of the European research happened in three stages:

1. the suggestion of the "European Science Area" concept by Rolf Dahrendorf in 1973. Regretfully, for a long time this remained a "paper project";
2. the introduction of the multi-annual RTD Framework Programmes by Etienne Davignon during the early 1980s. Since then, it has developed to the main financing tool for EU research; and
3. the formulation of the "European Research Area, ERA" concept by Philippe Busquin in 2000 [European Commission, 2000]. Since then, ERA has provided the conceptual basis for EU research.

Interestingly, not many policy analysts pay attention to the causal relationship between stages 1 and 3 above.

The three above-mentioned individuals have all been European Commissioners responsible for research at the European Commission. So far, they have left the most visible intellectual fingerprints on EU's research.

For the sake of historical correctness, reference should be made to two other Commissioners: Antonio Ruberti, who certainly belonged to the class of political visionaries. Regretfully his mandate expired after only two years. Another creative European thinker was Philippo Mario

[9] They included: energy, raw materials, environment, living and working conditions, and services and infrastructure.

[10] These were: i) direct action: research carried out by JRC; ii) indirect action: research contracted to researchers / research groups in Member States; and iii) concerted action: the European Commission ensures co-ordination of research carried out in Member States.

[11] Strategic Defense Initiative, SDI (also called "star wars" initiative) was proposed by U.S. President Ronald Reagan in 1983. Though it was never fully developed or deployed, it provided additional support to R&D in the US.

Pandolfi, who recognised the importance of EC–US co-operation in the area of science and technology and intensively promoted and further developed the related high-level dialogue.

The initiatives of the current Research Commissioner, Jan Potocnik, are promising. He attaches great importance to introducing the "Fifth Freedom" in Europe, i.e.: the free movement of knowledge (in addition to free movement of goods, services, capital and people (labour)—that were laid down in the EEC Treaty). His aspiration is to use the potential of European research fully "*by getting people, facilities and knowledge together from across the EU and beyond*". In May 2007, and on his proposal, the European Commission launched a broad institutional and public debate on what should be done to create a unified and attractive ERA—in other words: how to take another step forward with the ERA concept. The ERA should thereby better fulfil the needs and expectations of the scientific community as well as business and citizens.

All in all, European research has experienced its ups and downs. Due to budgetary constrains and political short-sightedness, research in Europe is still not optimal—it is under-funded and far from coherent. But there is light at the horizon. The ERA concept and the RTD Framework Programmes have become recognised political and scientific trajectories and driving forces for research in Europe. Nevertheless, we must keep in mind that funds allocated to EU funded research are limited to about 5% of the overall public and private research effort[12] in Europe.

In the opinion of the authors of this article, the most useful long-term effect of the EU research policy and related financing of joint projects is network building among scientists and scientific infrastructures. Be they between individual researchers or research groups across national borders or even beyond the borders of the EU..

From a broader perspective and beyond issues relating SOLELY to competitiveness and research, the aforementioned development has had additional important beneficial side effects in promoting the "European concept" of peaceful co-existence and democratic political stability in Europe. The most recent example being the Balkan region where scientific networking promotes peaceful, direct and non-political dialogue. Both across borders of newly created countries or between factions that may have been enemies in the recent past. Optimally, together with rising living standards, this development has the potential to contribute to regional stabilisation and these countries progressive and eventual full integration into the EU.

3. Interaction with European Union Regional Development Policy

Besides chronic under-funding, there is another challenge for research in Europe that gives justified reason for concern. Currently, Member States' research activities (public as well as private) are concentrated in a limited number of geographic regions. According to recent statistics, half of all European research funding goes to only 30 of the 254 EU regions. Even worse, disparities between regions when looking at private research spending are even larger.

Expert analysis and advice stress that in order to optimally use Europe's research potential, it is necessary to develop and make full use of the existing not-yet-realised potential, particularly in outlying regions remote from the geographic core of research. "*The challenge facing the Union is to unlock regional potential wherever it might be located and to harness this to support economic growth and the creation of employment. In order to achieve the Lisbon objectives, European policies should be focused on supporting all regions to achieve their potential for research and innovation*" [EURAB, 2005]. Moreover, "*Structural Funds can intervene in a wide*

[12] In addition to the EU-level research, there are other co-operative research initiatives in Europe. Examples can be found under http://ec.europa.eu/sinapse/sinapse/index.cfm.

spectrum of investments in relation to R&D" [EURAB, 2004]. Another recommendation went even further:"*...This would be particularly important for the new EU Member States, and especially for the States in the stage of pre-accession*" [CEEN, 2004].

Evidently, it has been recognised that the Regional Development Policy of the EU and the related Structural Funds have substantial potential to help the regions of the EU in building and developing their research and innovation capacities.

The cardinal question is how to combine the following two processes optimally: to promote excellence through the RTD Framework Programmes and, simultaneously, regional development or rejuvenation through the EU Structural Funds.

The former has commonly agreed objectives, implemented by research groups from several countries, and managed centrally from the European Commission.

The latter is focusing on national priorities and managed on a case-by-case basis by the Member States. HERE, distribution of funds often results in "pork barrelling" inside Member States, where national, regional even local priorities prevail, rather that European ones.

Understandably it is a tricky task for the Member States in general and the European Commission in particular, to ensure complementarities between EU science- and regional policies. At the official level both parties pay attention to optimally combine these policies. In reality, in spite of apparent good will, the two policies are largely operating in different "worlds" for different customers.

An independent body with simultaneous advisory function for both policies might be a helpful instrument to improve this situation.

The EU must demonstrate its readiness to support the setting-up of large-scale scientific installations in less developed regions through the EU Structural Funds. Such regions must include the new Member States.

This would be a good long-term socio-economic investment for the EU regardless of the return on investment measurement criteria.

4. European Union RTD Framework Programme

Until the early 1980s, political leaders rarely treated European research kindly. Research programmes were often adopted as part of a compromise solution in conjunction with larger budgetary programmes that had greater and more immediate political visibility, e.g. the agricultural budget. This followed the usual "pork-barrelling" course.

It was not until the pragmatic approach and political vision of European Research Commissioner Etienne Davignon (Belgian, in office 1981–1984) that the previous programme-by-programme (so called "salami-slice") approach was left behind. During the early 1980s Davignon provided strong leadership with the aim to formulate an all-inclusive multi-annual framework for European research.

The process was difficult and met with opposition from both inside and outside the European Commission. The latter included the scientific community, many of whose members were afraid to have their relative influence diminished. The former defended their relative independence and "small kingdoms" spread across the Commission's different Directorate Generals.

Loyal, diplomatic and above all determined support by Professor Paolo Fasella, Director General for research at the Commission (Italian, in office 1981–1995) together with a small team[13] behind him, helped to ensure the initial success of Davignon's political and intellectual

[13] Gilbert Fayl, one of the authors of this article, was a member of this core team.

endeavour. After a long and difficult high-level political battle, the first Research and Technological Development (RTD) Framework Programme was eventually approved in 1984. It was considered a considerable success that opened the way for enhanced research co-operation in Europe.

However, due to internal Commission opposition, Davignon didn't succeed in fully integrating all research activities within a single framework or under the authority of a single Directorate General.

No doubt, however, that during their subsequent evolution the EU research activities have been progressively rationally structured.

To date, six successive RTD Framework Programmes (FPs) have followed the first one (see Table 2). Each of them was guided through the complex process of political adoption by six successive Research Commissioners: Karl-Heinz Narjes (German, in office 1985–1989), Philippo Mario Pandolfi (Italian, 1989–1992), Antonio Ruberti (Italian, 1993–1994), Edith Creson (French, 1994–1999), Philippe Busquin (Belgian, 1999–2004) and currently Jan Potocnik (Slovenian, 2004–2009).

The FPs have become the main financial- and planning tool to implement EU research programmes and now also the ERA concept.

In general, the following main criteria guide the formulation of EU FPs:

1. Subsidiarity principle—this defines the relation between EU activities and those of its member states. Accordingly, actions are carried out at EU level only when there is a clearly identified advantage in doing so[14].
2. Pre-competitiveness—this means that the EU supports basic research, practical applications, general development and demonstration, but not product development, industrial production and commercialisation.
3. Pre-normative research—this is research aimed at providing scientific knowledge and technical know-how on which regulations, norms and standards can be based.

To be successful with a research proposal, three issues must be clearly explained in the application: i) the scientific excellence that is the sine-qua-non; ii) the expected impact, above all the value added; and iii) the quality of management.

Today, the EU supports larger co-operative projects first of all. An average EU research project includes ten participants from seven different countries.

Through the years, the EU FPs have undergone major developments. Most importantly the budget has been increased significantly (Table 2).

Other major developments can be highlighted as follows:

The content and focus of successive FPs have responded to current European political priorities. At the same time, the rules of application and participation have become considerably less cumbersome and more manageable. The first development took place due to increased political recognition of scientific research's societal value; the latter followed expert advice and pressure from the scientific community.

Environmental research, life sciences and technologies, and development of human resources through postdoctoral training in networks of centres of excellence have seen a considerable increase in funding. Information- and communication technologies have been strengthened. Here, Member States have readjusted their national programs in favour of EU actions. In controlled thermonuclear fusion, the EU programme basically comprises all activities carried out in the Member States. On the other hand, nuclear energy research has decreased from its previous dominant position. But renewable energy research is now a priority.

[14] To this end, the then German Research Minister Heinz Riesenhuber suggested a set of criteria (1983), since called the "Riesenhuber criteria".

Table 2.

The European RTD Framework Programmes.

Framework Programme No	Budget	Duration
FP1	3 750 (a)	1984–1987
FP2	5 396 (a)	1987–1991
FP3	6 600 (a)	1990–1994
FP4	13 200 (a)	1994–1998
FP5	14 960 (b)	1998–2002
FP6	17 500 (b)	2002–2006
FP7(c)	53 272 (b)	2007–2013

(a) Millions of European Currency Unit, ECU
(b) Millions of Euro, €. The artificial ECU was conceived in 1979 and in 1999 replaced by the real money Euro in ratio 1 to 1.
(c) Ref. [Council of the European Union, 2006].

New initiatives have been started, such as promotion of innovation and encouragement of SMEs participation in European research programmes. International co-operation has also gained more focus and budget support.

The most recent development is the Commission's aspiration to move away from direct research management and increasingly concentrate on policy- and legislative related tasks. To this end, in connection the current FP7, two major novelties have been introduced. These were in the areas of:

1. Scope of research: going beyond the afore-mentioned strict subsidiarity principle. That is to support excellence in basic research through a new support scheme to individual teams. The teams propose subject of their own choice that are not limited to pre-determined research areas.
2. Implementation of research: going beyond direct management of funding by the European Commission. Thus, two executive agencies have been set up. Under the Commission control, the European Research Council Executive Agency will manage basic research effort (see also footnote 23), and the Research Executive Agency will manage researchers' mobility and certain administrative and logistic aspects. Other novelties are the Joint Technology Initiatives that brings the Commission and the private sector together, and Risk-Sharing Finance facility that improves access to European Investment Bank's dept finance for participants in large European research actions.

In parallel with the above development, improved rules have reduced –albeit not eliminated– the previous heavy bureaucracy and made it more attractive to participate in EU research programmes.

Furthermore, more attention has been given to ensuring coherence and synergy among all innovation and competitiveness related EU actions. To this end, concurrently with the current FP7 (see Table 2), a separate "Competitiveness and Innovation Framework Programme (CIP)" has been established with a budget of €3.62 billion for the period 2007–2013.

In addition to the above, the EU Structural Funds spend considerable sums of money to support research infrastructures and networks, innovative business start-ups and the modernisation of SMEs. Between 2000 and 2006, some €13 billion—around 6% of the Structural Funds—have been spent on these areas. According to the Financial Perspective, this amount will gradually increase from 2007 onwards, as the EU's regional development policy will more and more focus on knowledge, research and innovation. It has been proposed to earmark 60% of the Structural

Funds for actions contributing to the Lisbon objectives. A significant part should be devoted to R&D and innovation.

As discussed in Chapter 3, there is no clear-cut mechanism to ensure complementarities between EU research- and regional development policies. Moreover, a large part of the sums above have been spent on "ribbon cutting" projects.

All in all, it is promising to see that current EU funds allocated to PF7, CIP and Structural Funds are significant.

Nevertheless, there remains a serious mismatch between available resources and request for EU funds. Demand from individual researchers, research institutes, universities and industry for participation in EU research programs considerably exceeds resources. While the rate of acceptance of good to very good project proposals ranges from 30 to 50 percent in most national programmes, it is only 10 to 20 percent in EU programmes.

Although the budget has increased from FP6 to the current FP7 by some 40% in real terms, all available evidence suggest that the financial means allocated to EU research are inadequate.

The prospects could certainly have been better. Of the overall EU budget of some €862 billion[15] for the period 2007–2013, only €53 billions have been earmarked for research. This corresponds to an average of €7.5 billion annually. Against this figure, the overall annual research spending of the EU Member States is about €190 billion.

By comparison, the current annual research budget of a single US federal agency, National Institute of Health, is in the order of €23 billion (US$ 28 billion). The overall annual figure of the US is about €250 billion and that of Japan is about €120 billion.

Expressed in percentage of GDP, the current overall figures are around 2 in the EU[16] (Member States plus joint EU research), against around 2.6 and 3.1 in the US and Japan, respectively

It is evident that more funds are needed for research in Europe in order to compete internationally.

Both in real and absolute terms, the funds allocated to EU-level research initiatives are insufficient to match the EU's ambitious global objectives. To make matters worse, the EU is currently lagging behind its global competitors economically. The competitiveness gap is widening or at best relatively stable. Among the EU countries, economic divergence is growing. Rich Member States are getting richer compared to the average and the poor are getting poorer.

The EU's efforts to achieve economic and social convergence are in question, as is the European social model. It is, therefore, not easy to understand the Member States' "lukewarm" position to open their moneybox for EU research.

In spite of the relatively limited funds, Member States are ready to assign to joint EU projects, EU research has clear value-added and produces useful results for European taxpayers. By now, it is generally accepted that such joint research is useful in order: "*(i) to pool dispersed resources (i.e. assembling critical mass, enabling "big science", leveraging private investment); (ii) to integrate research (i.e. addressing pan-European challenges, coordinating national and regional policies, conducting comparative research at EU level, disseminating research more widely); (iii) to promote excellence in research (i.e. supporting researchers' carriers and mobility, creating world class centres of excellence, promoting competition to increase excellence and creativity); and (iv) countering market failure and addressing specific needs*".

With regards to the future direction of EU research, Research Commissioner Potocnik recently stated: "*The Commission is currently a funding institution for research and innovation*

[15] This figure corresponds to about 1 percent of member states' overall GDP.

[16] Within the EU, national research efforts are very uneven, with the Scandinavian countries on top and some of the recently joined Member States at the bottom. The discrepancy is more than a factor 10.

projects. We want to change this so that we can concentrate more on policies and become like an EU research ministry, a true policymaker for the European Research Area". The FP7 and the Executive Agencies are move in this direction.

Clearly, we have reached the fourth stage of intellectual forming of EU research (the first three stages presented in Chapter 2).

5. Political Vision for the European Union

In 2000, during the EU Summit in Lisbon, European political leaders adopted an ambitious ten-year programme to revitalise growth and sustainable development across the EU. Against the background of sluggish economic growth, in this initiative the EU "*set itself a new strategic goal for the next decade: to become the most competitive and dynamic knowledge-based economy in the world*". (The initiative is also known as the "Lisbon Strategy" or "Lisbon Agenda" or "Lisbon Goals".)

Following on the Lisbon Strategy, in 2002 the EU leaders agreed "*that overall* /public and private/ *spending on R&D and innovation in the Union should be increased with the aim of approaching 3% of GDP by 2010*". In this choice the political leaders simply followed the recommendation of an expert panel[17] [Majo, 2000]. This so called "Barcelona Target" became an essential part of the ERA (European Research Area) concept and thus an element of the Lisbon Strategy.

In 2005, it became clear that the initial objectives had been far too ambitious. Over the first five years little progress had been made. A high-level committee recommended re-focusing the Lisbon Strategy on growth and employment[18].

Any discerning policy analyst must raise questions concerning the political soundness and validity of both the Lisbon Strategy and the Barcelona Target at the time of formulation.

Could the Lisbon Strategy have been illusory from its very inception? Could a block of 15 states (EU Members at the time when the Strategy was agreed) within 10 years transform itself to "*the most competitive and dynamic knowledge-based economy in the world*", while at the same time taking on board another ten new states and later two more?

Could the Barcelona Target have been illusory at its formulation? Was it realistic to expect that research spending could be significantly increased while struggling with economic recovery?[19]

One might want to consider that eight of these new member states (and later two more) and their economies had suffered for more that 40 years under the repression of the former Soviet Union.

Whatever the answer may be, the Lisbon Strategy and the Barcelona Target have started a process that can only be beneficial for the entire EU and possibly beyond. By now, the process has become more important than the initial objectives.

[17] The figure of 3% did not originated from any scientific consideration—it was simply a pragmatic recommendation by an expert panel: "*The Panel is convinced that the percentage of GDP spent in the EU on public and private RTD should rise to at least 3% over the next ten years. Higher levels will be necessary without parallel efforts to avoid duplication of effort across the EU. Private sector RTD expenditure will need to be stimulated if Europe is to keep pace with its competitors. The Panel recommends the use of indirect measures such as RTD tax incentives across the EU in order to flag to the rest of the world that Europe is an attractive place to conduct RTD.*" [Majo, 2000]

[18] The committee also underlined the need for real ownership by the Member States of the reforms. Resulting from this, most Member States have became more actively involved in the realisation of the "revised" Lisbon Agenda.

[19] Political leaders are rarely making such courageous decision. Esko Aho, former Finnish Prime Minister (1991–1995) was a rare exception. While introducing stringent economic discipline and reduced spending across many areas, his government allocated more funds for research and education. Finland overcame a deep economic recession and today among the best performing countries in the world.

This must be acknowledged.

Resulting from the re-focused Lisbon Strategy and the persistent reference at the highest level to the Barcelona Target, the needed dynamism seems to gradually being injected into the EU.

Indeed, in December 2007 the European Commission reported that the Lisbon Strategy to boost jobs and growth in the 27 Member States was finally paying off. Economic growth had increased from 1.8% in 2005 to 3% in 2006 and employment rates reached 66%—close to the Lisbon target of 70%. However, the report also states that despite the much-improved results over the past two years, EU governments will have to focus more on "*investing in people*" and "*unlocking SMEs' business potential*" in the next three years if they are to cope with the competitive challenge of globalisation. The report underlined that "*not all Member States were undertaking reforms with equal determination*".

Obviously, the EU has still a long way to go to become "*the most competitive and dynamic knowledge-based economy in the world*".

6. Inherent Misapprehension

Although the Lisbon Strategy has been re-focused, its initial objective is still around and will apparently remain in the "political arena" for some time. Some have not even realised the alteration of the objective.

It is almost as the Lisbon Strategy formulated in 2000 had become a doctrine of its own.

It has become "good Latin" to drop the buzzwords "*most competitive knowledge-based society*" at every possible opportunity. In speeches by politicians or policy related speeches by others such reference is routinely made. It is almost as if they would ask, "How are you?" Obviously, one doesn't question the meaning behind the words since everybody knows that the response is without exception just a meaningless standard phrase [Fayl, Fayl von Hentaller, 2008].

In relation to EU research policy, there are two other issues that contain a similar degree of misapprehension.

One is the strong belief that increased R&D spending is a guarantee for competitive success. The "magic 3%" Barcelona Target is a clear indication for this conviction.

The other is the strong desire and determination of political leaders to micro-manage public funds already prior to allocating them to research. It necessitates a reaction from policy analysts.

Each one of the three above issues contains a degree of misapprehension. The following aims to address these issues in an unbiased manner.

7. Knowledge-Based Society

There is a fundamental intellectual dilemma with the expression "knowledge-based society".

On the one hand, there is no clear definition of the concept. Consequently, there is no unambiguous criterion for when a society has reached this stage of development.

On the other hand, it must be understood that "knowledge-based" means using best current knowledge. Consequently, each preceding society has by definition contained "knowledge-based" elements. This must be acknowledged. It would be total ignorance of our ancestors' achievements to disregard or reject this essential fact. Indeed, it could be a moral dilemma to do so.

Throughout history, progress has always been based on state-of-art, i.e. best current knowledge. The first stone wheel, iron tools, steam engine, electric power, etc. have represented the then "best-knowledge". They all became stepping-stones to further progress. In this respect, progressive societies have always been knowledge-based.

There are, however, a few regretful examples of the opposite. This may be of particular interesting for some of the Asian readers of this publication. The most damaging has probably been the following: "*...the decision to ground the Chinese fleet in 1433 and destroy most official records of its existence was perhaps the single greatest blunder in all of modern history. This act, whose repercussions shaped the modern world order within which we all now live, plunged China into 600 years of decline and represents the ultimate triumph of partisan politics over common sense and the national welfare*" [H. Smith, 2006].

Today's society is progressive. Biotech, IT, nanotech, etc. represent our current best-knowledge and are being used accordingly. With their help we have been able to enter into the "21st century knowledge-based society" and will continue our journey into the future. But this is not a straightforward process. Knowledge creation will continue with an unpredictable speed and often in random directions.

Individuals who have failed in traditional educational systems sometimes profoundly influence this development. A few famous examples would be: Thomas Edison was called "addled" by his teacher. Albert Einstein failed the examination that would have allowed him to study electrical engineering at the "Eidgenössische Technische Hochschule" in Zurich. Bill Gates is a university dropout. Ingvar Kamprad (IKEA founder) admitted to being dyslexic.

These and others examples have demonstrated beyond any doubt that in the 21st century –also and in spite of the use of the Internet– individuals' creativity and imagination[20] are more important than simply "memorized" knowledge and "old-style" education. Creativity and imagination in connection with communication and marketing have become the key driving forces of today's progress and competitive success. In addition, the choice of appropriate co-operative partners has become a determining factor for success.

This development has led to the current situation where the competitive focus has moved from hardware to intellectual products such as copyright, patent, trademark and design. This explains the current successful performance of comparatively small Scandinavian countries—Denmark, Finland and Sweden [Dessewffy, 2006].

The above considerations suggest moving away from the overused expression "knowledge-based society". The authors of this article agree with the suggestion that it is more appropriate to refer to the current situation as "creativity-based society" [Howkins, 2001]. One would be well advised to expect that this situation will continue to evolve for the foreseeable future. In other words, the so-called "knowledge-based society" is a stage in the process of economic- and social development when products, processes and services become richer and richer in their knowledge content.

It is expected that the wealth of creativity-based societies will increasingly come from maximising knowledge content in products, processes and services. *Stricto sensu*, "knowledge-based society" will remain a moving target, and consequently remain a challenge for both present and future societies as well.

Therefore, excellent educational establishments able to produce uniquely qualified individuals, while promoting the true spirit of creativity and imaginativeness, are more important than ever before.

[20] Regretfully, these attributes are not sufficiently encouraged in European educational systems.

8. R&D Spending

Let's address the second potential misapprehension.

One has to accept that there is no straightforward causal relationship between R&D spending and economic success. So far, no single approach has been universally recognized as the most effective strategy.

It is a persistent myth that simply spending more on R&D will result in enhanced economic performance and improved competitiveness. Paradoxically, spending too little will definitely harm [Jaruzelski, 2005].

A pre-determined percentage figure of R&D spending is only useful as an indicator, "*not as an end in itself. Given the critical role of growth in business R&D, the market approach is the main driver ...*" [Aho, 2006]. According to the "Majo expert panel" recommendation, the 3% of GDP target should be achieved with the help of simultaneous contributions by public- and private spending, the latter primarily by industry. The recommended rational figures are 1% and 2%, respectively.

One commits a fundamental flaw when interpreting this recommendation in a simplistic way. A country's R&D-need is influenced by its technology- and industrial specialisation and other societal- and economic factors. To illustrate: a country specialised in services (finance, tourism, etc) is expected to have a lower R&D intensity than countries focusing on IT, biotechnologies, etc. [van Pottelsberghe, 2008].

Generally, in Europe private R&D spending is of particular concern as it is stagnating. In contrast, EU companies' investments are continually on the increase in the US.

One may surmise that, with regards to R&D spending, the EU as a whole is lagging behind the US and Japan, while China is well on the way to catch up with the EU.

The wise "decoding" of the pre-determined 3% budget figure can be of use in order to guide policy-making at both national and EU level. It helps to draw attention to the need for adequate research funding and may even trigger political discussion at the highest level on related fund allocation. That is how the EU's 3% "Barcelona Target" should be interpreted.

R&D spending must be seen in the right context. It has been repeatedly demonstrated that it is the overall research and innovation effort that may lead to competitive advantage. Therefore, in addition to adequate public and private funds and their efficient use, such efforts must fulfil a number of additional conditions. Notably, they must include excellent scientists, well developed S&T infrastructure, appropriate supporting measures for scientists and their intellectual output, established links with industry, etc. They must further be able to recognise opportunities and need for innovation in time.

A system with the above features will have high innovation potential. It will be able to introduce and efficiently use current and/or new solutions in a timely manner to improve the performance of an organisation, process or commercial offering (product or service). This will lead to competitive advantage.

Innovation happens in a complex environment. Firstly, the need of industry, public administrations (central, regional, local) and civil society actors and individual members generate the pull for innovation. Secondly, the offerings of **h**igher **e**ducation **e**stablishments and research institutions (achievements of scientific and technological conquest) provide the push for innovation. Thirdly, the demand for new and innovative products and services comes first of all from individual customers. The customer has far too often been forgotten in the innovation policy debate.

Taking all factors into account, larger economies may be able to afford to spend a smaller proportion of their budget on R&D than smaller economies.

Comparative small Scandinavian countries are often mentioned as best-practice examples, where high R&D spending has led to top positions in international competitiveness rankings. In isolation however, this is a simplistic statement. It disregards the fact that funds are not solely responsible for competitiveness achievements. These countries have traditionally always had excellent higher education systems, well developed infrastructures, etc.

Nevertheless, from a tactical point of view of the scientific community the "3 % approach" is helpful. Through easily understandable examples, it is possible to exercise pressure on political leaders for more funds. But not developing the other critical factors in parallel –even worse, disregarding them– will certainly be counterproductive in the longer term.

Simply to claim that a country with high R&D spending will become more competitive than another with lower spending (both expressed in percentage of their GDP) is far fetched. Equally pointless is any exercise that looks at "divergence from the 3% Barcelona Target" in isolation. The authors of this article caution against such a simplistic "linear" approach[21]. Yet, simple economic indicators fascinate many policy analysts[22].

In the EU, only the largest economies –such as Germany, France and the UK– can afford to support expensive research on their own. Smaller economies would not be able to individually mobilize the necessary resources and critical mass to compete with the big European ones even less with the US, Japan or China.

Individually, smaller economies can be successful in selected targeted areas.

As a consequence, joint European R&D initiatives (such as EU RTD Framework Programmes, COST (see footnote 8), European Science Foundation projects, etc.) are relatively more important for small economies than big ones. Nevertheless, all EU Member States –both large and small ones– doubtlessly profit from joint European initiatives. Disappointingly, funds allocated to these initiatives are comparatively small.

The EU's Barcelona Target of 3% of GDP spending on R&D must be seen in the context of the above. It is necessary but insufficient on its own. It should not be considered an absolute objective in its own right—neither as a magic solution for raising competitiveness.

One must keep in mind that the figure of 3% has no scientific foundation. It is a pragmatic estimation (with other words, "qualified guesstimate") by an expert group [Majo, 2000]. Admittedly, it has achieved its aim and succeeded in mobilising attention on R&D funding. Indeed, the progress towards the 3 % target from a lower figure can be considered as an expression for the ability and readiness to modernise the national science policy in question.

9. Political Guidance

It is naturally also necessary to address the third issue that may give raise to misapprehension in connection with the European research policy, i.e. the some time micro-management of research funding by political leaders. This is certainly a highly controversial issue between scientists and political leaders.

Rationally, the essential principles of conducting high-quality research with public funds are straightforward: (i) find the best qualified researchers; (ii) provide them with adequate funds;

[21] A high-level expert group has recently formulated a set of authorative recommendations that needs to be followed in order to enhance Europe's innovation capacity [Aho, 2006].

[22] A more comprehensive novel approach is currently under development in a joint effort by the OECD and other international bodies. The aim is to measure how societies are changing in areas that affect citizens' quality of life. It goes beyond conventional economic indicators such as employment, productivity, purchasing power, etc., and look at such factors as education, health and the environment [OECD, 2007].

and (iii) let them do what they think represent the best use of their intelligence and time, while respecting fundamental ethical principles [Bush, 1945, and Bromley, 1994].

Underlying this approach is the concept of societal investment rather than political procurement. In an ideal world, this approach may best serve the long-term interest of society. Unfortunately, in the real world the process is complex rather than straightforward.

Obtaining public funds for research happens in a "battle-field". The two main actors enter with different presumptions and objectives.

On the one hand, researchers possess a certain degree of "political naivety". They are ready to ignore constraints that are dictated by political realities, such as limited public funds. In turn, politicians often demonstrate "scientific ignorance" due to their inadequate scientific background. In addition, politicians operate with a different time horizon—the date of their mandate's expiration hangs above their heads like a Damocles sword.

Only even-handed negotiation between researchers and decision makers can ensure best use of taxpayers' money. To this end, both sides must make an effort to better understand and respect the other's manoeuvring options. Moreover, in order to generate "science for society", relevant civil society actors must become equal partners.

It is particularly important that political leaders will take a view of longer time horizons. They must also understand that it is not possible to force human creativity into a straitjacket. Their desire to only invest public money in "safe projects" is false. Much worse, in the long-term it is dangerous and counterproductive for society. Europe's main competitor, the US has undeniably demonstrated that putting money into new, risky projects—based perhaps only on hypothetical ideas — will in the long-run be profitable economically as well as being good for society.

In Europe, the 7^{th} EU RTD Framework Programme and the newly created European Research Council[23] are certainly steps in the right direction.

Another significant positive development is that, in order to better meet the challenges of globalisation, EU Member States have decided to establish a European Institute of Innovation and Technology (EIT). Its role is to "*stimulate* European innovation and help turn innovative idea", thus "contributing to the targets of the Lisbon strategy for the creation of growth and jobs". EIT's activities are to be based on excellence-driven networks of higher education institutions, research organisations and businesses, coordinated by a governing board whose members are selected on the basis of strict criteria. Its headquarters were decided to be in Budapest, Hungary [Council of the European Union, 2008].

In spite of all the laudable development, the current EU research effort is still insufficient. In the opinion of many policy analysts, considerably more funds are needed in Europe to support high-risk research. Unless this happens, the best European scientists will continue to look for more optimal research conditions outside Europe. So far, they are looking first of all at the USA but soon it may be Asia, including China—the "rising star".

As a constructive warning to our political leaders: they must understand that major scientific conquest often results from trial-and-failure approaches. Failure must be accepted as an unavoidable "ingredient" of research [Andersson, 2007].

In dealing with public money, political guidance is helpful. But there must be room for failure. Excellent scientists should be encouraged to conduct risky projects. A positive side-effect may even be more European Nobel Laureates.

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[23] Established early 2006, the European Research Council is the first pan-European funding body to support investigator-driven frontier research. Its aim is to stimulate scientific excellence. Scientists should go beyond established frontiers of knowledge and boundaries of discipline. It complements other funding schemes in Europe. The founding is from the 7^{th} EU RTD Framework Programme.

In conclusion, recent improvements in the area of EU research are promising and appreciated by the scientific community. But there is room for improvement.

10. Understanding the Meaning behind Words

As every other policy of the EU, its research policy has been developed –and is still developing– in a highly complex political environment. It results from lengthy and often difficult negotiations, including at the highest political level.

There are a multitude of interacting forces involving a variety of personalities and institutions from many countries, and not least political leaders. They range from civil service and bureaucratic levels through policy-making right up to the highest political decision-making. Furthermore, there are pressures dictated by interest groups, be they local, national or beyond, that could outweigh arguments, supported by scientific advice. Well-prepared proposals for political decisions may be fully or partly altered due to last minute "pork-barrelling" by political leaders.

Understandably, EU research policy may therefore not most optimally serve the interest of each and every researchers and research group in the Member States. But it is the best compromise that can be achieved at a given time at EU-level. As such, its aspiration is to serve the general interest of the European scientific community and society as a whole.

The same can be said about the related EU RTD Framework Programmes. They represent the optimal achievable solutions at the time of their approval by political leaders. They are formulated and decided on in a complex and evolving political environment where the global ambitions of the EU are not at a standstill.

There have been ups and downs, many compromises, and difficult negotiations. Individual national interests have collided with each other and with EU interests.

In this environment the parties have developed their own "lingua Franca" with specific wordings and meaning behind.

Insiders understand it.

Outsiders may find it less obvious and easily decodable.

This paper has hopefully helped to shed some light on certain issues that contain a degree of misapprehension.

11. Quo Vadis?

Concrete steps must now follow good intention. The EU must demonstrate its readiness to support the setting-up of large-scale scientific installations in less developed regions through the EU Structural Funds. Such regions must include the new Member States.

This would represent good long-term socio-economic sense for the EU.

Keywords

EU Research Policy, EU Regional Development Policy, EU RTD Framework Programme, Lisbon Strategy, Inherent misapprehension.

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THE NEW ERA OF KNOWLEDGE CIVILIZATION AND ITS EPISTEME

Abstract

This chapter discusses the concept of the new era of knowledge civilization and its vision, as well as the *conceptual platform* and the *episteme* of the new era. We start with the notions of *conceptual platform*, meaning the set of fundamental concepts essential for understanding the worldin the new era, and the *episteme*, meaning the way of constructing knowledge characteristic for a given era. Then we turn to current perceptions about the nature of the new era and address the issue of a new futurology, of the need of understanding future. We propose then a *vision* of the new era: *what problems of humanity should we solve (and how we could solve them)* using diverse aspects and tools of the new era. We then discuss *the main megatrends of the new era*, the impact of digital and network technologies, changes in economic behaviour and in economics, changes in social behavior and in sociology, *the main predictable conflicts of the coming era*, the main stages of the coming era and *our essential obligations*. We finish by discussing the divergent episteme of three distinct cultural spheres: that of social sciences and humanities, that of hard and natural sciences and that of technology, at the end of the era of industrial civilization; we present also an outline of a possible *episteme* of the new era that might have yet to take some time to be fully established.

Keywords: information society, informational revolution, new futurology, megatrends, future episteme

1. Introduction

This chapter is devoted to a vision of the starting era of *knowledge civilization*, together with related concepts, megatrends, predictable conflicts, the conceptual platform and the episteme of the new era. It is a new, combined and extended version of the papers presented by the same authors at the 1st World Congress of International Federation of Systems Research (IFSR) in Kobe, see (Kameoka and Wierzbicki 2005), (Wierzbicki 2005), (Nakamori and Wierzbicki 2005).

The new era was known also under many other names *postindustrial, information, post-capitalist, informational, networked etc. society.* However, it is important to realise that this is a civilization era, a long duration historical structure. Thus, it is necessary to outline a vision of this era, together with an analysis of the chances of solving humanity's current problems, as well

as with a discussion of the diverse dangers and threats resulting from the main megatrends of this era. In such a perspective, we think that the name *knowledge civilization* is more appropriate.

The literature on the subject of the *information society* and the current *informational revolution* is extensive. (Mattelart 2001) quotes over 270 publications on this subject, and this excludes the more technical ones, see, e.g., (Kameoka 1988, 1998), (Kameoka et al. 2004, 2005) (Wierzbicki 1988, 2000) etc. In this extensive literature, there are diverse views and prognoses, and a universally accepted core.

We are living in times of an *informational revolution* and this revolution leads to a new civilization era, in which knowledge plays an even more important role than just information, thus we might call the new epoch the *knowledge civilization era.*

Most other aspects of this development are uncertain and have diverse interpretations. Moreover, as Mattelart observes, much of what was published on this subject is related either to political hype, or to unfounded optimism that new technology and markets will automatically solve all old problems. An *informed and objective vision* of the new era of knowledge civilization is needed. Because this new civilization has the property of *globalization*, such an informed vision is needed for all our world, while most people are uncertain, distrustful, divided politically and by no means ready to accept political hype. In developing countries, people are also suspicious of what they see as attempts to intensify the existing domination of developed countries. They deserve, however, to know both risks and opportunities that will come with reasonable certainty as the result of the developments of knowledge civilization, to understand the dangers of these developments and how those dangers could be counteracted, how to best use the related chances and opportunities.

Such an understanding is related to several fundamental issues and concepts. First is the issue of a new understanding of futurology: not as a prediction of future, but as deliberation about future that deepens such an understanding. Related are the concepts of a conceptual platform of the new era, its main megatrends, its vision, resulting challenges, dangers and opportunities. Between these challenges and megatrends, the most important might be the megatrend of intellectual challenges of changing perception of the world due to the new era.

This intellectual challenge concerns also the episteme of the new era. The concept of an episteme was introduced by Michel Foucalt (Foucault 1972) and denotes the way of constructing knowledge characteristic for a given society and historical epoch. While Foucault analyses episteme ex post as a historical phenomenon, once he introduced this concept, we have also the right to use it and analyse its contemporary and future meaning and aspects. As pointed out in (Wierzbicki 2005), the episteme of industrial civilization was essentially challenged in the second half of 20^{th} century. Starting with the middle of that century, three different cultural spheres developed divergent episteme: that of hard and natural sciences, of technology, and of social sciences and humanities; the latter lead in its parts to extreme epistemic positions.

We are aware of the post-modernist and radical constructivist trends in sociology and philosophy that deny the importance and possibility of *objective* judgements. In technology, while we agree—for different reasons that we shall discuss in detail later—that there can be no *absolute objectivity* and we learned to *construct new reality, to create big technological systems*, nevertheless we do not proceed arbitrarily,we also have learned to greatly value *the efforts to make knowledge as objective as possible.* Without this *dedication to objectivity* as a goal, we could not develop travel technology—railways, cars, airplanes—and telecommunications—stationary telephony, television, mobile telephony (e.g., cellular technology), and the Internet.

Thus, there are big differences between the current episteme of three distinct cultural spheres— see (Wierzbicki 2005)—of technology, of hard and natural sciences, finally, of social sciences and humanities; in the last case, it is difficult even to distinguish a coherent episteme, there are rather many paradigms of knowledge creation. Almost fifty years ago, Charles Snow (Snow 1960) pointed out that there are separate *two cultures*—that of hard science and technology and that of social sciences and humanities. While Snow correctly stressed the differences, we think that the word *culture* was used by him imprecisely, a better description is *cultural sphere;* and he did not note the difference between the cultural sphere of hard sciences and that of technology, which we shall discuss in more detail later; nor did he observe that the differences concern essentially the episteme of these spheres—the concept of episteme was introduced later. In the new era of knowledge civilization, following (Foucault 1972), we should expect a slow formation of a new and unified episteme; we shall discuss this at the end of this chapter.

Coming back to the concept of objectivity, we feel that an objective vision of the new civilization era as well as of its future episteme, though it must be interdisciplinary and include some aspects of philosophy, history, sociology, economics, should be attempted by researchers whose background is outside of these disciplines. However, we limit the considerations on technology to judgements we are convinced that they are reasonably objective. We aim at applying our knowledge about management of technology, systems science and interdisciplinary rational enquiry to obtain a synthetic and as objective as possible vision of the era of knowledge civilisation. We feel that such a vision, even if constructed by technology specialists and even if it contains more properly formulated questions than answers, is nevertheless necessary in order to deal with the challenges of the coming era.

2. Conceptual Platform versus *Episteme* of New Civilization Era

An *episteme* is developed gradually after a start of a new civilization era; for example, (Foucault 1972) describes the formation of the modern episteme—that we shall call rather the episteme of industrial civilization era—in the closing years of the 18^{th} century and the beginning decades of 19^{th} century, while we date the beginning of industrial civilization at 1760 with the invention of James Watt. However, before Watt there were already many new concepts— provided by Isaak Newton, or by French encyclopedists—that prepared the new industrial era. This constitutes the opposite of the concept of episteme—so called *conceptual platform* of a new era that precedes the beginning of the era, see (Wierzbicki 1988),[1] and provides foundation for the development of a new episteme. Thus, when thinking about the future episteme of the new era of knowledge civilization, we should start with the analysis of the conceptual platform leading to informational revolution.

The history of the concept of information society can be traced to very early writings, as in (Mattelart 2001): from Bacon, Pascal, Leibnitz, Huygens, Halley, Newton, Vauban, Condorcet, Saint-Simon, and Boole. However, we prefer to start it with the history of actual construction of electronic computers, because it is valuable educationally in many respects. Since most people are fascinated by digital information processing, it is almost forgotten that the first electronic computers actually constructed and widely applied were analog computers developed by Vannevar Bush in 1931 (Bush 1931). They were originally called *differential analyzers* and were based on block diagrams of electronic dynamic systems, solving systems of differential equations, e.g., in

[1] Originally, the *conceptual platform* was called *cultural platform*, but thisname was changed upon consultations withy cultural theorists.

support of aiming battleship artillery or of design of complex control systems of industrial plants. In this type of applications, until the middle of 1960-ies they were superior (much faster though less precise) to later developed digital computers.[2]

The digital computer, although the possibility of its construction was discussed earlier, was developed marginally later: the principles formulated by A. Turing in 1936, actual construction in the USA during the Second World War, *Univac I* given to civil use in US Bureau of Statistics in 1951. The delay between the first conception of such a computer—given by Babbage in 1832—and its actual implementation would have been even longer, had it not been for the demand of military applications. Similarly, the development of telecommunications, starting first with electrical telegraphy (developed since 1837) and later stationary telephony, with analog computers as a byproduct, much later mobile telephony etc., was accelerated due to military or space applications.

These two developments—of telecommunications and of computers—did not themselves determine the coming of the new civilization era. Telecommunications was determined for a long time by classical stationary telephony; computers were giant machines that could be used only by specialized personnel who jealously guarded their privileged position. This changed radically around 1980, when two parallel developments—of computer networks and of personal computers—enabled a broad social use of digital information technology. Both developments are slightly older, but were limited before to military or space applications. Broad civil use of the Internet started with the definition of its seven ISO/OSI layers and TCP/IP protocols just around 1980, which by chance paralleled the development of the first personal computers.

We believe that the determination of historical dates defining certain historical eras—the issues of *periodization*—are mostly historical issues. Therefore, we follow here the example of Fernand Braudel (Braudel 1979) that defined the long duration preindustrial era of the beginnings of capitalism, of print and geographic discoveries, as starting in 1440 with Gutenberg, who promoted broad applications of printing press, and ending in 1760 with Watt, who made possible broad applications of steam machines; this started the next, industrial era. Neither of them were new inventions, only adaptations of older inventions that enabled, however, their broad social use. Gutenberg repeated, perhaps independently, an earlier Chinese invention, but the value of his invention was that he made it much more mechanically efficient and thus made possible broad social access to books; Watt added automatic control of rotary speed[3] to an older steam machine that was unstable and tended to explode before this improvement—thus, he made possible a broad social access to steam power. Following the example of Braudel, we select 1980—the time when information technology was made broadly socially available by the introduction of personal computers and computer networks—as the beginning date of the new era of knowledge civilization, even though computers were used earlier, just as steam machines were used before Watt and printing before Gutenberg.

However, as stressed above, the way of perceiving the world during a civilization era is formed starting with its *conceptual platform* that consists of basic concepts and ideas that are usually formed before this era; in the beginning stages of an era, this platform is the foundation of a new emergent episteme. Similarly as before Watt we had Newton and the French encyclopedists;

[2] Thus, in the beginning of 1960-ies the concepts of dynamic systems and analog computations were highly developed and broadly used in technology. The digital computers, based on essentially static and digital (quantified) computations, were at this time too slow yet for dynamic simulations. See further comments on the social science perception of the history of systemic concepts.

[3] Using in practice the concept of negative feedback before it was formulated and analyzed theoretically; in fact, Watt's invention stimulated this theoretical development. This is a very frequent phenomenon in the history of science and technology: many scientific concepts are developed on the basis of previous technological inventions, starting with the invention of a wheel and the concept of a circle.

before the Internet we had Einstein and many scientists that contributed to essentially new concepts that shaped the conceptual platform, the way of perceiving the world typical for the new civilization era. While in recent times (Mattelart 2001) pays most attention to writers popular in the media, sociologists or futurologists—(Innis 1951), (McLuhan 1964), (Bell 1973), (Masuda 1980), (Toffler and Toffler 1980), who contributed greatly to the popularization of the concept of change of cultural eras—we are more interested here in the concepts developed in 20^{th} century science and technology that contributed (or will soon contribute) to the new perception of the world.

The first of such concepts came from physics: from Albert Einstein—the concept of *relativity* of time; from Niels Bohr and his group—the concept of *quantum* theory, denying the infinite divisibility of matter and at the same time showing that the same particle can be equally well described as a corpuscle and as a wave; from Heisenberg—the *indetermination principle,* showing that the act of measuring influences the results of measurement, thus uncertainty cannot be diminished below certain value. All these concepts date from the beginning of 20^{th} century and contributed to *relativism* and *pluralism,* which had full impact on philosophy at the end of the century; they were integrated into technological and informational sciences much earlier. *Discrete time* was used, e.g.,in digital computers (based on a time quantum necessary for elementary processing of digital signals) and *probabilistic models* were applied in many technical disciplines following the example set by quantum theory in physics. Nevertheless, these physical concepts are much better known and popularized in the media than some other concepts coming from technology that also have changed our way of understanding the world. We shall therefore discuss some of these concepts developed by the technological and informational sciences in more detail.

Soon after the new concepts in physics other new concepts originated from telecommunication technology. Harry Nyquist (Nyquist 1932), Harold Black (Black 1934)[4] and others studied the concept of *feedback* – the circular impact of the time-stream of results of an action on its time-stream of causes—simply because it was technically necessary to stabilize the properties of not quite stable telecommunication devices, although this concept, in fact, had been used earlier in the invention of Watt and even before Watt, much earlier than the theory of feedback was developed. Feedback can be of two types: *positive feedback* when the results circularly support their causes, which results in a fast development, like a growing avalanche, and *negative feedback* when the results circularly counteract their causes, which results in an actually positive effect of stabilization (for example, the stabilization of human body temperature is based on negative feedback). The concept of feedback essentially changed our understanding of the cause and effect relationship, resolving paradoxes of circular arguments in logic, though it must be understood that such paradoxes can be resolved only by dynamic, not static reasoning and models.[5] This has not been fully perceived by some philosophers—perhaps because the concept of feedback and

[4] Black in a sense *invented* (or *reinvented*) feedback or its application for improving the quality of telecommunication amplifiers and patented it in diverse patents, while the date of this invention is actually known—August 2, 1927, see (Mindell 2002). But Black did not note that the concept of feedback was invented earlier and used by Watt, and he did not develop the theory of feedback systems; this was done later by Nyquist who introduced the critical distinction between *open loop* and *closed loop* systems. This is one of many examples illustrating the fact mentioned above (that new inventions in technology usually precede and stimulate the development of theory and basic science).

[5] We stress here the *dynamic* character of the concept of *feedback*: it is a circular interaction of two time-streams of events. The cause must be obviously earlier in time than its effects, and a circular impact of the effect on its cause appears temporally impossible. Thus, considered as a single, static cause and effect, feedback appears impossible. Alternatively, in static logic it is perceived as a paradox, a vicious circle: a contradiction in case of what we call negative feedback today and a self-supporting, circular thus illogical justification in case of what we call positive feedback today. The dynamic approach is to consider time-streams of causes and effects, taking their temporal dependence (delays, inertia) as given and thus resolving the paradoxes of circular reasoning. For example, most of the development of human knowledge is circular, because it consists of a positive feedback between the individual knowing subject and the intellectual heritage of humanity, with natural delays both for the analysis of the heritage and hermeneutic reflection and for the dissemination of a scientific publication.

its dynamics is not properly taught in the humanities—leading them to construct paradoxes that would not be paradoxical in a dynamic treatment.

The concept of feedback had profound implications. On one hand, around 1940 it led to the development of a separate technological science called *control engineering,* dedicated to the study of the dynamics of technical systems based on negative feedback and used to control and stabilize vehicles[6] and diverse parameters of all technological processes. Eventually, control engineering lead to the development of *robotics;* robots cannot function without feedback. On the other hand, Norbert Wiener (Wiener 1948) popularized the study of the concept of feedback in living organisms and in social organizations, calling such studies *cybernetics.*[7] Jay Forrester (Forrester 1961) borrowed from control engineering and analog computers the concepts of feedback and block-diagrams of the dynamics of technical systems and applied them under the name *industrial dynamics* (later called *systems dynamics*) in economics, management and social sciences— although, as we already stressed, the concept of systems dynamics actually stems from analog computers, thus from Vannevar Bush (Bush 1931).

On this example, it is important to note a discernible tendency—that indicates how big is the contemporary division of the episteme of different cultural spheres—in social and management science today to appropriate the systemic concepts developed by hard science and technology and to rewrite the history of their development. From management science literature on systemic approaches we learn—see (Jackson 2000), (Midgley 2003)—that it was Wiener in 1948 who "*invented*" the concept of feedback (no mention of Watt, Black, Nyquist), and it was Forrester in 1961 who "*invented*" system dynamics (no mention of analog computers and Bush). Recent literature on social networks maintains even that mathematical network theory was developed to support social network theory—while it was developed starting almost a hundred years earlier than the concept of social networks and was motivated by the needs of telecommunication networks. All such attempts suggest that a large part of social science writings does represent an anti-technological attitude— upon which we comment later in more detail.

Similar controversies are related to one of the most important consequences of the concept of feedback -the development of the *deterministic theory of chaos.* Before emerging as a distinct discipline, chaos theory was simply the study and application of the dynamics of strongly nonlinear systems with (usually negative) feedback. When studying the stability of such systems, new modes of their behaviour were noted by mathematicians and by control engineers, see (Lucertini et al. 2003). Parallel, the emerging software technology had to respond—in the early 1950-ies— to the need of simulating random numbers in computers, thus invented a pseudo-random number generator, a software device that in hindsight can be called a chaotic generator, but preceded the theory of deterministic chaos. Later, the use of computerized mathematical modelling in meteorology (Lorenz 1963) and in diverse biological and physical processes—such as crystallization or the formation of snowflakes—contributed to the realization of the fact that new types of behaviour emerging in strongly nonlinear dynamic processes with feedback are examples of *deterministic chaos with new order emerging from it,* see, e.g., (Gleick 1986). Parallel, stochastic interpretations of order emerging out of chaos[8] were giver by (Prigogine and Stengers 1984).

[6] Including aircraft and missiles, hence also the development of control engineering was strongly influenced by military applications.

[7] Control engineering has therefore sometimes been called *technical cybernetics,* but this is a misnomer, since control engineering is older and original; Wiener just used its principles for broader applications. A better name might be *control science,* because control engineering actually mixed with applied mathematics in the study of nonlinear dynamic systems. Similar comments concern the name *systems dynamics* used by Forrester: long before he adapted this theory for economic and social applications, it was much more deeply developed as a part of control engineering or control science.

[8] With a similar principle of the emergence of order, a strongly nonlinear transformation with recourse: a strongly nonlinear transformation of a probability distribution can result in amplifying the probability of selected events, thus

This can be summarized today in the *principle of emergence,* see (Wierzbicki and Nakamori 2006) and further sections of this chapter, when *new properties of a system result from its complexity, not from the properties of the elements of the system.* It should be added that hierarchical, multilayered systems theory, assuming many layers of systems with essentially different functions emergent because of systems complexity, resulted also from developments of control engineering or control science—see, e.g., (Findeisen at al. 1980). All these developments came either from mathematics (applied to meteorology, biology, etc.) or technology combined with applied mathematics, shortly—from applied mathematical modelling, by its practitioners often called *hard systems science.*[9]

The deterministic chaos theory is now very rich. Beside the principle of emergence, it describes diverse phenomena, such as *self-similarity* in *fractal geometry* – the property of certain images such that a magnification of a small part of the image is perfectly similar to the full image.A very important concept, introduced already by (Lorenz 1963), is *butterfly effect*—the *basic fact* that strongly nonlinear dynamic systems are usually very sensitive to their initial conditions, so that small causes can have very large effects, *the flip of a butterfly wings in Beijing can cause a hurricane in Florida,* see, e.g., (Gleick 1987). *Fractal geometry* contributed later to the concept of *scale-free networks,* see, e.g., (Barabashi and Bonabeau 2003), important because it describes more adequately the behaviour of the users of Internet.[10] Generally, chaos theory has had a great impact on the change in the way of perceiving the world we observe today. The *butterfly effect* contributed to the abandonment of the belief in *inevitability,* acharacteristic of industrial civilization:[11] while the industrial era saw the world as a giant clock, a machine turning with the inevitability of celestial spheres, the knowledge civilization era will see the world rather as a complex dynamic system in which anything can happen and an avalanche-type process is quite probable; thus instead of inevitability we believe in *change*. Together with the change of other concepts outlined here, we can even say that we believe in *Complexity Change.*

Another concept that contributes to the change in the way of perceiving the world originates from informational science. This is the theory of computational complexity. The theory characterizes diverse classes of computational tasks—from simple tasks like data sorting to the more difficult, such as pattern recognition or solving logistic problems—by proving how the needed computational effort depends on the amount of data processed. There are many types and specific details of this quite advanced theory, but only a general conclusion is important here: the dependence is almost always nonlinear, and strongly nonlinear (exponential or combinatorial) for most types of more difficult problems. This fact contributes to the *rational theory of fallible intuition,* see

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eventually—if repeated many times—in order. These similarities lead some philosophers to oversimplified interpretations that deterministic chaos is nothing but a way of achieving probabilistic chaos. But these two are essentially different as mathematical models. For example, an application of deterministic chaos principles instead of probabilistic models might lead to a fundamental revision of quantum theory.

[9] As distinct from a distorted perception of this interdisciplinary field, propagated by *soft systems thinking,* see, e.g., (Checkland 1982), widely different from the perception of practitioners of hard systems science— see one of last sections of this chapter.

[10] Note that mathematical models can describe the behavior of human users (even if, in principle, never fully adequately), and this fact has been used for over hundred years in telecommunications; but technologists know for a very long time that each such model is only an approximation, e.g., describes the behavior of users only more or less adequately.

[11] Many people, including scientists, are so much subconsciously accustomed to the industrial civilization vision of the world as a clock, a giant but well ordered machine with its *inevitable* movements, that they cannot accept the concept of a *butterfly effect,* consider it a *myth.* Unfortunately or fortunately, it is a *basic fact*, stressed first in scientific publications on mathematical modeling in meteorology by (Lorenz 1963), but substantiated also by other diverse studies, e.g., of the sensitivity of control system models, see (Wierzbicki 1977). Thus, it is *inevitability* that is a myth of the mechanical vision of the world of industrial age.

(Wierzbicki 1997, 2005): we can show that processing words is at least ten thousand times simpler than processing visual images, thus the invention of language was a powerful shortcut for the civilization development of humanity, but language remains only an approximate code to describe much more complex reality, and the *preverbal* capabilities of human mind, sometimes called shortly intuition, are much more powerful than the *verbal* ones. However, this fact has in fact much further reaching consequences for computational modelling and even for epistemology.

With the rapid growth of the available computing power, we could conclude that any complicated model of, say, technological systems such as a modern telecommunication network can be analyzed in a short time. This conclusion is, unfortunately, basically wrong. The exponential increase of computational complexity means that if one variant of such model can be analyzed, say, in ten minutes computer time, then by slightly increasing the complexity of the model (say, adding only one additional variable), the required computer time could easily jump to ten months. Experienced mathematical modellers know this problem well, by hard practice: they must perform many computational experiments in order to obtain variants of models that, on one hand, are not oversimplified and represent the analyzed technological problem adequately and, on the other hand, are simple enough to be computationally analyzed in reasonable time. This is not a passing problem that will vanish with improved computing technology. This is an essential problem, since any model can be further complicated, thus any computer, no matter how powerful, can be easily saturated with computational tasks.

Moreover, this problem shows the *practical limits to cognition:* why should we develop more accurate models of some parts of reality, if we would not be able to analyze these models in reasonable time? If we reflect, we see also a basic epistemological conclusion: possibly, *all our knowledge is represented by models constructed by us that are far from being perfect,* are (we quote Einstein here) *as simple as possible but not too simple,* and their accuracy is limited not only because we use imperfect tools (e.g., language) to formulate them, but also because we have imperfect tools (e.g., computers with finite processing speed) to analyze them.

Another group of essential new concepts results from the change of logic. Industrial civilization believed in the principle of the excluded middle, in *binary logic;* but *temporal, modal, multivalued—fuzzy and rough,* see (Pawlak 1991)—*logic* with diverse applications have been developed towards the end of this era. For the era of knowledge civilization, we need *logical pluralism: there is always a middle way.*

Recently, we observe also a change of knowledge creation theories. This change is in more detail discussed in (Wierzbicki and Nakamori 2006), starting with the *Shinayakana Systems Approach* (Nakamori and Sawaragi 1990) and *The Knowledge Creating Company* with *SECI Spiral Process* (Nonaka and Takeuchi 1995). However, such theories were developed also in other countries than Japan, e.g. in Poland the *rational theory of fallible intuition* of (Wierzbicki 1997) or *theory of regress* of (Motycka 1998). That led to the method called *Creative Space* (Wierzbicki and Nakamori 2006) that allows usto also represent other current theories of knowledge creation processes as spirals, e.g. the *ARME Spiral* of basic knowledge creation in times of scientific revolutions representing the *theory of regress* of (Motycka 1998), or the *Triple Helix* composed of three spirals representing normal knowledge creation in academia in three perspectives: *hermeneutics, intersubjectivity* and *objectivity*. At the beginning of the knowledge civilization era, it is necessary to develop an understanding how knowledge—and, in particular, technological knowledge—is currently created for today and tomorrow; such *micro-theories of knowledge creation* were not before addressed, for diverse reasons, by epistemology that concentrated on a grand historical perspective, on *macro-theories of knowledge creation*.

In conclusion, there are many concepts that characterize the new conceptual platform of the era of knowledge civilization; we listed here:

- *relativity and relativism,*
- *indetermination and pluralism,*
- *feedback and dynamic systemic development,*
- *deterministic and probabilistic chaos,*
- *butterfly effect and change,*
- *complexity and emergence principle,*
- *computational complexity as a limit on cognitive power,*
- *logical pluralism,*
- *new theories of knowledge creation*

generally, a *Complexity Change.* This list is by no means exhaustive; we shall stress later other necessary changes in basic assumptions that are induced by the development of knowledge civilization, leading to a development of a new episteme.

3. Current Perceptions of The Nature of The New Era

There are many thinkers and futurologists who predicted a change of civilization eras; here we shall briefly recall their arguments.

(Innis 1951) argued that telecommunication systems will become the future basis of power, and (McLuhan 1964) was the first to predict that electronic information transmission will lead to a new, global civilization era; actually, McLuhan's analysis of the functioning of the *mass communication society* has a much more lasting value than, say, the analysis of the faults of the *one-dimensional society* by his contemporary (Marcuse 1964) that started the anti-technological attitude observed until today in social sciences. David Bell in his writings, e.g., (Bell 1973) promoted first the concept of the *end of ideology,* then *post-industrial society,* and further, the *service society*. (Masuda 1980) was the first to use the term *information society*, (Toffler and Toffler 1980) used the term *third wave* to characterize essentially the same concept as Masuda. All of them were right in a general perception and wrong in details.

For example, the concept of the *third wave* is an elegant slogan, but is historically incorrect. If, following Braudel, we define a historical civilization era as a time when essential concepts shaping the image of the world remain relatively stable, then in the *agricultural, first wave* of Tofflers we could distinguish many civilization eras, ending with the era 1440–1760 described in detail by Braudel. Thus, the *industrial, second wave* 1760–1980 was not the second civilization era; and *third wave of information civilization* will be not the last. But there is no doubt that the Tofflers have contributed greatly to the understanding of the importance of changing civilization eras.[12]

Current perception of the nature of the new era is shaped rather by the opinions of Peter Drucker (e.g., Drucker 1993) and Manuel Castells (Castells 2000). Drucker used also the name *post-capitalist society,* which is not adequate (the power structure of capitalist society is not changing that much), but was one of the first to correctly diagnose the dominant role of knowledge as a productive resource in this era. This diagnosis influences today all thinking about the nature of current civilization development. Management and economic sciences stress today strongly the

[12] In fact, one of the authors has proof that the Tofflers' *The Third Wave* influenced communist leaders in Poland in 1984–89 and thus helped enable the peaceful transformation of Poland into a democratic society in 1989. Recall that one of arguments of *The Third Wave* can be interpreted as the end of the role of the class of workers in the Third Wave, thus the end of the legitimacy of the dictatorship of the proletariat. In other words, it was clear already in those years that the worker-capitalist conflict is characteristic for the industrial civilization era and changes essentially when workers are replaced by robots.

role of knowledge as a fundamental productive resource, speak about *knowledge economy* (e.g., Drucker 1993, 1998; Stehr 2003) and *knowledge management* (e.g., Wiig 1997, Davenport and Prusak 1998, Liebowitz 2000). The number of published sources using the concept *knowledge economy* in Internet exceeds today 125 thousands; a corresponding number of sources using *knowledge management* exceeds today 550 thousands.Castells notes other aspects—the changing character of organization of social and commercial life, toward a *networked society.* Moreover, he also rightly corrects the name *information society* to *informational society.*[13] But he consciously tries to avoid any prediction of future trends of the new civilization era, possibly because futurology is currently under attack by the media. Since this chapter and this entire book are concerned with the new futurology, we shall devote next section to a review of the arguments of such attacks and explain reasons why we believe in the necessity of new futurology.

4. The Role and Objectives of a New Futurology

Arguments against futurology can be divided into two layers: factual and ideological. Factual arguments can be summarized simply: all predictions have errors in them, thus speculating about the future is futile. Often, such a statement is supported by a long list of spectacular errors in predictions, including the most famous mistake of Bill Gates about the necessary size of memory in a personal computer. However, such arguments simply indicate *ignorance about the nature of prediction.* If we assume a continuous probability distribution of random influences on future events, then the probability that any specific prediction will come true is zero—thus *any prediction must be wrong, at least in some details.* Futurology or future studies (which include predictions, but also diverse other methods—scenario analysis, trend analysis, etc.) *serve not for predicting the precise course of the future, but for increasing understanding of the future by describing its possible courses.* Finally, all big companies make future studies for their own internal purposes, for strategic development—and even if they often make mistakes, the nature of such mistakes must be secondary. In other words, *how often has Bill Gates made such mistakes, if he is a very rich man?*

Ideological arguments often state that it is wrong to predict the future, particularly if it is done by a government or governmental agency, because this implies totalitarian tendencies; any such prediction is bound to represent some vested interests. This type of argument, however, is self-defeating: *if it is wrong for a government to predict the future by a government, and if big companies predict the future all the time, does not the argument itself represent vested interests?*

In the name of objectivity and emancipation, all agencies should have equal rights to speculate about the future. We believe that speculation about the future was an essential motivation of the development of human civilization: *we invented speech in order to organize knowledge, and we accumulate knowledge in order to be able to reasonably speculate about the future.* Moreover, we have shown already that a dominant feature of the new civilization era will be *Complexity Change.* How do we cope reasonably with *Change?* The answer is: only by trying to understand its nature, by speculating and deliberating about its possible courses.

Deliberation about future can be compared to laboratory experiments: it is usually too costly or even too dangerous to start the development of new technological artefacts without

[13] In some languages—for example, in Polish or Japanese—this change was achieved much earlier than when it was proposed by Castells. In Poland, Wierzbicki proposed in 1992 the change from *społeczeństwo informacji* (information society) to *społeczeństwo informacyjne* (informational society) and this change was gradually accepted; today the term *techniki informacyjne* (informational technology)is used quite broadly in Polish. Similarly, in Japanese literature Kameoka in (Kameoka 1988) proposed the use of the concept *informationalization.*

small scale experiments, thus in technology we need laboratory experimentation. Often even laboratory experimentation is too costly without preparation; we prepare it today by using *virtual laboratories,* computer models of experiments. Social experiments on a large scale are obviously even more costly and dangerous than technological ones; thus, we need diverse forms and well developed methodology of deliberation about future. Such methodology, in fact, already exists and includes diverse forms of analysing possible futures, such as *trend analysis,* see, e.g., (Naisbit 1982); vision formulation and *roadmapping,* see, e.g., (Galvin 1998), (Ma et al. 2005), *foresight processes,* see, e.g., (Salo and Cuhls 2003), (Kameoka et al. 2004), the concept of *constructive modelling* (addressing the question *what could be,* see Dolk 2006). All such approaches have in common a new concept of futurology: not a prediction of future events, but deliberation in order to increase the understanding of possible futures.

5. A Vision of New Era: Problems of Humanity to be Solved

Some people might feel that they are happy enough with the current situation and that they should resist *Change.* Many of them will not admit that they are against *Change,* but they might try to reduce it to some controversy that is being made outdated precisely by this *Change,* such as the debate of modernism versus post-modernism that—as we shall show later— was characteristic for the end of industrial civilization, not for the beginning of the knowledge civilization. Others might apply diverse strategies to counteract the *Change*. However, humanity does have urgent problems and the new civilization developments might help to solve them— only it will not be done automatically. We must think very deeply and seriously how to use the opportunities that are related to such developments. Thus we need *Change,* only we must understand it.

A fundamental problem is the growing gap between the most and least developed regions and countries, ***growing inequality, hunger and endemic diseases*** in diverse countries and regions of Africa and Asia. In the year 1960, the ratio of the earnings of the poorest 20% to the earnings of the richest 20% of people in the world corresponded to 1:30; today, in the year 2000, this ratio changed to 1:74—see, e.g., (Kuroń 2004). It is a sign of the impotence of the United Nations and of the egoism of richest countries and people in the world that, with the enormous resources squandered on diverse erroneous actions, we are not able to eradicate hunger and endemic diseases in remote parts of the world. The coming knowledge civilization might help in this task, but this will not be done automatically, only if we decide to use it and act towards using it for this purpose.

The second, equally important problem is ***ignorance and intolerance toward different cultures and people.*** Possibly the most valuable part of human intellectual heritage is *cultural diversity,* the number of various languages, cultures, customs of nations, tribes and regions in the world. It is equally valuable as *genetic diversity,* and for similar reasons.We do not know what gene might be helpful to develop protection against unpredictable viruses; we do not know what culture might contribute to the solution of unpredictable crises in the future development of human civilization. This puts a special responsibility on English speaking cultures (of which they are usually not aware): since English is the language of globalization, they are responsible for cultural diversity, for trying to help preserving diverse cultures and customs, for understanding them as far as it is possible. Otherwise, people of other cultures might rightly accuse them of *cultural imperialism* (usually, based on arrogance stemming from ignorance). We can obviously use information technology for the goal of preserving cultural diversity; but the greatest danger of intolerance comes from ideology—nationalist and religious. Unfortunately, it very often happens that preachers of some religion teach their people to be intolerant to others; if we reflect, this

is one of greatest sins, because God (of any religion) is tolerant by the very property of God's omnipresence.

The third, perhaps even more important problem is ***growing violence and hatred in human relations.*** Internationalterrorismis partly caused by this problem, partly by growing inequality and intolerance, hence it is a secondary symptom; to remove this symptom, we must first find remedies for its causes. Violence and hatred feed on several sources. The fundamental one is the *example of arrogance*—of the arrogant and wilful behaviour of the rich and powerful, which every person in the world can see, due to the globalization of information; another is the *example of violence* —of diverse violent behaviour, examples of which are given to every child in the world due to the commercialization of mass entertainment, where horror sells best. Other sources relate to growing inequality and intolerance; together they result in hatred, and hatred breeds terrorism. We can use knowledge civilization and information technologies to counteract these causes of violence and hatred, but not if we believe that all problems will be automatically solved and leave mass entertainment solely to market forces.

The fourth problem is perhaps less universally perceived, but possibly the most dangerous: the ***growing threat of intellectual pollution, of the overexploitation of human intellectual heritage.*** This isbecause this problem is specifically caused by knowledge economy, by knowledge becoming an economic asset in proportions not known in previous civilization eras. The essence of this problem is the relation of *privatized knowledge* to the *human intellectual heritage:*

> If we treat the intellectual, cultural, and civilization *heritage of humanity as a free resource* in times of knowledge civilization, at the same time *trying to privatize knowledge,*this might result in *degradations of this intellectual heritage similar to the degradations of the natural environment in industrial age.*

Naturally, there is a basic difference: as opposed to natural resources and environment, knowledge is not used up when it is used. This means that the concept of the *tragedy of commons,* used by classical economics to justify the efficiency of privatization, is not applicable to knowledge and to the intellectual heritage of humanity. On the other hand, since most corporations realize that knowledge becomes the fundamental productive resource, we observe an increasing lobbying and efforts of business and some governments to *privatize knowledge,* e.g. in the form of hardened intellectual property laws. However, there is a legitimate question whether such trends do not lead to oligarchy, do not hurt the foundations of a free, democratic society. This is because, as observed already by (Jefferson 1813) and stressed again recently by (Lessig 2004):

> *Ideas, knowledge, education are resources that are not used up, only increased when shared; and their sharing is essential for freedom and democracy.*

Until now, each generation has added objective knowledge to intellectual heritage; imagine what would happen if the intellectual heritage would be deteriorated either due to privatization or due to pollution. And our intellectual heritage can be polluted, e.g., if instead of objective tests on the value of diverse medical drugs, only the privatized tests of drug producers are published (we know that this pollution has already started). Questions of knowledge ownership and of the value of heritage of humanity might be basic problems and conflicts of the coming era. Again, we might use information technology to help solving the problem; but we must first understand the problem well and decide how to solve it.

How should we then solve these problems? Many thinkers in diverse countries – see, e.g., (Kuroń 2003)—have come to the conclusion that the *solution involves a great global reform of*

educational systems around the world, which we shall briefly call the *Reform.* That we need a change in educational systems at the beginning of new civilization age is obvious. The vision says more: that *the Reform must have global elements, use informational technologies and be focused on solving—through education and free access to information and knowledge—the basic problems of humanity such as listed above.* This means that *Reform* must be started in all countries, but based not on the principle of rigid planning of the *Reform*, but on the principle of *local action enhanced by coordination, by learning, exchange of experience among reformers around the world and adaptive corrections of the Reform.* This means that a global network of institutions must be established—perhaps, starting with but not limited to United Nations agencies, mobilized by the force of global opinion to devote adequate financial and human resources to support such a reform, particularly its implementation in the poorest countries.

This does not mean that the *Reform* must be based on public funding alone, particularly in the richest countries. A certain amount of competition is necessary, e.g., for universities in rich countries that should create knowledge not only for human heritage, but also for market applications. The *Reform* cannot be realized without mobilizing a considerable share of private resources—from families, enterprises, big business, foundations. But the *Reform* must also have an adequate share of public funding in order to provide for education of the poorest, who may be the most talented; or in order to counteract the tendencies to pollute the intellectual heritage of humanity.

6. Main Megatrends of The New Era

In order to develop such understanding we shall discuss in more detail the three main megatrends of the new civilization era as indicated in (Wierzbicki 2000). These are following:

I. The technological megatrend of digital integration,
II. The social megatrend of dematerialization of work and changing professions,
III. The intellectual megatrend of changing perception of the world.

I. The technological *megatrend of digital integration* is sometimes also called the megatrend of *convergence.* It is a long-term megatrend that results in basic technology changes. All signals, measurements, data, etc. could be transformed to and transmitted in a uniform digital form, but this requires time and adaptation. From a purely technical point of view, the digital integration could be much more advanced today if it were not limited by economic, social and political aspects.

Telecommunication and computer networks are becoming integrated; however, uniform standards would mean that small firms could freely deliver diverse services in this extremely profitable and fast growing market. Moreover, this specific market requires a certain cooperation among market players, since connection to the network must be provided to all customers, no matter in which domain the service originates and to which domain the customer is connected; this is called the *interconnection* requirement. If standards are not uniform, it is easy to defend a monopolistic or oligopolistic position on this market by making interconnection requirements sufficiently difficult or complicated. National regulatory authorities require that big telecommunication operators (telecoms) publish interconnection requirement manuals, but some such manuals are thousands of pages long. The demand of telecoms to have an *unregulated, free market* usually means the freedom to keep their monopolistic positions. Thus, very often entirely new backbone (long distance traffic) networks for the scientific use of the Internet are subsidized by governments—in fact, the costs of constructing optical backbone networks are fast decreasing— with two goals.

One objective is to provide science with very advanced technology, since monopolistic telecoms usually only say that they provide the newest solutions, while actually the solutions they offer are often many years old. Another is to break up the monopoly by promoting the entry of new players; small firms usually get better interconnection agreements with such new networks.

Diverse aspects of the intelligence of networks, computers, decision support, and even of intelligence of our ambient habitat are becoming integrated. Making computers intelligent has been a legitimate goal of computer scientists for many decades. Even if, because of reasons related to the *Rational Theory of Intuition* shortly described above, we do not believe that computers will soon become more intelligent than people, they are intelligent enough to better serve people. The miniaturization of computing chips and the development of diverse sensors make also possible the increase of intelligence in our ambient habitat—in intelligent offices, rooms, houses, cars, roads, stores, etc. All developed countries and all high technology companies have programs of research on such *intelligent ambient habitats.*[14] Diverse problems must be overcome yet before the full potential of this idea can be realized. The technology should be inexpensive enough for customers to pay for it. The customers must trust the technology. The privacy and other rights of customers should not be threatened. Overcoming all these problems requires time and the most serious might be the issue of privacy. It is technically possible to build secure networks and much research is devoted today to the issue of trust in the networks. However, the problem is more social, legal and cultural than technical. Social and legal, because privacy rights and standards must be discussed and defined anew with the advent of omnipresent computing. Cultural, because computer scientists, motivated by the goal of making computers as intelligent as possible, tend to let computer software outguess and dominate people (even in word processing software), which is simply not admissible: human user must have a *sovereign role* in their interactions with any device, including computers—and for intelligent ambient habitats, a new culture must be formed to guarantee such a role. For all these reasons, the idea of an intelligent ambient habitat needs still several decades until it will be more broadly socially used.

Diverse communication media—newspapers, books, radio, television—are becoming integrated. The basic recording medium is gradually changed from paper to electronic form, although it will necessarily take a long time to change human customs. Often we simply do not realize the potential of this change, e.g. the intellectual power of video-recording an event in combination with written notes in electronic form. The economic and political power of this integration is well perceived and we already observe fights about who will control the integrated media.

From a common root—so called *soft current electrical engineering*—manybranches of information technology diversified since the beginnings of the 20^{th} century: *telecommunications, informatics, control engineering and science, electronic engineering,* and so on. The megatrend of digital integration today implies that there is not much sense in considering them separately; in the 21^{st} century they are becoming re-integrated, so that we often speak jointly about *informational technologies* and distinguish in them *software* and *hardware.* When we reflect on this distinction—introduced already over fifty years ago by technology—we observe that this is one of the first and clearest demonstrations of the *emergence principle,* already mentioned above and discussed in more detail in last sections of this chapter: *software* cannot function without *hardware,* but it is *irreducible,* it cannot be explained by the functions of *hardware, reduced* to it. Generally, this megatrend of digital integration has gigantic impacts and will define the directions of informational technology change for many years to come.

[14] Even if diverse names are used. In its Framework Programs the European Union calls this *Ambient Intelligence* (AmI), the United States refers to either *ubiquitous* (omnipresent) *computing* or *wireless sensor network,* in Japan the name *intelligent home* or *building* or *yaoyorozu* (eight million Shinto gods, implying omnipresence) is used.

II. The social *megatrend of the dematerialization of work* can be also called *the megatrend of change of professions* and might be even more powerful than the megatrend of digital integration. The idea that technology should make human work less onerous dominated the entire industrial civilization era; the era ended when the idea began to actually materialize, when robots started to replace human work. *Control engineering, robotics, and the broad use of information technology together have slowly resulted in a dematerialization of work.* This fact and its consequences are generally misunderstood by social and political sciences, upon which we comment also in the concluding sections.

Rapid technology change induces a rapid change of professions and so called structural unemployment — which is actually is a misnomer, resulting from the static thinking of the industrial age. Structural unemployment means that the structure of the economy has changed and there will be unemployment until the labour force adapts to the new structure. However, what if the structure is changing continuously and its speed of change is limited precisely by the speed of adaptation of the labour force? Today's technology would permit us to build fully automated, robotic factories, but what would we do with the people who work in the existing factories? If old professions disappear, we must find ways to devise new professions, new occupations for people, to replace the old ones.

The dematerialization of work has some clear advantages. For example, it makes it possible to realize fully equal rights for women. Women liberation movements remained utopian in industrial civilization, because while the idea of a woman as a tractor driver might have been a catchy slogan of communist ideology, it was realizable only for women of great physical strength. The computer and the robot made possible fully equal rights for women, but the issue is much more complex: to realize equal rights we need to change customs, to give all women equal access to tertiary education, etc. This also shows that the time needed for full realization of knowledge civilization is necessarily rather long.

The dematerialization of work produces also other great dangers beside unemployment. Not all people are equally adaptable and the need to change professions several times in life might be too large a burden. This results in the *generation divide*—between the younger people who can speedily learn a new technology and the older ones. This is also followed by *digital divide*—between those who profit from information technology and those excluded from this technological progress. The digital divide affects diverse countries, and it is a dynamic, not a static effect: if left to market forces alone, it might *eventually* (possibly, after a hundred years) disappear. Thus, it is the duty of the governments of these countries to counteract the digital divide; the free market, though necessary for economic efficiency, will not prevent the digital divide until it is too late. If not counteracted, the digital divide can threaten the very existence of democratic society and the market economy as we know them now, in two ways. One is already known and well perceived: the digital divide is the social source of terrorism. Another is more subtle: mass consumption society, as we know it from the late period of industrial civilization, is based on mass demand, stimulated by the nearly full employment of reasonably well paid citizens. Large, persisting unemployment resulting from the digital divide might mean that mass demand will collapse and with it market society as we know it today. Thus, the digital divide is one of the most dangerous effects of the dynamics of *Complexity Change* and it is our duty to think hard how to alleviate it.

One obvious way is to intensify and reform education, which is an additional argument for the *Reform* of educational systems outlined earlier in this chapter. Increase the participation in all forms of education, including tertiary, promote greater participation of women, delete

unnecessary subjects of study,[15] add more training in mathematics and computers on one hand and in philosophy and debating, in negotiating and managing small enterprise on global electronic markets on the other hand, and generally reform the education towards the needs of knowledge civilization. Such a reform might have high costs but is the best investment a country might make.

III. Another reason why a fundamental *Reform* of educational systems is needed is the last megatrend, actually the most demanding: **the intellectual *megatrend of mental challenges, of changing the way of perceiving the world.*** We commentedon this*Complexity Change* when discussing the *conceptual platform* of the newera; we shall comment in further sections on some changes which are in our opinion necessary though hindered by disciplinary paradigms. But the *Change* of civilization epochs is so vast that some disciplinary paradigms must be changed along the way. This concerns, in particular, economics and sociology. We describe these needed changes in the following sections, starting with the impact of digital and networked technology on social life.

7. Impacts of Digital and Network Technology

The changes in social life resulting from digital and network technology at the beginning of the knowledge civilization era will be very great and are not yet well understood—neither by the general public nor, particularly, by sociologists, because their episteme diverged essentially from the episteme of technology; thus, a paradigmatic change of understanding is needed, both in technology development and in assessing its social impacts. The basis of this change is the observation that the broad social use of Internet or generally, the digital networked economy, will have impacts comparable to Gutenberg's improvement of printing technology or Watt's improvement of the steam engine. Let us first discuss the possible meaning of this comparison.

The fast development—following Moore's law, see (Moore 1965)—of the available size of digital memory has already made possible essential changes in the social use of digital technology. Many of us already use *USB memory sticks*—called also diverse other names, external discs or electronic pens—small digital memory devices that hold today from 64 to 1024 Megabytes, carried with you everywhere and attachable to the USB outlet of any current computer, devices that replace diskettes, notebooks, personal file systems, photographic collections. If their memory size grows 100 times, which according to Moore's law should occur in next 10 years, we can use such memory sticks for collections of films, music, books, for carrying any personalized information. Only a few professionals realize the future importance of USB memory sticks; they are not widely popular yet, and software companies have not yet fully realize the tremendous potential of their use. Imagine a personalized library, office and network software carried on such a stick that would allow you to use any computer and give you access to any computer network in a personalized format; you then carry with you all information that is important for you and use it *any place and any time.*

And this is only one example. Another is the possibility of changing the format of classical books to books integrated with films, with interviews or entire courses of lectures presented by the author of the book. There are many more such examples of new informational technologies: *grid technologies, ambient intelligence, Blog network services,* etc. The current informational revolution has a tremendous potential of social applications by far not exhausted yet.

[15] Deleting some subjects of education is usually a very hard choice. Consider the issue of teaching kanji, hiragana and katakana in Japan.

This potential is not understood by broad public. Some social opinion reviews of important trends in science and technology give information technology high but only short-term priority. Since around 1970 Japan has organized *technology foresight processes*, involving a broad representation of national experts and policymakers in articulating and forecasting social demand for emerging technologies. Diverse methods, such as various modifications of the classical *Delphi method*, are used in such *foresight processes* or *surveys*, see (Kameoka et al. 2004). The seventh such survey (1999–2001) determined as a most important field *information and communications*, but only for the decade 2001–2010, while after 2010 the most important fields were defined as *earth science and environment technology* and *life science*, with *information and communications* dropping to fifth place. This cannot, however, be considered as a correct assessment, since perhaps 90% of experts involved in the seventh survey did not even know what an *USB memory stick* nor what *Blog service* on the Internet is; thus, they could not imagine the not exhausted yet social potential of information technology. But a more important reason is that *very few technology experts are also specialists in systems dynamics* and can correctly assess the delay times and inertia inherent in creating a social demand for emerging technologies.This diagnosis can be substantiated by many examples, here we quote two: one Japanese and one European.

In 1977 a special foresight exercise based on the *Delphi Scenario Writing* (DSW) method was started in order to forecast and promote the development of *small facsimile* machines for home and small business use, see (Kameoka et al. 2004). Small facsimile machines were in fact developed and promoted on the market. After a time they enjoyed (and still enjoy) a world-wide success, but the dynamics of market adoption were quite different than predicted in the foresight analysis, see Fig. 1.

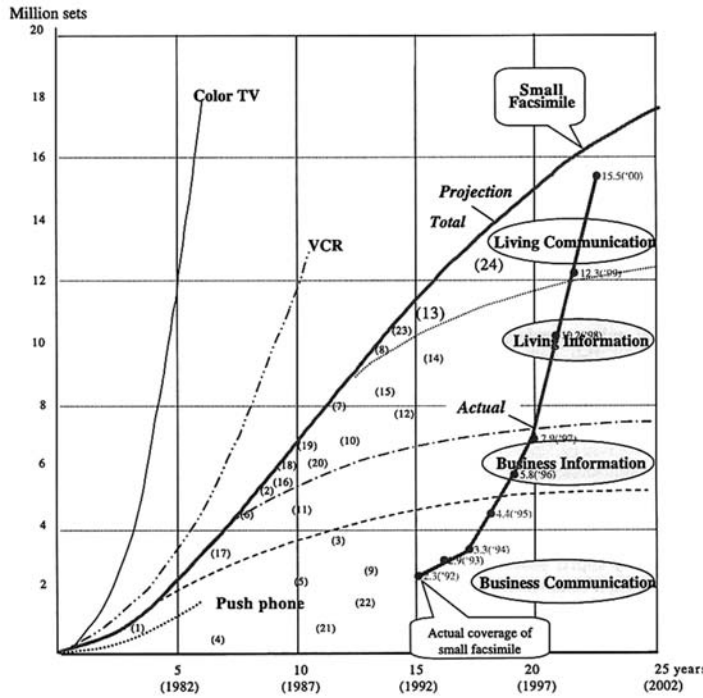

Fig. 1 Penetration curve of small facsimile machines in Japan: projection in 1977 and actual penetration process (Kameoka et al. 2004)

The foresight projection assumed an early start and slow build-up of market penetration, while the actual adoption curve shows an unpredicted almost pure delay of approximately ten years, then another ten years of slow build-up. However, after twenty years occurs much faster than predicted, avalanche-like market penetration process (with a similar penetration process on world-wide markets), contrary to original predictions, once public awareness of the advantages of small fax machines became sufficiently widespread. Comparing the actual adoption curve of small faxes with the actual adoption curve of colour TV, we see that these curves are almost parallel, only shifted in time by about 17 years.

Actual market penetration curves of emerging technologies exhibit delays; the delay of ten to twenty years exhibited in the case of small facsimile machines can be judged as typical for smaller innovations, while larger ones– such as the mobile cellular telephone or digital TV quoted earlier — have exhibited delays up to fifty years. Technology experts usually do not understand the reasons for these delays, because they are only in small part technological (time needed for technology development and improvement); the delays are caused primarily by psychological factors (readiness to use new methods), social factors (following the example of others) and economic factors (readiness to pay for new possibilities).

Similar conclusions could be derived from another example—of the development of the concept of *Ambient Intelligence* by the Information Society Technology Advisory Group (ISTAG) of European Community. As explained above, the *intelligent ambient habitat* will almost certainly become one of the defining features of future social applications of technology; but the European Community wanted to use it as a relatively short-term (ten years) goal in its Framework Programs of supporting research and development in Europe. One of the authors of this chapter, who participated in the work of ISTAG and was very supportive of the general idea, had nevertheless to warn ISTAG and European Community that such short adoption time is unrealistic according to his expertise in another field—systems dynamics.[16] On the other hand, when *intelligent ambient habitats* become widely socially used, patterns of social life will change tremendously.

Because of the phenomenon of delay times and because of the large un-exhausted potential of digital and network technologies, we are sure that information and communication technologies will determine the *Complexity Change* of social life patterns for many decades yet to come, including the use of such technologies in knowledge creation based on a new episteme; see the concluding sections of this chapter.

8. Change in Economic and Social Behaviour, in Economics and Sociology

Economic behaviour changes essentially with the turn towards knowledge civilization, because of several reasons, such the size and character of global markets and the character of knowledge as a resource. Recall that *inevitability* is replaced with *change* and *avalanche.* Thus, while industrial civilization dealt mostly with stable markets, assuming their predictability of a clock, the penetration process of new products in a global knowledge economy is based on change: once a new product, a technology or service such a mobile phone catches the attention of consumers,

[16] This point illustrates also the importance of objectivity. Since all of ISTAG—a group of over 30 experts—was convinced of the validity and importance of the idea of Ambient Intelligence, it was a highly inconvenient for the entire group to hear that, even if the idea is great, it is not realistic to expect its market penetration in ten years. Thus, that information was actually disregarded. We see in this example that intersubjectivity makes it possible to disregard inconvenient information, while objectivity requires that we take into account even more highly inconvenient information.

it spreads like an avalanche. This alone would be sufficient to justify the opinion about essential changes in economic behaviour. But there is also another, even more fundamental reason.

Since *knowledge is not depleted when it is used*, its additional use does not cost any more. If knowledge is the dominant productive resource, then *the marginal production cost*, the cost of producing an additional unit of a good, *must become negligible.*

And these costs already have become negligible: the cost of producing another mobile phone, another copy of software, or of another pill of a medicine, is negligible when compared with the price of the goods. This means that *theobserved economic behaviour has already essentially diverged from the accepted economic theory:* according to free market theory, the price should be equal to marginal production cost and not be hundred times higher.

Prices that are a hundred times higher than marginal production costs can be explained only by monopoly or by near-monopoly.[17] The actual behaviour, since there usually is more than one essential producer in a given segment of the market, is rather similar to oligopoly with price collusion. While explicit price collusion is usually prohibited by law; the trouble is that tacit agreements and price collusion are equally effective: when changing the price is not profitable to a market player, he will happily follow the example of other market players in not competitively changing the price. This can be even explained by the theory of monopoly and oligopoly with classical market equilibration. Most producers in high technology markets would indignantly protest when accused either of monopoly or of tacit price collusion; but if they are right, then the classical equilibration theory does not apply to knowledge based, high technology markets. Thus, entirely new theory of market behaviour is necessary.

Many elements of such a theory have been already formulated, see, e.g., (Arthur 1994). Most economists treat these attempts as elegant theoretical exercises, see, e.g., (Stehr 2004), not as challenges to accepted theory; the mainstream economics sees the effects of knowledge economy only in the light of the classical invisible hand of the market (*The Economist* 2006). In the meantime, however, the observed economic behaviour has not only challenged, but invalidated, falsified the accepted theory.

The basic argument of neoliberal economic theory—that it is best to leave the market alone because then it will efficiently equilibrate—*is no longer valid in high technology markets;* it remains valid only in markets with a large number of producers and without the dominating role of knowledge as a productive resource.

What shall be the advice to policy makers, until economists create a new market theory, adequate for high technology markets with a dominating role of knowledge? They must be very cautious in accepting neoliberal arguments about the value of a free market: these arguments represent the rationality of an industrial civilization. In the knowledge civilization such arguments can be suspected of being an excuse to leave a monopolist free to continue monopolistic practices. As an example, consider the problem of the power of medical drug industry and its practice of tacit collusion on setting high prices and on promoting drugs tested in its own laboratories. This belongs to the fundamental problems created by knowledge based economy; while this economy

[17] Near-monopoly can be defined as a sufficiently high market share that the producer is essential for the market and can have a large index of additional profits due to his market share. This index is defined by $I_p=p/m_{pc}-1$, where p is price, m_{pc} is marginal production cost. Using game theory, it is easy to show that this index at market equilibrium depends on the market share y_i of the producer i by the formula $I_{pi}=y_i/(\varepsilon-y_i)$, where ε is the elasticity of demand with respect to price. If both y_i and ε are close to 1, this index of profits due to market share can easily be equal to one hundred.

creates many advantages and opportunities, it also creates such fundamental problems, and we should not believe that these problems will be solved automatically, especially not by market forces alone.

Even if we say that that neoliberal market economics is no longer applicable in a knowledge based economy, we mean by this only that the free market is an abstraction which has never been fully realized and—for reasons outlined above—cannot be realized, especially in a knowledge based economy; moreover, that the market alone cannot solve all problems. People solve problems when they realize how to do it, applying also the market competition mechanism that is a very robust tool for implementing diverse ideas, but is only a mechanism, not a dogma of faith.

In a knowledge civilization, social behaviour changes even more strongly than economic behaviour does. The use of internet gives people more freedom and, at the same time, more dependence on technology. Until an internet user learns to correspond by email for most of her/his business, she/he can live without email; once someone is accustomed to emailed business, any disruption of this service is a fundamental obstacle. To give another obvious example, consider the dependence on the reliability of your car. Even thirty years ago it was a given that a car often breaks down; now we are accustomed to truly reliable cars. Thus, the knowledge civilization will be characterized not only by diminishing physical labour, also by growing dependence on the reliability of technical systems. These are only examples; there are many other social trends characteristic for the beginning of new era of knowledge civilization and we cannot imagine a responsible theory of society in the new civilization era without accounting for and analyzing such trends.

One would expect that these tendencies would be noted and analyzed by sociology. However, sociology went in precisely the opposite direction, perhaps because of its preoccupation with its own problems, based on the difficulty (and danger) of making social experiments, which resulted in questioning the concept of objectivity, thus in counter positions of *intersubjectivity* and *objectivity*. We follow here Helena Kozakiewicz (Kozakiewicz 1992) in her fascinating description of main epistemological problems of contemporary sociology; however, being technologists, we shall differ with her not in the analysis (which we simply repeat), but in final essential conclusions; in the next section, we shall analyze in more detail the differences in the episteme of social sciences and that of technology.

Kozakiewicz—a well-known Polish philosopher and sociologist—states that sociology is often called "the most general of social sciences". But then she asks: *in what sense is sociology a science?* It is a science by tradition, since it started from Comte's positivistic belief that society can be described objectively using methods similar to those of hard science. However, sociology itself revised these beliefs. A branch of sociology, the sociology of science, including known trends of the second half of the 20^{th} Century—the strong program of the Edinburgh school with its emphasis on *interests*, see, e.g., (Barnes 1972), (Bloor 1976); the micro-constructivism with its self-description of knowledge development, , see, e.g., (Knorr 1981); translation sociology, see, e.g., (Latour 1990)—all deny the possibility of the objective epistemological explanations of science, and treat science only as a social discourse. What happens if we apply this to sociology itself? A paradox: *sociology is a social discourse about itself.*

We presented here only a sketch of much more detailed Kozakiewicz's arguments, see (Kozakiewicz 1992). However, she concludes that *post-modernist sociology awaits essential reformulation, must return to epistemological reflection*, must combine what we know in epistemology—including the basic conclusions of Kant and Hegel on the ontological difference between theory and praxis— with new cognitive perspectives. With this conclusion of Kozakiewicz we principally agree –with, however, some fundamental differences in interpretation.

Sociology cannot remain in the stage of *antithesis* to Comte and negate the value of objective knowledge, must find not only a *theory of intersubjectivity,* but also a *synthesis of intersubjectivity and objectivity.* Without such a synthesis, sociology will not be able to describe the social aspects of technology—which is, after all, a basis of the new civilization era.

For example, if someone says that objective knowledge is not necessary, then she/he cannot trust— and cannot socially analyze—the reliability of technological systems.

Another, quite recent diagnosis of the critical situation in sociology came recently from a younger sociologist—see (Sojak 2004). Sojak maintains that sociology is inherently diversified internally and multi-paradigmatic, thus inconsistent, because it tries to express and describe the *anthropologic paradox*—the basic fact that at the same time people are defined by the objectivity of nature and define nature by creating subjective knowledge, that *they are at the same time determined and free* to create self-knowledge. Sojak attempts to overcome this *anthropologic paradox* by following the results of contemporary sociology of science and, in particular, by applying the language of the social systems theory, e.g., of (Luhmann 1984, 1990). However, as we shall show in concluding sections, both sociology of science and social systems theory have an anti-technologist and anti-objectivist bias, thus overcoming the *anthropologic paradox* does not seem to be possible without further reaching changes in the episteme of sociology.

9. Main Conflicts and Stages of The Coming Era

Before discussing epistemic questions, we should characterize main conflicts of the coming era. It would be utopian to expect that the new civilization era will develop without conflicts. Each change—and in particular *Complexity Change*—and each problem, each big project such as educational *Reform* touches necessarily diverse human interests and results in conflicts that must be resolved—best by debate, by posing questions, analyzing diverse interests and positions in the conflict. The questions are: what will be the dominating conflict in the coming era? How should we prepare to resolve it?

The industrial civilization era had its basic great conflict. No matter what our ideological position, it must be objectively admitted that the big conflict of industrial civilization concerned the property of the fundamental productive resources of this era—the industrial assets. As soon as the industrial civilization era ended, the conflict became obsolete, which is what ended the importance of communist ideology.[18]

If knowledge becomes the fundamental productive resource, then the *big conflict of the coming era will concern the property of knowledge.*

This is not only an analogy, a theoretical conclusion: already today, we observe many signs that this conflict intensifies. Big high technology companies, having business fundamentally dependent on knowledge, have perceived its importance and naturally do everything not only to protect their own knowledge, but also to *privatize knowledge* generally. Other knowledge creators, in academia and in small firms, also fundamentally depend on knowledge; but their interests are in keeping open access to public knowledge and in preventing the pollution of the intellectual heritage of humanity that would soon result from excessive knowledge privatization.

[18] In other words, as we commented before, the trend of dematerialization of work made obsolete the importance of the proletariat, which took away communism's legitimacy.

This conflict might be alleviated if we could find solutions respecting interests of both sides. We must find them before the conflict intensifies beyond hope of resolution—because then it would lead to another revolution, this time on much larger, truly global scale, fought with new weapons of cyberspace, with unpredictable dangers and consequences.

An accompanying aspect of this conflict concerns *access to quality education.* As we noted already in the vision of *Reform* of educational systems, some elements of *privatization of education* are inevitable; but full privatization would only aggravate the fundamental conflict. In all civilization development, all societies found it advantageous to give public support for the education of a most gifted part (even if sometimes very small) of poor youth. This cannot be reversed by dogmatic privatization. Generally, however, the implementation of the vision of *Reform* of educational systems outlined earlier will have a beneficial effect, alleviating the fundamental conflict concerning the property of knowledge; this is another reason to implement it as soon as possible.

Another question concerns the main stages of the coming era: of what time perspective are we speaking here? The pre-industrial era of print and geographical discoveries described by (Braudel 1979) lasted 320 years, from 1440 to 1760. The era of industrial civilization lasted 220 years, from 1760 to 1980. What reasons do we have to make the simple extrapolation that the era of knowledge civilization will last (perhaps at least) 120 years, from 1980 to 2100?

We have good reasons for such a prediction. The shortening period of civilization eras can be explained by the shortening of the basic delay in the broad social implementation of important new ideas. We have already given several examples of such delay. It is also reasonable to assume that in the period 1440–1740 such a delay was much longer, amounting to several human generations (a new generation of teachers has to be trained to convey the new idea to students before the idea is distributed broadly enough to permit social implementation), though the increasingly broad use of printed books slowly resulted in shortening such a delay. The speedup of communications in the industrial civilization age further shortened this delay time. However, as explained above, the main reasons for such delay are social customs and economic interests, and even now we observe delays of 20 to 50 years.

What is the relation of these delays to the period of a civilization era? We can apply here the knowledge of cyclic processes, from telecommunication, for example: for a feedback process with accumulation and delay, the typical period of a cycle is four times the delay time. This is easily proven by using the *Nyquist criterion* of stability of dynamic feedback systems. According to this criterion, any system with negative feedback can generate cycles if the feedback coefficient is large enough, while the period of the cycle is such that the phase shift amounts to 180° or π in radian arc measure. For a system with accumulation and delay, the phase shift of accumulation is $\pi/2$, and the phase shift of delay is $2\pi T_0/T$ where T_0 is the delay time and T is the period of the cycle. These phase shifts are additive, hence we have $\pi/2 + 2\pi T_0/T = \pi$, or $T = 4T_0$.

Another way of demonstrating the same conclusion is via a simple example: imagine a market for educated specialists, say in management science, in which tertiary education demands $T_0 = 4$ years of study. If we consider the impact of a sudden increase in demand for educated specialists on this market, it is easy to show that the delay time in supply must produce a cycle with the period $T = 4T_0 = 16$ years. This also proves that markets for educated specialists, essential for knowledge economy, are fundamentally unstable: any small perturbation of demand creates cyclic behaviour on these markets.

Clearly, the development of civilization eras is not cyclic, it is rather a spiral with strongly pronounced chaotic elements; but we can use this analogy for understanding the reasons for the shortening periods of civilization eras. If the period equals 4 delay times, then the delay time in the era of print and geographic discoveries was about 80 years, the delay time in the era of

industrial civilization was about 55 years, and the delay time in the era of knowledge civilization might shorten to 30–40 years. All these estimations are reasonable, thus the knowledge civilization era might last 120–160 years starting with the year 1980; therefore:

Knowledge civilization is a long duration phenomenon that most likely will last at least until the year 2100.

This indicates also that it is reasonable to speak about four major stages of a civilization era, but that it is very difficult to predict their character for the future. If we subdivide the history of industrial civilization into four stages, the character of them is clear: in 1760–1815 we observe the chaotic realization of the benefits of new technology; in 1815–1870 there is a systematic realization of these benefits while the other side of the basic social conflict is slowly organizing; in 1870–1925 we see high realization of the benefits, but also high confrontations in the basic social conflict; finally, in 1925–1980, there is an alleviation of the basic social conflict, but also signs of the end of the civilization era. Will this scenario repeat in the knowledge civilization era? Already the fact that we ask this question today is a good reason for a different course for the future, *the probability that any prognosis is precisely right is zero*. But this analogy helps us *to understand what might happen in the future*.

Another analogy is the delay between the formation of the *cultural platform of concepts essential for a new civilization era* and the formation of an *episteme of this civilization era*, i.e., the structure of concepts characterizing scientific activity in this eraaccording to (Foucault 1972). As we noted earlier, the *cultural platform* precedes a civilization era, thus most concepts needed for the cultural platform of the knowledge civilization are already formed (though not all are equally broadly understood). Foucault dates the formation of the pre-industrial *episteme* at the beginnings of the 17^{th} Century, the formation of modern (actually, industrial) *episteme* at the beginnings of the 19^{th} Century; we see that an *episteme* is formed after the beginning of a civilization era. Thus:

We can expect the formation of an *episteme* characteristic for knowledge civilization somewhere during next few decades.

Contributing to the formation of the new *episteme* is one of our obligations, and we try to fulfil it by writing this chapter. However, our essential obligation is to try to understand the future, preserving an open and critical mind in the time of great *Complexity Change*. We will not be sufficiently prepared for the future if we adhere to old concepts and disciplinary paradigms, we must be ready to question them.

10. The Three Divergent Episteme of The Three Cultural Spheres

We indicated above that *the sphere of social sciences with humanities* is different than the *sphere of technology,* because they adhere to different values, have different episteme, use different concepts and language. The same obviously concerns also the sphere of social sciences and humanities versus the sphere of basic, hard and natural sciences; similar distinction concerns hard sciences versus technology. Some social science writers, e.g. Bruno Latour (Latour 1990), speak about *technoscience*. However, this is a great error resulting from the lack of deeper understanding of technology: while science and technology are obviously related, they differ essentially in their values and episteme.

The anthropology of 20th century created a very useful principle of dealing with separate cultures: *you should never judge a foreign culture without fully understanding it.* We can extend the same principle to the three spheres of hard science, technology, social science and humanities. But then, what does post-modern sociology of science (as represented by Latour, op. cit.)? By telling a hard scientist that he does not value objectivity, only power and money, it behaves like a communist activist coming to a priest and telling him that he does not value God, only power and money. By telling a technologist that his products enslave people, it behaves like telling an artist that his religious paintings enslave people. By the principle mentioned above, the episteme of hard sciences should be discussed, criticized and further developed by hard sciences themselves; the same concerns technology. The same concerns social sciences; however, until they overcome their own internal crisis, they should not expect that their opinions about other spheres will be seriously attended to. Unfortunately, they express such opinions quite openly; we shall later analyze some of them to illustrate their biases.

If we adhered too closely to the principle described above, these three spheres would become completely separated, which is neither possible nor desirable. Intercultural understanding should be promoted; with this aim, we indicate here the limitations of each *episteme,* using metaphors to describe the differences between them.

We should note, first, that contrary to some opinions of social sciences quoted below, both hard sciences and technology know for a long time that knowledge is constructed by humans—since the indeterminism of Heisenberg have shown that there is no precise measurement, since the theory of truth of Goedel and Tarski has shown that the question of truth cannot be decided internally in a given system, since (Quine 1953) summarized these issues by concluding that all human knowledge *"is a man-made fabric that impinges on existence only along the edges".*

However, even if a hard scientist knows that all knowledge is constructed and there are no absolute truth and objectivity, he believes that scientific theories are *laws of nature discovered by humans* rather than *models of knowledge created by humans.* He values truth and objectivity as ultimate ideals; metaphorically, *hard scientist resembles a priest.*

A technologist is much more relativist and pragmatic in his *episteme,* he readily agrees that scientific theories are models of knowledge—because if he has several competing theories, he simply compares their usefulness. But he requires that these theories should be as objective as possible, tested in practice, he demands that they should be *falsifiable.*[19] If he does not have scientific theories to rely upon, he will not agree to wait until such theories are created, but will try to solve the problem anyway using his own creativity. Metaphorically, a *technologist resembles an artist.* He also values tradition like an artist does, much more than a scientist: an old car is beautiful and, if well cared about, can become a classic.

A post-modern social scientist or a soft scientist believes that all knowledge is subjective,constructed, negotiated, relativist. There are traps in such *episteme,* itwould not stand up against a serious Kantian-type critique, as indicated by Kozakiewicz; but this is a sign of an internal crisis that must be overcome by social and soft sciences themselves. Metaphorically, a *post-modern social scientist resembles a journalist:* anything goes as long it is interesting. He also does not much value tradition.

These three essentially different episteme are results of a long process that started approximately around the middle of 20th century: the episteme of industrial civilization era was disintegrating and the three different episteme of three cultural spheres developed divergently. This resulted in the issue, the need and the possibility of a new integration of the episteme for all

[19] In the sense of Karl Popper; technology and technological science are closest to the Popperian falsificationism, hard science is rather paradigmatic in the sense of Thomas Kuhn, while post-modernist social science treats falsificationism as another relict of positivism.

sciences, humanities and technology. The need of a new integration is obvious in the new era of knowledge civilization and was stressed even by social sciences, e.g., by (Latour 1990) or (Jackson 2000). However, we present here the arguments for such need from the opposite side, of hard sciences and technology, which might lead to different conclusions. The main argument from our side is that:

In the knowledge civilization era, we need social science that understands well knowledge creation in hard sciences and technology, and we, the representatives of the latter cultural spheres, cannot find such understanding in the arguments of social sciences today.

We might illustrate this by asking the question: *what is technology?* They are diverse answer to this:

- For a postmodern social scientist: *an autonomous force enslaving humanity*
- For an economist: *a way of doing things, a technical process*
- In common language: *a technical artifact*
- For a natural scientist: *an application of scientific theories*
- For a technologist: *the art of constructing tools, an immanent faculty of humanity, motivated by the joy of creation:*
  - — *Liberating*people from hard work
  - — *Helping*technology brokers (venture capitalists, bankers, managers) to make money—and if any effect of that is *enslaving,*the brokers are responsible;
  - — *Stimulating*the development of hard science by *inventions*giving it new principles to develop new concepts.

In particular, we feel that the misunderstanding of technology and an anti-technological attitude started probably with (Marcuse 1964) who used the concept of the *single-dimensional man enslaved by the autonomous, dehumanizing force of technology;* this position was followed essentially by all social sciences, including, e.g., (Checkland 1978), (Habermas 1987), (Jackson 2000). However, the concept of the single-dimensional man represents a wrong diagnosis, as we shall explain below; but such wrong diagnosis prevents social sciences from understanding the actual role, dangers and advantages of the knowledge civilization era, e.g., of obviously occurring dematerialization of work.

That this diagnosis is wrong might be seen based on the analysis presented in (Wierzbicki 2005), repeating and extending the analysis of technology in (Heidegger 1954). It is shown there that technology proper is a basic human faculty that concentrates on the creation of tools and other artefacts needed for humanity in dealing with nature. It presupposes some human intervention in nature, but can also serve the goal of limiting such intervention to the necessary scale.

Technology proper is essentially a truth revealing, creative activity, thus it is similar to arts and, in its essence, liberating.

It is also, for the most part, a problem solving activity, concentrating on solving practical problems. Thus, technology proper uses the results of basic sciences, if they are available; if they are not, technology proposes its own solutions, often promoting this way quite new concepts assimilated later with delay by hard or social sciences. It is not an autonomous force, because it depends on all other human activities and influences them in return. It is, however, sovereign, in a similar sense as arts are sovereign human activities.

Autonomous forces can be found in the socio-economic system of applications of technology proper. Here, however, there is a great danger. As already observed by Martin Heidegger

"Meanwhile ... man exalts himself and postures as the lord of the earth" which means that humans can become fascinated and blinded by their seemingly unlimited power over nature apparently given by technology — and this fascination is exploited by socio-economic applications of technology.

The relations between hard sciences, technology proper, its socio-economic applications and social sciences are presented in Fig. 2. Hard, basic science and technology influence each other through the intellectual heritage of humanity, see (Wierzbicki and Nakamori 2006), called also the *third world* by Karl Popper (Popper 1972). But this influence forms a *positive feedback loop*, see Fig. 2; technological development stimulates basic science, scientific theories are applied technologically. Recall that *feedback* – the circular impact of the time-stream of results of an action on its time-stream of causes—was used by Watt in a *negative feedback loop,* while in a *positive feedback loop* the results circularly support their causes, which results in a fast development, like a growing avalanche.

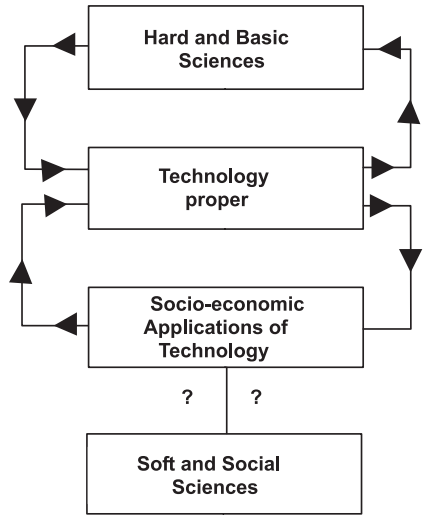

Fig. 2. Two positive feedback loops

The positive feedback loop between technology and science works slowly: technological stimulations are analyzed by science with much delay, technology also does not reply instantly to new scientific theories. The second positive feedback loop is between technology and the systems of its socio-economic applications. The distinction between technology proper and its socio-economic applications is not stressed sufficiently by social sciences, though it should be obvious for at least two reasons. The first is that technologists often work on a technological problem quite long (e.g., almost fifty years in the case of digital television) before their results are broadly socially applied. The second is simple: *technologists do not make much money, technology brokers do,* similarly as art brokers make more money than artists. As indicated above, by *technology brokers* we understand here entrepreneurs, managers, bankers, etc.: all our socio-economic systems turn around applications of technology. If a technological product or service, such as mobile telephony, produces much revenue, then more money is available for its further technological development; this leads to truly *avalanche-like processes of social adoption of technological hits.*

However, these processes have also strange dynamic properties, socio-economic acceptance of novelties is slow, there is usually a large delay time between purely technological possibility and the start of an avalanche of its broad socio-economic applications (this delay time amounted also

to almost 50 years in the case of cellular telephony). This delay has many causes: the necessity to develop such technological versions that are inexpensive enough for an average customer; an initial social distrust *turning into a blind social fascination* once a technological hit becomes fashionable. Once it starts to work, the second positive feedback loop is much stronger and faster than the first one. But it can have very dangerous side-effects.

This blind social fascination is actually the autonomous force incorrectly attributed by social philosophy to technology proper, it is precisely the source of the Heideggerian danger that *man exalts himself and postures as the lord of the earth.*

For example: how many people are aware that mobile telephony makes it very difficult to practice radio-astronomy from Earth surface, that it is the reason of moving radio-telescopes into cosmic space? And this is a relatively modest adverse effect; what if an avalanche-like adoption of a technological hit would result in truly disastrous effects? After all, a nuclear power station is also based on avalanche-like processes that must be carefully controlled—by negative feedback systems of control engineering—to be safe; but if such systems fail (or are tampered with for fun by irresponsible people, like in the Chernobyl case), the disaster can have no limits.

The answer to the question posed by (Mesthene 1967): *why it is so that many people perceive technology as an alienating force, enslaving, degrading, and destructive of man's most cherished values,* might be the following: *the essential reason of it is the intuitive perception of such danger of a social infatuation with technology leading to avalanche-like process of adoption of technological hits with diverse resulting threats and possible catastrophic results.*

Being intuitive, the perception needs not be rationally correct and the diagnosis can be wrong, according to the rational theory of fallible intuition discussed above; we must analyze this perception critically. Thus, we encounter here crucial questions:

1) What mechanisms limit and stabilize the avalanche-like processes of socio-economic adoption of technological hits?
2) Who is responsible for overseeing that these mechanisms work effectively?

The one mechanism that at least safely prevents any economic excesses is the market economy; people tried to replace market by human intervention in the communist system without success. However, it is only a robust mechanism, it does not solve many problems, as discussed above. As to the responsibility, obviously it should be borne first by the *technology brokers*. However, to be effective on the market, they must be motivated by profit, let us only hope that the motivation will be tempered by ethics. Ethics results from education; *who educates technology brokers?* Not technologists proper, but social, economic, management scientists. They should not only educate well technology brokers ethically, but also help them to understand their future jobs by analyzing the mechanisms of social demand for technology, of infatuation with technological hits, together with their dangers.

Thus, *the responsibility for socio-economic applications of technology, for overseeing the effective limitations of blind social fascination with technological hits lies also at social sciences.*

Unfortunately, they do not perform well in this respect. This is indicated by the question marks in Fig. 2: while the role of hard, basic sciences and technology proper versus its socio-economic applications is clear, social sciences, concentrated on their own internal crisis, do not seem to

even understand their role. This does not mean that technology proper is not co-responsible and should not at least try to work together with social scientists on limiting such dangers. However, a technologist usually considers carefully possible future impacts of technology developed by him; moreover, he must be careful because he knows that the blame for any possible misapplications will be put on him. On the other hand, the responsibility of technologists will not prevent all misapplications of technology. Human creativity of misapplications is boundless (*against stupidity, the gods themselves contend in vain*).

11. How post-Modern Social Science Perceives The Episteme of Basic Sciences and Technology

Instead of trying to understand technology—or, at least, the reasons and character of social fascination with technological products—representatives of social sciences often misinterpret and present in a distorted way the episteme of technology and that of hard sciences. Let us illustrate this by specific examples.

Pedagogy is no doubt social science, though it borders with humanities. The pedagogical theory of instructional design distinguishes three approaches *behaviorism*, *cognitivism* and *constructivism*, see, e.g., (Mergel 1998). The two former are called together *objectivist* and *constructivism* is counterposed to them as a new, better approach, see e.g. (Jonassen 1991). We do not doubt merits of constructivism; but we have severe doubts, whether objectivism as described in these papers represents truly the essential elements of the episteme of our cultural spheres. Specifically, (Vrasidas 2000), following (Jonassen 1991) and (Lackoff 1987) lists the following elements supposedly defining objectivism:

1) There exists a real world that consists of entities which are structured in their properties and relationships;
2) The real world is fully and correctly structured thus it can be modelled;
3) Symbols are representations of reality and are meaningful as far as they correspond to reality;
4) Human mind abstracts symbols in computer-like fashion so that it mirrors nature;
5) Human thought is symbol manipulation and is independent of human organism;
6) The meaning of the world exists objectively, independent of the human mind, and is external to the knower.

Each of the above points can and has been debated in the history of philosophy.[20] We shall give later an essentially different description of contemporary objectivism. Here we shall note only three critical remarks:

a) The above points are a mixture of epistemological beliefs of positivism and logical empiricism, belonging to the episteme of industrial civilization that lost their validity around 1950, and of the cognitivist belief in the analogy of human mind to a computer that lost its validity around 1990, see, e.g., (Wierzbicki and Nakamori 2006);
b) One of the best descriptions of objectivism, given by (Popper 1972), is generally quite different than the points listed above. It admits that knowledge is constructed by humans, nevertheless stresses the roles of objectivity and of the *third world* of ideas and knowledge, existing independently of human mind in our libraries etc., and called by us today *the intellectual heritage of humanity*, as the domain of existence of the meaning of the world;

[20] To give an example, we stress that even the belief in the existence of the real world is not necessary for objectivism, it is possible and logically consistent to believe in *idealistic objectivism*. However, we limit our discussions here to *realistic objectivism*.

c) Anyone who has constructed and used computerized models of outside reality, such as any good telecommunication engineer should do, knows that these models are only approximations of reality, thus the assumption of a correct and full structure of the real world supposedly needed for modelling is erroneous.

One could say that these six points supposedly describing objectivism are presented only as *the end of a spectrum of beliefs,* but this is precisely the problem: they serve as a *caricature distortion* constructed in order to be criticized, they do not describe what objectivist beliefs a technologist must have today in order to be successful when constructing technological artefacts. Thus, they do not help in—in fact, they prevent—a correct understanding of technology by social sciences.

One could also say that these six points serve only as a background of presenting the opposite concept of constructivism that is better suited as a basis of an educational theory. Let us quote thus how (Vrasidas 2000), following (Jonassen 1992) and (Lackoff 1987), characterizes constructivism:

(1) There exists a real world that defines boundaries to what we can experience. However, reality is local and there are multiple realities;
(2) The structure of the world is created in human mind through its interaction with the world;
(3) Symbols are products of culture used to construct reality. The mind creates new symbols by perceiving and interpreting the world;
(4) Human thought is imaginative and develops out of perception, sensory experiences and social interaction;
(5) Meaning is a result of an interpretive process and depends on the experiences and understanding of the knower.

Again, each of the above points can be debated, but we postpone it to the next section. We do not also argue here that a constructivist approach such as characterized by the points above might result in better theories of teaching, especially in giving more freedom to talented students.[21]

Suppose, however, that a teacher is convinced by the above arguments of constructivism and will use it in constructing her/his courses. Will the teacher refrain from propagating the constructivist epistemological beliefs between her/his students? We think that this would be impossible, because epistemological beliefs are like a system of basic values, define a personality that is the most important characteristics of a teacher. And even if the teacher "impartially" presents both these lists of points characterizing the objectivist and the constructivist epistemological beliefs as described above, the education of the students will be biased, because, as we noted, the description of objectivist episteme is distorted, does not teach the kind of objectivism truly needed by a student of telecommunication engineering. The alumni of such teaching courses will either fail in the construction of telecommunication devices and systems (for example, through the belief that the reality of the telecommunication network is local to their local area networks), or—if they turn to management instead of engineering—will fail to understand truly good engineers working with them.

This type of *distorted caricature* construction resulting in distorted views about technology and hard sciences occurs, unfortunately, rather frequently in social sciences, in effect preventing their understanding of either technology or hard sciences. Another example of this fact is the controversy of *soft* versus *hard systems thinking* in particular, the issue of *Soft Systems Methodology (SSM),* see, e.g., (Checkland 1978, 1982). SSM stresses listing diverse perspectives, including so-called *Weltanschauungen, problem owners,* and following open debate representing

[21] Although some suggestions of (Vrasidas 2000) show a clear lack of understanding of the difference between expert and novice fashion of decision making, see (Dreyfus and Dreyfus 1986): if students are asked to act as experts, this inevitably leads to a caricature of expert decisions.

these diverse perspectives. Actually, when seen from a different perspective, that of hard mathematical model building, SSM (if limited to its systemic core) must be also evaluated as an excellent approach, consistent with the lessons derived from the art of engineering system modelling even much earlier. More doubts arise when we consider not the systemic core, but the paradigmatic motivation of SSM.

(Checkland 1978, 1982) clearly indicates that he is motivated by the belief in the enslaving, degrading and functionalist role of technological thinking. He argues that mathematical modelling cannot adequately describe human behaviour (which opinion, although debatable, can be accepted in principle, since a model can never be fully adequate) and that mathematical modelling cannot express complexity (which opinion actually shows ignorance, since already in 1963 Lorenz started the development of mathematical theory of deterministic chaos that eventually helped to unravel complexity through the principle of emergence).

SSM is presented by (Checkland 1982) as a general method, applicable in interdisciplinary situations; but a sign of misunderstanding is the opinion that *soft systems thinking* is broader and includes *hard system thinking* as defined there, see Fig. 3A. Such an opinion, however, indicates a belief that the episteme of social sciences is superior to the episteme of hard sciences and technology. If we follow the principle of cultural anthropology mentioned above, we should rather represent the relation between *soft systems thinking* and *hard system thinking* as shown in Fig. 3B: these two areas have some (unfortunately, small) common intersection, but also large parts that are not common to both of them.

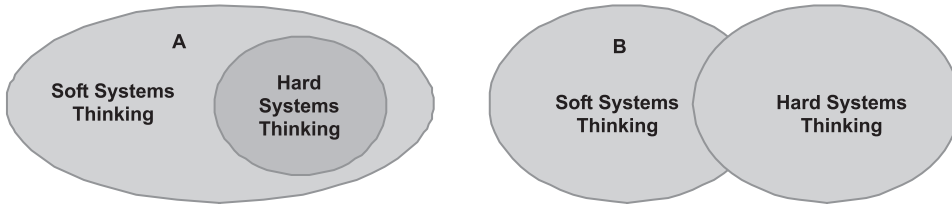

Fig. 3. A: The relation of *soft systems thinking* and*hard systems thinking* according to Checkland (1978); B: the same relation resulting from the distinction of different episteme of cultural spheres

We can also ask: *should not SSM be also applicable to itself?* It includes two *Weltanschauungen: hard and soft;* thus *the problem owners of hard Weltanschauung should have the right to define their own perspective.* However, hard systemspractitioners never agreed with the definition of hard systems thinkinggiven by Checkland. He defines hard systems thinkingas the belief in the statement of (Ackhoff 1974) that *all problems ultimately reduce to the evaluation of the efficiency of alternative means for a designated set of objectives.* On the other hand, hard systemtechnological practitioners say *no, they are hard because they use hard mathematical modelling and computations, but for diverse aims, including technology creation, when they often do not know what objectives they will achieve.* Thus, Checkland used a *distorted caricature* definition of hard systems thinking in order to prove the futility of computerized modelling and the superiority of soft systems thinking. While we admit that soft systems thinking has its advantages, the distorted definition of hard systems thinking resulted in the absolute lack of understanding of hard systems science by social science, since the latter follows Checkland in this respect. As a result, if managers are educated in soft systems thinking including this interpretation of hard, they will never be able to understand technology development that requires today a creative use of computerized modelling: since real experiments are very costly, they must be prepared by extensive virtual experiments.

Such *caricature* constructions have their own life, are apt to influence beliefs of many other researchers. For example, the distorted definition of hard systems science given by Peter Checkland influenced in return Michael Jackson, see, e.g., (Jackson 2000), in his construction of the four cornerstone paradigms of *critical systems thinking,* later repeated as the basis of *creative holism: functionalist systems thinking, interpretive systems thinking, emancipatory systems thinking,* and *post-modern systems thinking.* We do not have any doubts about interpretive systems thinking as such (including the *SSM,* soft systems methodology of Checkland, if stripped of its distorted views about hard systems thinking), nor about emancipatory systems thinking. In fact, the remarks here represent our arguments for emancipation—of the technological and hard systems thinking from the domination by social and soft systems thinking.

Influenced by Checkland, Jackson includes hard systems thinking in the functionalist systems thinking; we would rather argue that *hard systems science creates its own, separate paradigm common with its technological and hard science applications,* since all remaining parts of the four paradigms discussed by Jackson concern social science; emancipatory systems thinking, if taken seriously, should insist on such division. In order to prove that such a division is necessary for avoiding domination, let us just quote how Jackson characterizes hard systems thinking. In (Jackson 2000, p. 138), he summarizes *"the faults of hard systems thinking as arising from its inability to deal with subjectivity ..., its difficulties in coming to terms with extreme complexity ..., and its innate conservatism".* We must only say that all these points can be severely debated and—for a hard systems practitioner—this judgment is just another *distorted caricature.*

Thus, technological and hard systems science has all reasons to *demand that hard systems thinking is excluded from the social science category of functionalist thinking* and is counted as a separate paradigm—in fact, separate to all social systems thinking. We are not saying that social systems thinking is not valuable, but we are saying that it is based on the episteme of social sciences that, during the second half of the 20^{th} century, has grown apart very far from the episteme of technology and that of hard and natural sciences.

The part of social science that went farthest in modifying the episteme is the post-modern paradigm in general and the post-modern sociology of science in particular. In fact, we believe that even if the post-modern paradigm has produced some interesting and valuable ideas (such as the concept of an episteme), it positioned itself so much at conflict with the episteme of technology and hard sciences that their reconciliation is impossible. There are several reasons for such belief.

Firstly, post-modern social science believes in the *centrality of discourse* and *the discursive production of an individual.* We are sorry, but while we value discourse, we must protest against reducing humanity to social communication only:

> Humanity is defined both through communication and through tool making, thus both sociology and technology address basic human faculties; an individual is produced through her/his both communicating and tool making abilities.

Secondly, post-modern social science believes in *the loss of power of grand narratives* but in fact goes further, postulating a destruction of many higher values (such as, e.g., rationality, predictability or order). While grand narratives are bad if they lead to dangerous social experiments, people must believe in some narrative to be motivated for concerted action. Such motivation is necessary for a team working on technology creation, thus this postulate of post-modernism is irreconcilable with the technological episteme. This postulate is also irreconcilable with the practice of management, where big companies in the time of knowledge economy must be motivated by appropriate visions and missions.

Thirdly and specifically, post-modern sociology of science postulates the *destruction of objectivity*, starting with the destruction of objectivity of knowledge, see, e.g, (Lyotard 1984), where power is assumed to be the dominant motivation of knowledge creation, or (Latour 1990), where all scientific creation is shown to depend on money and power, thus supposedly there can be no objectivity. We believe, contrariwise, that *objectivity is a higher value, similar to ethical values and necessary both for hard scientific and for technological knowledge creation.* It is obvious that knowledge creation depends on money and power and can also in return produce them; but it is irreducible to them, such as software cannot be reduced to hardware even if it cannot function without hardware. Thus, the following critical remarks can be directed against this basic postulate of post-modern social sciences:

(a) Their reasoning when trying to destroy objectivity is based on a reductionist argument, inadmissible in the knowledge civilization era;
(b) Their reasoning might be suspected of self-serving motivations, because experimentation in social sciences is difficult (or even dangerous), thus the deconstruction of objectivity would be advantageous for them;
(c) The reduction of knowledge and objectivity to power and money is likely to encourage both scientific frauds (in fact, recent increase of such incidents, such as Hwang Woo-suk's wrongdoing in academia, can be seen as encouraged by this reduction), and political distortions of objectivity (in fact, current president of Iran only recently quoted directly the post-modern destruction of objectivity in his criticism of Occidental culture).

For these reasons, we do not think that we can include post-modernism in the emerging episteme of knowledge civilization era. It was simply an intellectual fad of the end of industrial civilization, a sign of a change of eras, when it is fashionable to believe that *anything goes.* Naturally, it produced some valuable concepts that will remain in the intellectual heritage of humanity, some of them of lasting value—such as the concept of episteme or the stress of the rights of marginalized elements in the concept of pluralism—some of a passing curiosity value.

12. The Emergent Episteme of Knowledge Civilization and Conclusions

The emergence of new concepts and properties on higher levels of complexity was noticed for a long time in philosophy, see (Król 2006). But a clear formulation of emergence principle evolved first with the empirical evidence of the concept of punctuated evolution in biology,see (Lorentz 1965), noted also by (Popper 1972); then it was rationally reinforced by the concept of order emerging out of chaos, see (Prigogine and Stengers 1984, Gleick 1987); parallel, it was pragmatically substantiated by technology, in the hierarchical systems theory (Findeisen et al. 1980), as well as in the concept of seven layers of telecommunication protocols, see, e.g., (Wierzbicki and Nakamori 2006).

Thus, the *reduction principle of the industrial episteme—that the behaviour of a complex system can be explained by the reduction to the behaviour of its parts*—is valid only if the level of complexity of the system is rather low. With very complex systems today, we should use instead:

Emergence principle:
new properties of a system emerge with increased level of complexity, and these properties are qualitatively different than and irreducible to the properties of its parts.

It is a fundamental conceptual change. Even if it might seem that emergence principle logically results the *principle of synergy* or *holism*—that *the whole is more than the sum of its parts,* see (Bertallanfy 1968), this is not necessarily a correct interpretation. The principle of synergy or holism does not say that the whole should have essentially different properties than its parts. Thus, sciences of the 20^{th} century, accustomed to the atomistic or sub-atomistic reasoning of physics, continued to believe in reductionism: a whole might be slightly greater, but is still reducible to its parts. This is precisely how sociology of science attempts to reduce objectivity to power and money. However, information technology provided a counterexample to such reasoning already in the middle of 20^{th} century, only its importance has not been widely noted: this is the distinction of *software* from *hardware*. Software cannot function without hardware, but its functions cannot be explained by analysing hardware; it is simply a quite different level of complexity. Thus, the emergence principle stresses that with an increased level of complexity, the concepts of synergy and holism still are applicable, however, the whole is then not only greater, but qualitatively different and irreducible to its parts. In this sense we are saying that *the emergence principle expresses the essence of complexity* and means much more than synergy or holism.

It is also a fundamental intellectual challenge. The new concepts that emerge on higher levels of complexity are obviously constructed by people and are products of culture in a historical, long term sense. However, how do we use emergence principle in a pragmatic, not in a historical sense? In other words, how do we recognize that an increased complexity substantiates the introduction of a new concept? We are that much accustomed to reductionist thinking that we use it subconsciously — most of our logic is in fact reductionist. However, we should be aware that *if our reductionist arguments grow too complex, it is time to seek for new metaphors expressing new needed concepts.* This is best expressed by the already quoted words of Albert Einstein: *good theories should be simple—but not too simple.* This also indicates that much what was written in the second half of 20^{th} century needs to be critically evaluated or even revised precisely from the perspective of the emergence principle.

The second fundamental principle is related to an evident trend in web communications and in recording our intellectual heritage: to include more multimedia messages and records. As indicated by the earlier discussion of trends in digital technologies, it might take a few decades yet until this trend will fully mature. However, an understanding of the full significance of this trend is related to the rational theory of powerful but fallible intuition (Wierzbicki 1997; 2004; Wierzbicki and Nakamori 2006) mentioned earlier. According to this theory, visual and generally preverbal information is much more powerful than verbal, since images require at least ten thousand times more processing capability; human mind has such capability but it is suppressed to subconscious by verbal reasoning and, for the lack of words to describe it, is called intuition. The multimedia principle combines these arguments:

Multimedia principle:
words are just an approximate code to describe much more complex reality, visual and generally preverbal information processing is much (at least 10.000 times) more powerful and relates to intuitive knowledge and reasoning, future records of the intellectual heritage of humanity will have multimedia character, thus stimulating creativity.

This is perhaps even more fundamental conceptual change than the emergence principle, since almost all philosophy of 20^{th} century attached a great role to words, concentrated on communication to that extent that it tried to reduce humanity to discourse. An exception was Martin Heidegger with his *being in time* (Heidegger 1927) or, in Japan, Kitaro Nishida with his *Basho* or *action-intuition* (Nishida 1990); however, even Karl Popper (Popper 1972), although he

noted the difference between verbal and other sensory information, was convinced that words are more important. All logic can be interpreted as rules of correctly using words. On the other hand, all tool making was originally intuitive and preverbal, hence the roots of technology are preverbal.

This is also a great intellectual challenge: we must learn to speak about preverbal perception and intuition (contrary to the classical advice *wovon man nicht schprechen kann, darüber soll man schweigen* of Ludwig Wittgenstein, 1922), that is, we must devise new concepts that will enable us to analyze intuitive aspects of knowledge and knowledge creation. However, as indicated in the conclusions of (Wierzbicki and Nakamori 2006), the multimedia principle might indicate that all the dichotomies of *logical empiricism versus humanistic rationalism, reason versus being,* or *technical versus practical,* that were so pronounced in the history of philosophy during the industrial age, can be explained in the knowledge age in a different way, in terms of the dichotomy *verbal versus preverbal*. In particular, the dichotomy of *reason versus being* is not a sign that human reason is a kind of cancer on the biological development of the universe, nor is it a joke played by the Devil in opposition to the Creator. We can explain this dichotomy simply: our mind is most creative when engaged in *preverbal* reflection and imagination, thus it always tends to immerse itself in deep thought, in opposition to precise *verbal* formulations.

The multimedia principle is perhaps even more important than the emergence principle, also more important than other trends such as digital intelligence (which was originally understood only in verbal sense) and implies that we should use as much multimedia content as possible in order to stronger stimulate creativity. This will have impacts comparable or exceeding the development of printing technology, thus becoming the essence of the new civilization age.

Based on these two fundamental principles, we can give now a short description of an epistemological position that might be called *constructive objectivism,* closer in fact to the current episteme of technology than to that of hard sciences:

1) People are not alone in the world; beside other people, there exists other parts of reality or of *nature,*[22] although parts of this reality have been converted by people to form human-made, mostly technological systems. There are parts of reality that are local and multiple, there are parts that are—more or less—universal.
2) People developed both *language* to communicate with others, and *tools* to convert various aspects of nature according to their needs; humanity can be defined only when taking into account both these basic human faculties.
3) According to the *multimedia principle,* language is a simplified code used for describing much more complex reality, while human senses (starting with vision) enable people to perceive much more complex aspects of reality. This more comprehensive perception of reality is the basis of human intuition; for example, tool making was always based on intuition and on a more comprehensive perception of reality than just language.
4) People have an innate curiosity about other people and nature, thus they *construct hypotheses* about reality, while *creating a structure and diverse models* of the world. Until now, all such hypotheses turned out to be approximations only. Since we perceive the reality as more and more complex, thus devise concepts on higher and higher levels of complexity according to the *emergence principle,* we shall probably always work with approximate hypotheses.
5) *The origins of culture are both linguistic,* such as stories, myths, symbols, *and technical*, such as tools and devices used for improving human life. Both these aspects helped in a slow development of *science*—by testing, abstracting and accumulating human experiences with nature, tools and other people, by testing and refining corresponding models and theories.

[22] We do not discuss here whether we shall say *nature* or *Nature,* whether *Nature* is equivalent to *Matter* or to an omnipresent *God*, or whether *God* and *Matter* are separate aspects of *Nature*, or whether *God* is the *Creator of Nature* or *He is a Goal* to be attained by the development of nature and people.

6) The accumulation of human experiences and culture results in and is preserved as the *intellectual heritage of humanity* (or the *third world* of Popper) with its *emotive, intuitive and rational*[23] parts, existing independently from human mind in libraries and other depositories of knowledge.
7) Human thought is imaginative, has also emotive, intuitive and rational components and develops out of perception, sensory experiences, social interaction, and the interaction with the intellectual heritage of humanity, including interpretive hermeneutic processes.
8) Objectivity is a higher value that helps us to interpret the intellectual heritage of humanity, select its components that more closely and truthfully correspond to reality, or are more useful either when constructing new tools or when analysing social behaviour of people.
9) A prescriptive (in a short term) interpretation of objectivity is the *principle of falsification:* the measure of validity of any hypothesis, theory, or a model is the number of attempted falsification tests that this hypothesis, theory or model has successfully passed. A long term descriptiveinterpretation of this principle is evolutionary: hypotheses and theories, preserved in humanity intellectual heritage, evolve similarly to biological species—the more objective ones have a better chance of survival.
10) While above general principles are equally applicable to hard and natural sciences, social sciences with humanities, and technology, they might be differently interpreted by them: hard and natural sciences search for theories that are universal, calling them the *laws of nature,* and are thus influenced by *paradigms, exemplars* of such theories; social sciences and humanities concentrate on local and multiple aspects of reality, thus follow multiple paradigms; technology is most pragmatic, motivated by the joy of creating technical artefacts, and therefore it is following rather the principle of falsification than paradigms.

We are aware that the contemporary differences between the episteme of the three cultural spheres of social sciences and humanities, of hard and natural sciences, and of technology are very great, thus the acceptance of the principles listed above might take a long time. For example, modern history valued objectivity, believed that we shall report history following Herodotus principles or *wie es eigentlich gewesen war.*[24] However, post-modern sociology of science attacked that belief and promoted the slogan *winners write the history.* We believe, on the other hand, that this slogan, even if historically correct, is ethically wrong: we cannot permit that our intellectual heritage be polluted, our descendants should know the history written possibly most objectively. But it will take time until the harm done by post-modern interpretations is overcome.

We are also aware that the principles we listed above might be modified in such an adoption process. But we listed them precisely for that purpose, to present them as an object of discussion and possible falsification.

We turn now to the conclusions from this chapter; we are aware that there might be many such conclusions and present here only most important. While important conclusions are related to the conceptual platform and the new episteme of the knowledge civilization era, the most important conclusion seems to be that the *Complexity Change* between the industrial and knowledge civilization era is vast and brings both great hopes and great dangers, generally—a great challenge. The world in the coming era will be quite different than the world now; however, we can at least try to use the *Change* for solving most pressing problems facing humanity.

[23] *Emotive heritage* consists of explicit part such as *products of arts* (music, paintings, literature, movies) as well as of tacit part: *collective unconsciousness, archetypes, myths and instincts of humanity. Intuitive heritage* contains, e.g., *a priori synthetic judgments* of Kant, not necessarily true but nonetheless very powerful in stimulating scientific creativity. *Rational heritage* contains all recorded experience and results of rational thinking of humanity—non-fiction, sciences in their broadest sense, including on one end of the spectrum theories of technology and on the other end theories of arts (such extremes, however, always touch between themselves). See (Wierzbicki and Nakamori 2006).

[24] *As it actually happened;* this principle was introduced by Leopold Ranke about 150 years ago.

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LESZEK KUŹNICKI

COGNITIVE AND CIVILIZATIONAL PROBLEMS OF CONTEMPORARY SCIENCE

July 2005 marked the 125th anniversary of the first *Science* issue. On this occasion the *Science* team fielded 125 questions to which contemporary science has failed to provide a satisfying answer[1], of which they selected 25 as most crucial for human education and humanity's future prospects. Some of these questions arose in our times, some have remained unsolved for more than a century. Each was analyzed in a separate article. Here is a list of these main problems in the same order in which they appeared in *Science*:

1. What Is the Universe Made Of?
2. What Is the Biological Basis of Consciousness?
3. Why Do Humans Have So Few Genes?
4. To What Extent Are Genetic Variation and Personal Health Linked?
5. Can the Laws of Physics Be Unified?
6. How Much Can Human Life Span Be Extended?
7. What Controls Organ Regeneration?
8. How Can a Skin Cell Become a Nerve Cell?
9. How Does a Single Somatic Cell Become a Whole Plant?
10. How Does Earth's Interior Work?
11. Are We Alone in the Universe?
12. How and Where Did Life on Earth Arise?
13. What Determines Species Diversity?
14. What Genetic Changes Made Us Uniquely Human?
15. How Are Memories Stored and Retrieved?
16. How Did Cooperative Behaviour Evolve?
17. How Will Big Pictures Emerge From a Sea of Biological Data?
18. How Far Can We Push Chemical Self-Assembly?
19 What Are the Limits of Conventional Computing?
20. Can We Selectively Shut Off Immune Responses?
21. Will Deeper Principles Underlie Quantum Uncertainty and Nonlocality?
22. Is an Effective HIV Vaccine Feasible?
23. How Hot Will the Greenhouse World Be?
24. What Can Replace Cheap Oil—and When?
25. Will Malthus Continue to Be Wrong?

[1] This issue of *Science* (vol. 309, no 5731) is entitled *What Don't We Know?*

Today we are unable to provide clear and satisfactory answers to any of these questions. Why then did *Science* pick them as the most pressing?

First, the issues they address differ considerably in scientific import. Some are fundamental, others quite trivial, some of a general nature and some narrow and specialized. The three final questions concern economy and environment, spheres of equal importance to politics and the public sector as science. Still, the overwhelming majority appears to be *life science* related, only seven questions involving other scientific fields.

Thus, what mainly drove the *Science* team's choice were public expectations of science and not fundamental issues of interest only to specialists. For instance, until this day we have developed no method of integrating the relativity theory with the quantum uncertainty principle stemming from quantum mechanics. Moreover, there are rising indications that the search for one "universal theory" may have been a fundamental misconception. However, not even scientists today fully realize how important this question is—much differently than in the case of prolonging life or finding an AIDS vaccine, both matters of primary concern for science as well as the population at large. The three last questions address environment, energy and food industry, very general spheres but crucial for the future of *Homo sapiens*.

The vast majority of the Earth's population would doubtless choose to keep their good health for as long as possible and live long lives in friendly environments which also ensure all of civilization's comforts. The search for answers to most of *Science*'s questions will be a step towards this goal.

This brings us to another important conclusion—for the first time in history science has found itself under strong public pressure. This is most evident in public and private spending on science: biomedical and environmental projects have the biggest funding chances.

This enormous, unprecedented social pressure on scientists and research institutions is partly the result of the spread of digital and IT communication. The global information revolution—and its diverse effects—are a fact.

This has resulted in epistemological writings seeking a universal definition for the condition of contemporary knowledge. One of these is an article by Andrzej P. Wierzbicki, Akio Kamoeka and Yoshiteru Nakamori entitled *The New Era of Knowledge Civilizationand Its Episteme*[2]. As the title suggests, its authors attempt to describe the emerging new era, which they call "the era of knowledge civilization". One of its founding elements is the information revolution, but it is not the essential driving-force. In the era of knowledge civilization knowledge plays a bigger role than plain information, hence its to-date descriptions as "postindustrial", "post-capitalistic" or "information era" are no longer correct.

The New Era of Knowledge Civilization and Its Episteme aims at creating a conceptual platform and *episteme* for the new knowledge era. I am not quite sure why the authors chose the Greek term *episteme*—possibly, true to antique philosophy, they wanted to accentuate scholarly cognition as opposed to *doxa*, the subjective cognition typical to non-scientific milieus.

Although I disagree with some of the conclusions in *The New Era of Knowledge Civilization*, I consider it an interesting and recommendable article representing the views of certain technical scientists.

For one, I reject the suggestion that the latter half of the 20^{th} century saw the emergence of separate epistemologies for the "culture spheres" of technology, hard science (physics, natural sciences) and the social sciences and humanities. According to the authors a common epistemology for these three culture spheres will only be possible at a later stage of knowledge civilization. Moreover, the process may take time, the authors predicting knowledge civilization to last about a hundred years.

[2] *The New Era of Knowledge Civilization and Its Episteme.*

Wierzbicki, Kamoeka and Nakamori believe their conclusions have laid the foundations under a common *episteme* for all three spheres, of which they especially favour technology, and this for several reasons. First, technologists are pragmatic and select scientific theories by their usefulness and advantages for humans. Their method is closer to Popper's falsification theory while exact scientists rather lean towards Kuhn's paradigm concept. Also, the creative power of technologists is close to artistic creativity, therefore has a liberating effect. Thus, the anti-technological trend launched by Marcuse in 1964[3] finds no confirmation in fact. The "one-dimensional man" created by technological growth simply does not exist.

The New Era of Knowledge Civilization and Its Episteme is based on four main concepts:

1. It emulates technology and technologists as the most creative builders of contemporary knowledge.
2. It criticizes the post-modernistic postulates dominating the social sciences.
3. It decidedly propagates anti-reductionism and the new emergence principle, which the authors have thus formulated: "The system's new properties emerge together with its rising complexity. These properties are qualitatively different and therefore cannot be reduced to its parts (elements)".
4. The authors named the new epistemology "constructive objectivism" and based it on a "multimedial principle". Here is this principle's content: "Words (language) are only a rough code which serves to describe a very complex reality. The visual and universal pre-verbal information process is at least ten thousand times stronger and tied to intuitive knowledge and reason. In future humanity's intellectual heritage will be stored multimedially and in ways that further creativity".

My critique of the views defended in *The New Era of Knowledge Civilization and Its Episteme* also concerns the following: the segregation of scientists into separate culture spheres is by no means new. Already in 1960 C. P. Snow[4] maintained there existed two cultures—that of the humanities and that of "science" and "technology". This theory found no great acclaim, and this although the English term "science" embraces both the exact and the natural sciences. In my belief contemporary science is becoming increasingly interdisciplinary despite high specialization, the trend for heretofore totally unrelated fields to converge dominating over the wish for separateness.

On a global scale we are witnessing industrial civilization's gradual transition to another model, best known under the term "information civilization". The process is an undisputable fact, hence I consider the idea to rename it "knowledge civilization" confusing. Also, forecasts that this civilization will last a century sound to me like pure fantasy.

IT technology has provided researchers in many fields with new tools. Digital processing enables the storage of vast quantities of data, however there is a serious snag here: computers generate more data than our brain can process. Rising computerization has to date proven helpful in many research fields, nonetheless to my mind it has changed neither the epistemology nor even the nature of science-generated knowledge.

Thus, I see no objective reasons why the outset of the 21st century should be regarded as a "threshold to knowledge civilization" and hold the juxtaposition of "information" and "knowledge" civilization for exaggerated or at least premature. According to the three growth criteria applied to knowledge-based economy as the material basis of information civilization, the world is still far removed from information civilization, not to mention knowledge civilization. To date only 15 of the world's 225 countries (together numbering no more than 0.7 billion people or about 12 percent of the current global population) have come in contact with these criteria.

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[3] H. Marcuse, *One-dimensional Man*. Boston 1964, Bacon Press.

[4] C. P. Snow, *The Two Cultures*. Cambridge 1960, Cambridge University Press.

Simultaneously, the early 21st century is marked by rising anti-scientism, with diverse research schools not fully up to scientific standards (despite their protagonists' conviction that they represent the avant-garde of science) not only refusing to disappear but even gaining in strength and social influence.

To such fields I personally count psychoanalysis and emergentism, and the somewhat younger post-modernism. Postmodernists are essentially antiscientific in their claims that every truth depends on context, scientific knowledge is created by negotiation and history written by its victors. Indeed post-modernism with its free interpretations of terms like "fact", "comprehension" or "explanation" can hardly be viewed as scientific.

In turn religious fundamentalists totally reject scientism and rationalism. This is a typical stance for many followers of Islam, Judaism, Hinduism and Christianity, and usually accompanied by religious conflict mounting to crime and warfare. In my belief, despite our considerable scientific progress we are still very far away from "knowledge civilization"—two of whose characteristics should be dialogue and universalism.

Neither do I see any essentially new or original paths to the scientific creation of knowledge in the epistemology professor Wierzbicki and his associates dubbed "constructive objectivism". Their strong accentuation of the holistic approach does not reach beyond the system analysis created by Ludwig von Bertalanffy (1901–1972) in the first half of the 20th century.

References to pre-verbal information, intuition, and individual and collective subconscioussness as the main sources of new knowledge are on the one hand a continuation of the psychoanalytical theory created by Sigmund Freud, developed by Carl Gustav Jung and further honed by their numerous followers, and on the other an effect of emergentism. Closely linked to names like Samuel Alexander, Jan Ch. Smuts and C. Lloyd. Morgan, emergentism explained growth by spiritual factors and was a strictly theological thought school. Like psychoanalysis, it was most popular in the first half of the 20th century. Most of the theses underlying psychoanalysis and emergentism could be neither falsified nor verified by biology and medicine.

The New Era of Knowledge Civilization and Its Episteme makes no reference to the outstanding writer and philosopher Henri Bergson (1859–1941), an especially avid advocate of intuitive cognition. According to Bergson intuitive cognition outranks sensual and rational cognition in every way as it cannot be expressed by reality-deforming words.

It also escapes me on what evidence Wierzbicki and associates based their view that the invention of tools, crucial for the evolution of hominids and especially *Homo sapiens*, was intuitive and pre-verbal. Without convincing paleontological, archeological, neurophysiological and psychological proof the epistemology of "constructive objectivism" is merely an unproven hypothesis. The same applies to the thesis that pre-verbal information, intuition and multimedial perception not only played an instrumental role in creating knowledge in the past, but also do today.

In my belief technology's main task is producing new and better tools and material goods. It can also contribute to creating scientific knowledge, but is of no great meaning to epistemology. It is also a fact that the growth of IT technology was accompanied by a retreat of rationality—and this in completely unexpected fields like molecular biology.

2006 saw the publication of Francis S. Collins' book *The Language of God. The Scientist Presents Evidence for Belief*[5]. The title was criticized by Robert Pollack in a late-September review in *Science*[6].

First a few words about the book's author, then the reviewer. Francis S. Collins works at NIH in Bethesda, where he also chairs the National Human Genome Research Institute. It was he

[5] New York 2006, Free Press Simon and Schuster.

[6] R. Pollack, *DNA, Evolution and the Moral Law: Science*, 2006, Vol. 313, 1890–1891.

who on June 26 2000, together with Craig Venter from the rivaling Celera Genomic Corporation, informed then U.S. President Bill Clinton that their teams had independently managed to complete a draft sequence of the human genome's molecular structure. It turned out that the human genome consisted of 3 billion nucleosides.

Francis Collins is not only an eminent molecular physicist but also a pious, practicing Protestant. His book *The Language of God. The Scientist Presents Evidence for Belief*, attempts to combine Christian faith with evolutionism with special weight on the biological aspects of morality.

Robert Pollack works at Columbia University's Centre for the Study of Science and Religion and also declares himself a religious person.

Francis Collins harbours no doubts that the first earthly life forms appeared as a result of natural processes almost 4 billion years ago. It is also evident to him, that ever since life has been a ceaseless process based on the physical continuity of DNA particles sequenced by random mutations. Collins is also a Neo-Darwinism advocate claiming the development of new species from simple to more complex forms is the effect of prolonged natural selection and that humanity and *Homo sapiens* are a result of the same process that formed millions of other species.

Thus, the Divine Creator did not operate by means of distinct miracles but natural processes, which by His will we are able to comprehend. This view is well-reflected by the subtitle, *The Scientist Presents Evidence for Belief*. However, Collins does not stop here, but goes on to the origins of what C. S. Lewis over half a century ago defined as "Moral Law"[7]. As an example of Moral Law in action Collins quotes Christ's tale about the Good Samaritan recorded in the Gospel of Luke. Collins' book seems to maintain that Moral Law—or doing good and acting justly—is somehow encoded in the human genome.

In his *Science* review Pollack accuses Collins of contradicting himself. Human consciousness, he says, is from birth to death a product of human interaction with the surrounding world and not a pre-set behaviour code switched on at birth. Hence, Moral Law understood as the presence of God in our midst can not be reduced to DNA sequences or even the entire human genome. But if it is not encoded in our DNA, how can it be the language of God?

Francis Collins is doubtless a courageous scholar. His book appeals to the faithful to cease battling with scientists and accept that only scientific research can provide insight into life's processes and the genesis of the world's species. This appeal is mainly addressed to protestant fundamentalists, who, inspired by their literal interpretation of the Bible, also believe that the Old Testament's remarks about the origin of the universe, nature and humanity should be taken literally.

The term "biology" comes from Greek and is a combination of two words—*bios* (life), and *logos* (knowledge). Collins called his religion-based vision of nature "biologos", which brings to mind the first sentence of the Gospel of John as in Greek *logos* also means "word". Perhaps he also wanted to suggest a different interpretation of this sentence—"In the beginning there was knowledge, and knowledge was in God, and knowledge was God".

The Language of God... is further proof that attempts to link religion to the achievements of contemporary science invariably end in irreconcilable conflict regardless of the intentions and knowledge of those who undertake them. And no wonder, as biologywise both are absolutely unrelated.

Nonetheless the issue of Moral Law (whose material origins can not, regardless of Collins' beliefs, be rooted only in DNA) does exist, and is of crucial ethical and practical import also in molecular biology—especially genomics. The race between the Human Genome Project at the

[7] C. S. Lewis, *Mere Christianity*, London 1952, Richard Bles.

public institution NIH and the private-sponsored Celera was not so much for prestige—at play from the very start was very big money, which immediately pushed all ethical considerations aside.

The first head of the National Center for Human Genome Research, 1953 DNA co-discoverer James D. Watson, was forced to resign the post in 1992. He was replaced by Francis S. Collins, and this for a very distinct reason: Watson opposed the patenting and commercial use of uncovered DNA sequences, and believed research on nucleic acids and their relations to proteins should remain a domain of basic research. In Watson's opinion studies of human DNA—and any DNA—should serve the public good and be public property, not a goldmine for the few who manage to patent DNA fragments.

The commercialization of this science field and the pace at which genetic DNA sequences are patented have surpassed the most pessimistic forecasts. And the rush to beat competitors is so high that in some of the cases it is even uncertain if the patented sequences have any encoded protein.

Robert Pollack asked the author of *The Language of God*... "how he reconciled this fact with his postulate of Moral Law's encodement in human DNA". Doubtless this is another contradiction Francis S. Collins failed to avoid.

Collins' main contender Craig Venter focused on sequencing his own genome. In *Nature* of October 25, 2006 he reported that the project was in its closing phase and would offer the first-ever picture of a single human genome. Venter plans to make the results of his work public, which opens another ethical question: whether and to what extent data on individual human genomes should be protected in future. This, however, is a problem for the future, today we must rather search for the right balance between basic and applicative research.

Today ambitious research in fields like physics, biology and medicine requires considerable money and international cooperation. Knowledge and ideas are not enough, also necessary are financial means to support such projects over extended time. Such big money is mostly in the hands of pharma, nanotechnological, chemical, and biotechnological corporations and their R&D outlets, who publish their findings only after they have been patented and put to commercial use.

The severe competition in this field doubtless drives research into new medicines, materials, production technologies and food products. Commercialization, however, is a double-edged sword when it comes to science, as it channels publicly-funded research into fields which promise quick application. In their battle for votes politicians tend to back projects whose results can be put to practical use fast—an example here are the priorities and structure of the EU's 7^{th} Framework Programme.

The rising trend to support applicative research may in future bring negative effects both to science and humanity as two factors appear crucial for the growth of scientific knowledge—the research field must be possibly broad and information flow unlimited. How this can be reconciled with commercial science remains an open question.

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HOW TO COMMUNICATE IN THE GLOBAL WORLD? THE CASE OF GLOBAL LANGUAGE

If we make the assumption that we already live in a global world (if not in a global village) the problem of communication in a mutually comprehensive way immediately arises. I take here this assumption for granted leaving aside the two main approaches to the fact of globalization, one treating it as the era of interconnectedness between very many countries where the process of "democratization of technology" and "democratization of finance" (Friedman, 1999) is occurring, and the other treating the fact of globalization as the era of vast expansion of American values (so-called McDonaldization) resulting in "progressive spatial segregation, separation and exclusion" (Bauman, 1998, p. 3).

Good or bad globalization does exist. So the notion of a "global language" has arisen and has evoked a lot of interest followed in the first decade of 2000 by many publications (such as several books by David Crystal, a compendium edited by Jacques Maurais and Michael A. Morris *Languages in the globalising world* or *The Power of Babel* by John McWhorter; see also References).

The notion of "global language" was explicitly formulated by David Crystal in the title of his book: *English as a global language* (1997/2003). What is a global language? Of course one cannot answer this question by just saying: This is English. If we study the history of human thinking, the wish to have one common language has always been quite strong. Starting from the biblical story of the Tower of Babel where the diversification of languages was treated as God's punishment for human sin, we have to accept the idea that one common language has always been regarded as an ideal state.

The notion of a global language has functioned in human thinking under different names such as universal language, lingua franca, etc. Umberto Eco in his book *In the search for a universal language* (2002) investigated the history of the many attempts to create such a language. First, there were inquiries for a language from before Babel, the so called Adam's language, then for a perfect language in form and content. As candidates, some cabalistic systems, philosophical languages or magical codes were proposed. Quite interesting is the story of international artificial languages like Esperanto invented by Ludwik Zamenhoff. He created a language with very simple grammatical rules free of exceptions and based on vocabulary stemming from the Indo-European family of languages, according to the rule that a given word should have a similar root in several languages from this language family. After a period of great interest (several translations of world masterpieces have been made into Esperanto), nowadays this enthusiasm has faded.

For several centuries Latin as a lingua franca constituted a special case in Europe. Latin had been spoken two millennia ago in the whole Roman Empire but since then was fragmented into mutually unintelligible varieties, the so called Romance languages: French, Spanish, Italian, and so on. Nevertheless, its classic form, documented in many writings and as the language of religious services in the Roman Catholic Church, endured for several centuries. Already a dead language Latin was still taught in schools and universities and was used in scientific writing. As such it served as a lingua franca even in countries where its derivatives had became mother tongues. But since the Enlightenment the use of Latin has gradually decreased. In Europe Latin as one of the foreign languages was taught in secondary schools until the middle of the twentieth century; nowadays several important centers of classical studies are still active in the universities. The Finnish radio is broadcasting news in Latin three times a week. The Roman Catholic Church keeps Latin as an official language in the Vatican, but since the Second Vatican Council (1962–65) all religious services are performed in local languages of the particular countries.

Has English now started to play the same role as Latin did for many centuries? Are there any analogies between Latin as lingua franca and contemporary English as a global language?

The story of English in its global role is quite new. Its primacy started only after World War II, before which French pretended to this position, for example, as the language of diplomacy. Some scientists claim that its success lies in logic and in the simplicity of its grammar. English is really an exceptionally logical language because it never uses a double negative which according to the rules of logic makes an affirmation. But some derivatives of English like Black English has already introduced a double negative and very young English speaking children before becoming fluent speakers are inclined to make such "errors". The simplicity of English grammar is simply a sort of myth. Its morphology is really simple, almost unmarked but its syntax and phonology are very complex. The rules of word pronunciation are very difficult to acquire by an adult learner, especially when he or she is confronted with the task to distinguish 20 various vowels (including diphthongs) while in his/her first language there are only five or even three different vowels.

Let us see how English as a global language is characterized by its main proponent David Crystal (1997/2003; 2004): In recent decades English has found itself at the right time in the right place. The main causes of its position lie in the power of the states where English is spoken as mother tongue. First, the **military power** of these states. The diffusion of Latin and Greek in ancient times had followed the military expansion of states where these languages were spoken. Nowadays, American and British military bases are dispersed throughout the world. Military power is strongly connected with the **political power** of the USA and previously of the British Empire which still exerts a strong influence on its postcolonial countries (in some of them English has been chosen as the state or official language and used also for educational purposes). Political power is by no means accompanied by the **economical power**—world economy speaks in English. Quite important also is its **cultural power**—in the mass media English predominates over all other languages. And, finally, inherent in this language is its **technological power**—the internet and the whole electronic industry is based on English. There exists a specific internet language dominated by English (three fourth of all e-mail letters are written in this language).

Most of the inventions promoting globalization come from English-speaking countries, but even while the invention itself originated outside these countries like that of the radio by Italian Guglielmo Marconi or film by the brothers Lumiére from Lyon, it was propagated mainly in English — radio by the BBC and movies by Hollywood.

The main analogy between English and Latin as lingua franca lies in their role as the languages of science and technology. Most scientific publications are issued in English. It dominates in international scientific and business conferences and organizations, from UNO to any international scientific society or journal. Usually at least one of the local journals in a given

scientific domain appears in English (e.g., *Polish Psychological Bulletin*, *Scandinavian Journal of Psychology*, *Japanese Psychological Research*, and so on). The main difference between Latin and English lies in the fact that English is still a living language while Latin was already a dead one.

Where is the place of English within the whole spectrum of existing world languages? How does it influence these languages?

The estimated number of all the world languages is around 6,000 (Majerowicz, 1989; Breton, 2003). But they differ by the number of speakers—from more than 100 million to 10 or even one living speaker. Crystal in his book entitled *Language death* (2005[1]) warns the international readership of the danger facing 80% of the existing languages. If less than 1000 people speak a given language, it is already in danger (see Table 1). About half of the world languages will disappear in the course of the present century.

Table 1.

World's languages in numbers of speakers

	N	%
More than 100 million	8	0,13
10–99,9 million	72	1,2
1–9,9 milion	239	3,9
100.000–999,999	795	13,1
10.000–99,999	1605	26,5
1000–9,999	1782	29,4
100–999	1075	17,7
10–99	302	5,0
1–9	181	3,0

Source: Crystal (2005), p. 15.

The upper 8 languages [Mandarin /the main language spoken in China/, Spanish, English, Bengali, Hindi, Portuguese, Russian and Japanese[2]] are spoken by two and a half billion people on the earth and if we take into account those which are spoken by at least 50 million people (there are 12 such languages), we have the result that half of all mankind uses only 20 languages out of around 6, 000. The remaining languages are extremely dispersed over the whole globe. The distribution of languages is as follows: Europe—4%, both Americas—15%, Africa—31%, Asia, Australia and Oceania—50%.

What do all these figures tell us about global communication? I would like to make here two comments.

First, we have to realize how this process affects the real existence of so many endangered languages and how to stop these tragic consequences. The main problem concerns the languages which do not possess any writing systems, no means to leave traces of their existence. Those which are equipped with such systems like Latin, Classic Arabic, even ancient Egyptian, can always be revitalized as the case of Hebrew clearly shows. Linguists try to register the attainable utterances of the last speakers but the whole enterprise is extremely difficult and at a great cost. Their initiatives should receive much greater support from the international community.

The second comment concerns our main topic, i.e. a global language, or English as a global language. As we have seen, English is only the third most popular language on our globe. But

[1] This book was first published in 2000, I am referring here to its fifth edition.

[2] The order of languages follows the diminishing number of native speakers of a given language.

let us make a precise distinction between so called first and second languages (L1 and L2). L1 means a mother tongue, a national or ethnic language and L2 means a language acquired to a comparable extent as L1, usually being an official language in a multilingual state or the language of education. We leave aside the foreign languages taught in school because usually their acquisition does not attain a comparable level with L1. So if we compare the number of English speakers as L1 with the number of its L2 speakers (both around 400 millions giving the sum of 800 millions[3]), English becomes the most widely spoken language in the world. This tendency is growing and the number of L2 speakers has surpassed the L1 speakers in the last decade. English is also the most frequently chosen foreign language at school throughout the world.

What are the consequences of this triumphant march of English nowadays? What kind of influences does it impose on other languages and what might be its future?

Of course other states with widely spoken languages, like German, French, Spanish, do not easily accept this dominance and try to propagate their languages and the culture related to them. As an example of this might serve the Goethe Institutes, Cervantes Institutes or French Culture Institutes which function in many countries in the world.

Quite a new initiative of this kind comes from China. The Chinese government has opened in Beijing and plans to open in many countries throughout the world the Confucius Institutes which aim is (according to the announcement in the Internet) the promotion of the Chinese (more precisely Mandarin) language and culture through, e.g., "the multimedia and web-based Chinese teaching"; "courses of Chinese for special purposes (translation, tourism, business, finance or Traditional Chinese Medicine)", and also "Chinese degree courses integrated with those in Chinese universities and institutes" (www://hanban.edu.cn; page 1). The goal is to reach by 2010 the fugure of 100 million of foreigners studying Chinese. In contrast to other institutes of this kind which are independent organizations in the given countries, the Confucius Institutes will be closely connected to the universities or other educational institutions of those countries to ensure collaboration with the appropriate Chinese universities. Thus we can observe a soft-power offensive through the promotion of the Chinese language and culture toward the status of a global language.

But how far will this initiative go? Is it possible that Chinese will replace sometime in the future the role played now by English as a global language? Probably not, or at least not very soon, because at present the learning of Chinese as a foreign language has to be mediated by the previous knowledge of English since the majority of manuals and dictionaries are based on English.

Right now the influence of English is really enormous. Many languages integrate into their vocabularies English words from all the domains mentioned above—culture (movies, radio broadcasting), science, technology, economy and even politics. However, this process is not going very easily. Everywhere there are purists who fight against such an encumbrance of their perfect languages with all these strange words. The parliaments in France and in Poland have passed a law delimiting this undesirable influence. One such English word that can be found in many languages is "computer" (root of which goes to French "compter" or Latin "computare"). Nevertheless, such a word does not exist in French, where it is replaced by "ordinateur".

With new facts, situations, and inventions—new words ought to be introduced. The privilege of coining a new word goes to the language of its creator or the inventor of something new. The other languages have either to borrow this particular word or create a linguistic calque, i.e. the translation of a loan-word. An example of such a translation is the Polish word "samochód" that replaced a loan-word "automobil" (where samo=auto, and chód=something in movement).

[3] It might seem that Chinese should reach the largest number of speakers in the world, but the varieties of Chinese spoken throughout the whole country are mutually incomprehensible, so they must be treated separately.

The languages could be divided into easy borrowers (English, Russian) and those which prefer translation (Czech, French, and to some extent, Polish). There are linguists who maintain that at least half of the contemporary English vocabulary had been borrowed in the past from other languages, mainly from French.

In this context I would like to refer to my own experience during a stay in Israel as visiting professor in the Psychology Department of the Hebrew University in Jerusalem. Walking through the University campus in the company of my host, Professor Benny Shanon, I asked him: "how is psychology in Hebrew?" "Psychologia"—was his reply. "Do you speak Polish?"; "No, why?"; "So how is sociology, mathematics, history...". All his responses sounded like genuine Polish words. Later on, I tried to resolve this puzzle and learned that the revitalization of the already dead classic Hebrew had been started by Eliezer Ben Jehuda by the end of the nineteenth century. He was born in the area around Vilnius where the spoken language was Polish. I could now present (thanks to my young friend, Ela Okuniewska, who knows Hebrew) quite a long list of words (let us call them "international"), e.g., emancypacja, integracja, proporcja, motywacja, prowokacja, sytuacja, technologia, etc., that are pronounced in Hebrew according to Polish rules of pronunciation and word formation.

In contemporary times the only lender for all borrowing languages is almost certainly English. But how long will such a situation last? What is its future?

English is a very live language in contrast to Latin as lingua franca, already a dead language. Being a living language involves continuous change. All living languages change somewhat within one generation (Lightfoot, 2006; McWhorter, 2003). In addition, English is spoken in many different places in the world—as L1 in Great Britain, USA and Australia, and as L2 in most of the postcolonial countries. Far from the place of origin of their language English speakers encounter different flora and fauna, different places and situations, different people and customs; their language enriches, and as a result is differentiated into so called World Englishes (Kahru, 1989). Until now they are still mutually comprehensible, but this differentiation might result in the future in mutually incomprehensible dialects, and finally totally new languages. Such things have already happened several times in history.

Probably the process of globalization as such will inhibit the scope of this differentiation. But not completely. In any circumstances, all of us who use English as L2 in our work, in science and in business, in travel and in tourism, are interested in keeping English as stable as possible. We need a sort of Standard English.

In conclusion, English as L1 might differentiate but English as L2 ought to remain steady; otherwise it would loose its properties as a global means of communication. Latin serving as lingua franca had not changed over centuries.

This means that all who use English as a global language have to be at least bilingual. From the psychological point of view this is a great advantage. According to the newest psychological research (cf. Kurcz /ed./, 2007) on bilingual children and adults (including very old people) bilingualism creates a more open and flexible mind. The cognitive controlling mechanisms are better developed in the mind of a bilingual person as compared to a monolingual one. The bilingual resolves faster any classification task where the criteria of classification often change. His or her volitional and attentional processes are more subtle and generally better developed than those of a monolingual person, and this is true not only for their linguistic behavior (where the benefit of such abilities is obvious) but for all cognitive and perceptual processes not necessarily involved in producing and understanding speech. The results of several studies by Ellen Bialystok, Ferguson Craik and their team in Toronto have shown that bilinguals resolved various types of response conflicts faster than monolinguals and that this advantage generally increased with age. Bilinguals (mean age 75) were significantly better in several sorts of cognitive tasks than monolinguals (mean

age 45). As the newest analyses (Bialystok et al., 2007) show, bilingualism slows down the process of dementia for about four years.

Let us hope that even those whose native language is one of the World Englishes would have to learn in the future Standard English as an unchangeable global language to be able to communicate in a global world, as for example Frenchmen or Italians in medieval times had to learn Latin to write their texts or treatises. Thus even native speakers of English would be able to profit from the benefits of bilingualism.

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NATIONAL ATTACHMENT AND GLOBALIZATION PROCESSES

Introduction

The process of globalization, probably the most significant phenomenon of the last decade, has many psychological aspects. The progressive opening up to the international market and the increasing significance of international institutions have brought up the problem of cultural and psychological differences in abilities to open up communication and cooperation. Mechanisms of international perception, social attitudes and identity, stereotyping and prejudice are today widely studied in a globalization context.

An important manifestation of the process of globalization is the formation of supranational political, economic and military organizations. People affected by globalization processes have experienced identity problems because supranational organizations aim at operating as one integral entity while at the same time preserving the identity and specificity of the national unit it consists of. The European Union seems to be the most advanced such structure that supercedes national boundaries. It is governed by a common constitution and an international European Parliament, and is united by a common economy. Such organizations must engender a sense of belongingness and loyalty among its members. However, the contemporary world is still a world of nations. In the world of nations everyone is expected to possess a national identity which links them to one (and usually only one) national entity (Gellner, 1983; 1987; Giddens, 1990; Smith, 1986; 1990; Billig, 1996). According to Gellner (1983) "... the modern man must have a nationality as he must have a nose and two ears. Having a nation is not an inherent attribute of humanity, but it has come to appear as such" (p.6). The sense of belongingness to a nation (as an "imagined community") is treated as a "natural horizontal bond", and seems to be an important dimension of social identity.

There are a number studies indicating that a positive identification and strong attachment to one's national group is an important factor in an individual's well-being (de Figueiredo, Elkins, 2003; Skarżyńska, 1998; 2005; Skarżyńska i Poppe, 1997). Young adults Poles, Dutchmen and Americans who have a positive national identity are more able to form and secure stable and secure interpersonal relations, and are more likely to feel empowered in the public domain of a democratic society than are young people who don't declare attachment to their own country. Young Poles with strong national attachment highly appreciate the values of harmony in social relations and have a rather positive image of politicians, national politics and their country's economy.

The general idea of the article assumes that subjective understanding of one's own nationhood and the type of national attachment or the type of relationships that one builds with the national unit are significantly associated with the success or failure of the globalization process.

Two models of nation and two types of national attachment

There are two sociological models of a nation that have important consequences for membership: ethnic-genealogical (or traditional-cultural) and civic—territorial (Smith, 1986, 1990; Rothi, Lyons, Chryssochoou, 2005). The focal point of the ethnic-genealogical nation is genealogy: the only way to membership is through descent, or ancestry . The common culture is in shared components of "native" traditions and symbols. The key aspect of the civic-territorial nation is the political community. Membership is here based on juridical definitions of citizenship irrespective of ethnic ancestry. The common culture is based on shared components of political structure such as the rights and obligations of citizenship.

There are a number of studies which indicate that an analogical distinction exists in current social consciousness. Some citizens within a given nation-state understand the nation as an "exclusive community": they perceive the boundaries of the national group as including those who share a common heritage and ancestry with the majority. Others may perceive these boundaries as including anyone who is legally part of the polity and adheres to their citizenship obligation irrespective of their ethnicity—they understand a nation as an "inclusive community" (Blank, Schmidt, 2003; Rothi et.al., 2005; Radkiewicz, 2006; Skarżyńska, 2005).

The other important aspect of national attachment is the manner with which people identify with their country. Research on this problem has identified two main forms of national attachment: sentimental and instrumental (Kelman, 1969; Kelman, Hamilton, 1989; Cinnirella, 1993; Rothi et. al., 2005). Sentimental attachment is based on a perception that the national unit (nation as a group) reflects individual identity and involves an emotional connection to the culture and symbols of the nation. Instrumental attachment is based on a cost/benefits analysis associated with the rights and obligations of citizenship, such as satisfaction with political organizations or public services.

An exclusive national identity and sentimental national attachment accentuate citizens' identification as national group members. Social psychologists have stressed that salient group identification motivates group members to view their group (the "in-group") as distinct from and more positive than other relevant groups ("out-groups"). Such a positive in-group identification generates in-group-biases, attitudes, and behavior (Tajfel, Turner, 1986; Billig, 1996). Group beliefs and stereotypes which glorify the in-group can be associated with competitive attitudes toward the members of other national groups and supranational organizations. So, some kind of cognitive and emotional construction of national attachment can be a serious obstacle to loyalty and commitment to a broader, international organization; other types of national identity open citizens' minds to international cooperation and facilitate globalization processes.

Empirical evidence of the role of the two aspects of national attachment will be presented in the next sections of the article.

Exclusive versus inclusive national attachment

An exclusive national identity draws from positive evaluation of nation's characteristics and unique achievements, and the national history and culture; a nation's unique morality or martyrology, achievements in art, science or sport, a nation's special input brings changes in the world. Psychological studies indicate that this kind of national identity is based on belonging to a social category (e.g. us—Poles, us—Germans, us—Russians) which is constructed by abstracting and emphasizing commonalities within a category and neglecting internal diversity and heterogeneity within the national group. The commonalities are substantial and rigid rather than psychological: ancestry, ethnic roots, "blood"—not "a sense of being a member of a nation" or "love for a nation". Such categorization allows for exclusion of those from a nation who are in some respect different and leads to overestimation of intra-national similarities in values, way of life, political preferences, etc. (Blank, Schmidt, 2003; Pawlicka, 2001, Skarżyńska, 2005). This kind of national identity and national pride is related to favoring one's nation and country, believing that its history, culture, politics, values or everyday habits are better than those of others. Exclusive national identity enables rejection of some national or ethnic groups inhabiting a country or international organization as a "worse" and belonging to other people.(Adam, 1990; Blank, Schmidt, 2003; Radkiewicz, 2006). An exclusive national attachment expresses an agreement with such statements as "Only those with Polish blood are really Polish", "Only Poles should live in Poland", "Other countries should learn a lot from Poland", "Poland and Poles have more input into positive changes in the world than any other nation".

The other base of a positive national identity can be an evaluation of the quality of one's own state in current conditions. The criteria of state evaluation might be clearly defined as certain universal supranational standards of a modern and democratic state (e.g., the functioning of democratic institutions, educational system or economic and social security). This "civic" (Blank, Schmidt, 2003) or "institutional" (Radkiewicz, 2006) national identity, associated with the feeling of pride, emerges from a subject's consciousness of what "we" have in common with "others", not from what is "exceptional" or "unique" for "us". This kind of national identity is "inclusive", more flexible in delineating national categories. It allows one to believe that "everybody who feels Polish is Polish (German, Russian, French)" and belongs to the in-group of people inhabiting the same region even if they do not share a common heritage or religion. It is based on the assumption that national and ethnic groups are equal and defines nationality in terms of psychological rather than categorical or substantive criteria. Various studies have shown that this "inclusive" or "civic" national identity is related to an individual's prosocial attitudes, behaviors and contribution to the group's well-being, sensitivity to social dysfunctions of unfairness, involvement in social and political activities (Putnam, 1993; Skarżyńska, 2005). Individuals oriented towards supranational standards of their state are also more tolerant of cultural, religious and political differences and ethnic minorities than individuals oriented towards exclusive standards (and exclusiveness or uniqueness of own's nation, country, state) (Hinkle, Brown, 1990; Mummendey, Klink, Brown, 2001; Skarżyńska, 2005).

A study on current British identity has not only confirmed the two types of national identity based on two distinct interpretations of nation, but has also shown significant connections between these identities and constructive and blind national relational orientations (Rothi, Lyons, Chryssochoou, 2005). Constructive national orientation involves support for critical loyalty and criticism of current group practices that are driven by desire for positive change. Blind orientation, on the other hand, is defined by a staunch support for one own country's (nation's) actions, an intolerance of criticism, and an unquestioning positive evaluation of one's country (nation). A constructive orientation potentially facilitates integration processes, while a blind orientation

impedes international cooperation and globalization processes (especially if accompanied by lack of trust in other states or nations). British citizens who support exclusive, traditional cultural understanding of nationhood are more likely to express an uncritical, conformist national orientation and are more resistant towards changes in British culture than British who perceive the national "in-group" in civic context and for whom a psychological boundary demarcation is based on a shared policy and an attachment to the nation's civic practices. There are also some data showing that it would be difficult to effect social change while expressing a blind national orientation. Social change activists express critical, civic patriotism and are often denigrated by those who do not share their orientation (Andrews, 1997). Globalization and European integration processes may be treated as a serious social change on a macro scale. So it is possible that an exclusive, traditional-cultural context of national identity—through its association with a blind relational orientation—will resist the processes of international cooperation and integration. Public opinion polls regarding European integration have shown a perception of threat to national identity and culture as the important predictor of negative attitudes toward the European Union in British and Polish society (Eurobarometer, 2002; Skarżyńska, 2005; Skarżyńska, Golec de Zavala, 2006). However, the inclusive civic attachment, together with a critical (constructive) relational orientation, may lead to a consideration of the costs and benefits of integration processes before making decisions on any international problem.

Several studies conducted in Poland in the month before the formal accession of Poland to the European Union (in May 2004) distinguished both the described kinds of national attachments and showed the different consequences of exclusive and inclusive national identity for individual support for European integration (Skarżyńska, Golec de Zavala, 2006). Exclusive national attachment (i.e. love for one's country based on exclusive criteria of in—group categorization and national pride, accompanied by a tendency to diminish or dominate other nations) is related to greater fears and negative expectations toward European integration. Individuals characterized by rather exclusive national identity fear the loss of political and economic independence, they expect more costs than benefits in relation to joining the EU and believe Poland would be economically better off staying outside of EU. Individuals with inclusive national identity are generally positively oriented toward joining a larger international community and see it as an opportunity for the further development and betterment of Poland. They do not feel threatened by losing their national distinctiveness (after the accession to the UE). Inclusive national attachment based on belief that national in-group identity results from a personal choice rather than inheritance and sense of national superiority leads to open interaction with others and to the acceptance of differences and diversities. Our data show that inclusive identity is associated with individuals' preferences for cooperation and dialogue with their political opponents and with greater tolerance and acceptance of different opinions. The opponents and supporters of European integration in Poland differed with respect to their psychological attachment to the nation rather than to demographical characteristics (such as sex, age, economic status, but not individual level of education).

Because an inclusive national attachment and civic pride opens people to wider social contact and allows them to tolerate political and international (or cross-national) differences, we can expect that this kind of attachment will support democracy (Putnam, 1995) and modernization processes (Florida, 2005). The data from the International Social Survey Programme (ISSP) have shown a higher percentage of citizens who have inclusive national identification among "old democracies" than in "new democracies" (e.g. compare the Polish and Netherlands sample—Table 1).

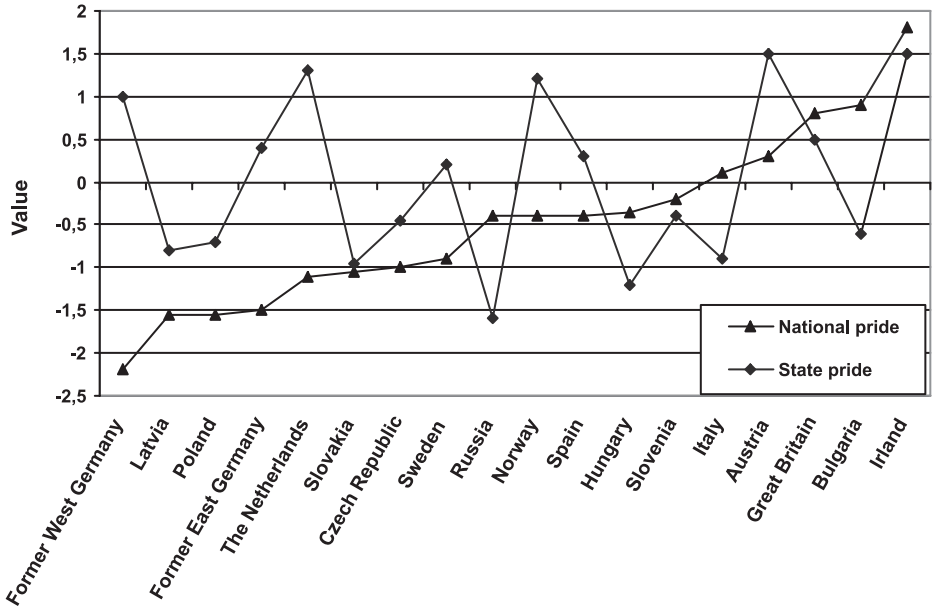
The same international studies showed the salient cross-sample differences in the proportion of national and state (civic)—pride (see Figure 1). Citizens of more advanced and modern democracies (e.g. the Netherlands, England, Norway, former West Germany, Ireland, Austria) are

Table 1.

Exclusive and inclusive criteria of belongingness to a nation in Poland and in the Netherlands (in percentage)

The criteria of belongingness	Poland	The Netherlands
Language	53.7	76.4
Living in the country for most of one's life	38.0	21.0
Respect for political institutions and law	33.6	40.0
Being born in the country	42.7	23.4
Being a Catholic (or Protestant)	26.8	3.3

Source: ISSP, 1995



Source: ISSP (1995)

Fig. 1. National and civic pride in European countries

characterized by a higher level of civic pride than citizens from "new European democracies" (Slovenia, Hungary. Bulgaria, Poland, Russia).

A survey conducted in 2002 on an nation-wide representative sample of adult Poles (n = 1522) confirmed that national pride based on own nation's history, culture, science, military and sport achievements is strongly related to xenophobia (measured by assessment of such statements: "Immigrants contribute to the growth of crime", "Immigrants make Poland more open to new ideas and other cultures" (reversed coding), "Immigrants contributed to the Polish economy's development" (reversed coding) and "Immigrants take jobs from people born in Poland"). National attachment based on institutional or civic bonds to own state is negatively correlated with xenophobia (Radkiewicz, 2006).

Our last studies, conducted in May 2007 on a representative sample of adult Poles have supported these results and have shown that an exclusive national attachment predicts prejudices (social distance) to Russians, Germans and Jews. The best predictor of the level of this type of national bond turned out to be an individual sense of threat (insecurity) in the social world: exclusive national bonds significantly increase when the social world is perceived as more endangered (Skarżyńska, Radkiewicz, 2008). The following items have been used to measure this sense of threat:

- "There are many people who are ready to attack without any reason, just because of pure wickedness."
- "Any minute anarchy or chaos may appear."
- "The world around us is more and more dangerous and chaotic."

Ethnic exclusionism that means avoidance of social contact with immigrants is observed in many European countries (Scheepers at al., 2002; Coenders at al., 2007). Data derived from European Social Survey 2002/2003 (19 nation-wide representative samples) have shown that avoidance of social contacts with immigrants strongly prevails among underprivileged people, i.e. low educated people, manual workers, unemployed and retired people. Prejudices against resident immigrants are positively correlated with religious attendance. The results supported also the "contact hypothesis": the more opportunities for interethnic contact, the less resistance to ethnic out-groups. Subjective perception of one's own social situation was found as a more important predictor of avoidance of social contact with immigrants than objective contextual determinants. People perceiving their social situation to be unsafe, and those who feel threatened by resident immigrants, those who overestimate the presence of foreigners in their country turned out to avoid social contact strongly, next to those who consider themselves to be on the right wing of political beliefs and attitudes.

Sentimental versus instrumental attachment

The second dimension of national attachment which is important for international relations is the proportion between symbolic and individual involvement (among citizens). National symbols: the flag, the monuments of national heroes, patriotic songs and ritualistic—ceremonial activities, arouse powerful, emotional expressions of national sentiment primarily because they accentuate citizens' identification as national members. There are several ways in which national symbols promote national identification. Firstly, by signifying the group, such symbols render the individual's identity as a national member highly salient. Secondly, because a symbol is a tangible representation of the group (nation), it provides the individual with a manifest object of identification. We can say that the national group symbolizes directly the identification process and accentuates awareness of group identity. The ability of national symbols to "objectify" the group is essential to forming a group identification, particularly for such large and "imagined" communities like a nation (Anderson, 1991; Kelman, 1969; Billig, 1996). Thirdly, if group symbols facilitate ingroup identification, they should also augment group members' attempts to positively distinguish ingroup from outgroups in an effort to enhance self-esteem (Tajfel, Turner, 1986). Finally, national symbols such as a flag or an anthem represent the group (nation) as a whole or in the abstract, thus communicating "groupness" itself, the shared ingroup categorization per se. So they should be capable of arousing group identification and demarcating ingroups (own nation) from outgroups (other nations).

Symbols also represent a national group across time: they crystalize the past of a group into an historical entity that can be glorified, romanticized, and mythologized (Kammen, 1991). National

symbols thus essentialize a group as a transcendent psychological entity, one that connects an individual to a larger meaning and purpose, superceding the individual's personal existence and inevitable mortality, thereby reducing anxiety (Pyszczynski, Greenberg, Solomon, Arndt, Schimel, 2004). This aspect of national symbols may explain why they are endowed with near mystical signification and why their desacration arouses such anxiety and outrage.

Social psychologists emphasize that national symbols not only provide objects of direct group identification but are also able to lead individuals to participation in ritualistic ceremonial activities such as parades, celebrations, songs (Cialdini, 2001; Schatz, Lavine, 2007). In this way people actively express their national identity. These symbolic activities occur in the presence of their national members which should further heighten the salience of ingroup membership and intensify commitment to the nation.

National attachment grounded in national symbols and ritualistic-ceremonial activities (labeled as "national symbolism" or "sentimental national attachment") is associated with manifestation of "blind patriotism", including stalwart national allegiance, rejection of national criticism, support for conservative leaders and policies, militarism, and anti-internationalism (Kelman, Hamilton, 1989; Shwartz, Staub, Lavine, 1999; Muller, Peters, 1998; Sullivan, Fried, Dietz, 1992). National pride—the core aspect of sentimental attachment—is positively related to a feeling of national superiority, support for national currency and opposition to the Euro (Muller, Peters, 1998).

Sentimental national attachment is opposed to "functional national attachment" (Kelman, Hamilton, 1989) or to "instrumental national involvement" (Schatz, Lavine, 2007). This form of individual attachment to one's own national group is based on utilitarian concern for the functionality of the nation's political, social, and economic institutions and on the perceived capability of these institutions to provide instrumental benefits to citizens. This instrumental attachment not only serves different psychological functions than do symbolic attachment, but also is associated with divergent patterns of affective, cognitive and behavioral consequences. Some social psychologists assume that this type of national attachment is "sociotropic" because it focuses on concern that national institutions provide instrumental benefits for all group members, not only for the self and for individual intrapsychic needs. Examples of items to measure instrumental attachment are the following: "I think a lot of about how well this country serves the needs of its citizens", "I am really interested in the health of this country's democratic institutions", "I feel proud of the country's social security system", "I am proud of the equal and fair treatment of different social groups and national minorities in my country".

Data collected from a representative American sample (National Election Study—NES) showed that two distinct forms of national involvement were associated with an entirely different set of affective, cognitive and behavioral expressions of national membership (Schatz, Lavine, 2007). Symbolic attachment predicted a tendency to rate desirable attributes as characteristic of the United States and to rate neutral attributes as characteristic of the United States only if such attributes were viewed as desirable. These judgments served to bol ster and protect the positivity of the individual's identification with the nation. Symbolic involvement was simply independent of an individual's knowledge about his/her country and is unrelated to any form of participation in national political life. "A personal concern for national symbols and rituals seems to have little to do with behavior intended to monitor or improve the functioning of the nation" (Schatz, Lavine, 2007, p.351). But when ingroup concerns are salient, symbolic attachment predicts activity designed to establish, maintain, or accentuate national sovereignty, homogeneity, distinctiveness, and moral superiority. Symbolic involvement increases when national threat is more salient. Such forms of national attachment lead to active support of a common national language, joining or supporting the armed forces, visiting national historical sites, donating time or money to national causes like 9/11.

Individuals who are high in instrumental national attachment possess more knowledge about the working of the government, the nature of the ideological divide in American politics, and basic aspects of economy than those who attach less importance to national functionality. Voter turnout and other forms of political participation was related to the individual's level of instrumental attachment, but not to the level of symbolic involvement (Schatz, Lavine, 2007).

In Poland, institutional national attachment is negatively related to xenophobia, social anomia and political alienation, but it is positively associated with approval for democratic order; sentimental involvement is related to national exclusiveness (Radkiewicz, 2006). A higher level of institutional attachment strongly correlates with positive emotions toward members of other national groups (Russians, German, Jewish). Both types of national attachment are related to the respondents' age: elders are more sentimental and also more instrumentally oriented that younger (Skarżyńska, Radkiewicz, 2008).

Conclusions

The processes of democratic modernization and European integration are impelled by instrumental rather than symbolic attachment, and inclusive rather that exclusive national identity. These open (inclusive) and instrumental attachments make it possible to compare one's own country and society in the universal dimension of the wealth of its citizens and the degree to which it abides by democratic rules; it does not result in the feeling of being exceptional, but admits heteronomy of values and lifestyles, thus also accepting immigrants. Instrumental attachment remains associated with a higher level of political and economical awareness of citizens and their greater political engagement. As a result, a higher level of inclusive and instrumental attachment creates better conditions for the modernization of society and the country: it fosters openness to cultural diversity, discussion and cooperation, which in turn enhances innovativeness and leads to economic growth and the improvement of the quality of life for citizens. Research conducted in 65 countries in the late 1990's showed that cultural pluralism (measured by the percentage of immigrants and tolerance for minorities) is one of the most significant predictors of the happiness of citizens and the modernity of a country (level of education, computerization and urbanization), cf. Veenhoven, 2007.

Poles are not yet strongly acceptant of cultural diversity. The campaign of "historical politics" conducted by right wing Catholics, which has concentrated society's attention on historical merits, national mythology and particular contributions to world history, fosters exclusive national attachment as well as sentimental rather than instrumental attachment. These campaigns have led to difficulty in international contacts, rather than fruitful cooperation. It is hoped that changes in the content of our national identity will be brought about by the process of European integration, opening of borders, and familiarization with processes governing other countries and the members of their nations. It seems that for Poles, the effects of globalization will depend, to a large extent, on our national attitudes and the content of our own identity; the sooner our national identity becomes open and more universalistic, the more we will gain by participating in a global world. One must bear in mind, however, that our failures in the field of international competition will most likely turn the attention of Poles to their glorious past, exceptional wrongs suffered and the symbols of these wrongs. Modern psychology has collected much compelling evidence to show that, for individual and group well-being, a balanced time perspective (integrating the past, present and future) is far better than focusing solely on the past and its symbols.

For successful international cooperation contemporary societies need economic and citizenship education as well as psychological knowledge about the forming of personal and social identity, inter-group comparisons and their roles in individual and group well-being.

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PAUL DREWE

WHAT FUTURE FOR THE NATION STATE OR—RATHER— WHAT NATION STATE FOR THE FUTURE?

'Les Européens se trouvent ainsi en devoir de se définir sur trois points essentiels: l'ordre international, la protection sociale et la solidarité, enfin la liberté de pensée'.

(Edgard Pisani, Vive la révolte!)

'...la culture celtique s'oppose aux frontières stables et fixées à l'avance, géographiques ou d'autres, et ...la notion d'Etat ou de nation était totalement étrangère aux Celtes....En vieux celtique, il n'y a meme pas de terme pour exprimer le mot "pays" , comme patrie *en français ou* Vaterland *en allemand'.*

(Björn Larsson, Le cercle celtique)

Nations including nationalisms are a very complex topic. One may need to consult a dictionary because a large number of keywords is involved (Kott & Michonneau, 2006).The history of Europe is marked by the evolution of nation states. The State, in fact, is a typical European idea (Schulze, 2002). Until 1945, European history has been dominated by murders, mass murders, colonial and world wars (Schlögel, 2002). Only after World War II, in 1951, a group of elderly statesmen initiated one of the largest peace building operations ever, the creation of the European Union. Albeit vital competences have been transferred to the EU, in 2008 member states rather tend to act as if they were still fully sovereign powers. There are no visionaries like Monnet any more. Instead one clings to national symbols such as flags or anthems demonstrated at international sport events. One celebrates national places of remembrance, *lieux de mémoire*, against at best lukewarm remembrance of the milestones of European integration (Juncker, 2002). The identity of nation states is reduced to video clips of stereotypes increasingly conforming to the image US-Americans have of Europe: that of 'some kind of elegant Third World' [1]. This is a far cry from Pisani's view which is more of a dream:

'As a militant of the early days, I have always believed and still do that Europe will only have a future and the world will only find its balance in the case of a political union of Europe turning it into a power: an ally of the United States but basically different from them; entertaining privileged, good neighborly relations with Russia; being a powerful but not presumptuous interlocutor of China and

India; attentive, to the problems of the Third World, engaging in supporting its development. Europe has to define itself and take a firm stand'(Pisani, 2006: 31).

The status quo of nation states is obscured by the coexistence of notions as such, the people, society, the State, citizenship, ethnic origin, home. This coexistence of notions creates a state of confusion which manifests itself, for example, by the position taken with regard to immigration. Despite of the 'demographic necessity' of immigrants, they are rather treated as 'intruders'. A 'Ministry of Immigration and National Identity' seems to invite the stigmatization of immigrants.

However, as Singer has put it, 'facts puncture every bubble of conceit, shatter theories and destroy convictions. The future of the nation state, according to Pisani, today is compromised because of critical changes: economic and financial globalization; the emergence of world governance; regional organizations; the rise of networking; regionalism disguised as federalism; the development of ICT which helps ethnic and cultural communities around the world to manifest themselves.

Some have even sketched a ***Global*** scenario (Crozet & Musso, 2003; Drewe 2006).

It depicts a world dominated by globalized market forces and networks of transnational companies. The global economy unfolds effectively in a network of world cities and succeeds in liberating itself from constraints such as physical obstacles, cultural particularities and regulation policies affecting the circulation of flows. The Global scenario is threatened by major crises: natural catastrophes, technical breakdowns, social outbursts or regional conflicts badly controlled. The nation state proves to be too small for the problems engendered by the global forces and Europe does not succeed in creating a political union.

Is this future possible? Yes, it is. But it is hard to tell whether it is probable. Some scholars, however, referring to 'spatial politics and chronopolis', would assume that Global is quite probable (Adam quoting Bauman (1998). And, of course, one may find the Global scenario undesirable.

There usually is a large array of possible futures. Not all of them are probable. And even fewer of the probable futures are desirable. See Figure 1.

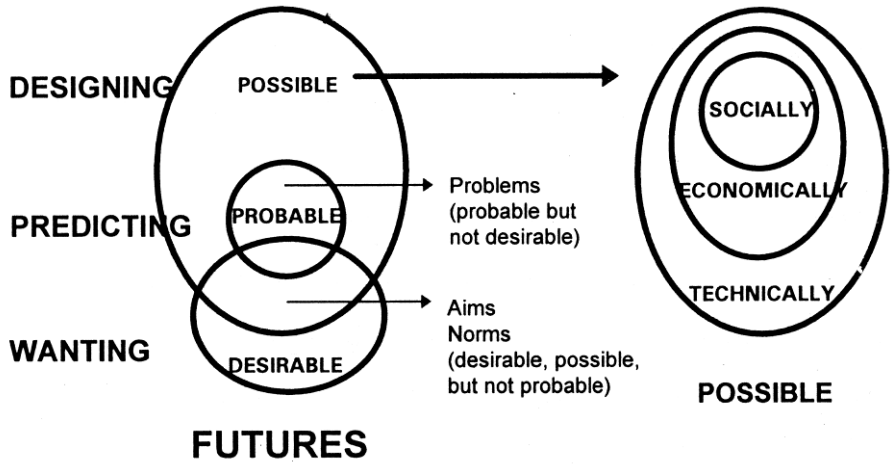


Fig. 1. Three kinds of futures (Source: De Jong & Frieling,1994: 528)

Let us pass in review other scenarios or possible futures with the future of the (European) nation state in mind. Checking for probability and desirability, one may arrive at an alternative

1. GLOBAL (Global marchand co-régulé)

2. GLOCAL (Glocal coopétitif)

3. CENTRALIZED EUROPE (L'issue européenne)

4. NATIONAL PREFERENCE (Redéfinition)

5. SUBSIDIARY EUROPE (Multi-subsidiarités réticulaires)

Fig. 2. Five global scenarios (Source: Crozet & Musso, 2003)

concept of the nation state, to be dealt with in greater detail. Once again, we are using the scenarios built in Crozet & Musso (2003), described by Drewe (2006). They are listed in Figure 2.

Glocal combines competition or competitiveness at the global level with cooperation at the Global. Regions play a more significant part. Embracing global competition, they try to boast their competitiveness through cooperation, in particular within regions through the development of so-called innovative milieu (Fifure 3). Capgemini uses an old slogan to advertise its services: 'Think local, act global'. In line with the Glocal scenario, this should rather read 'Think global, act local'.

- **Group of actors (business firms, research and educational institutions, public authorities)**
- **Material, immaterial and institutional elements (plants, infrastructure; know-how; public authorities and other organizations)**
- **Cooperation (or partnership among actors; networking to make best use of existing resources thus creating value added or synergy)**
- **Learning or 'apprenticeship'(enabling actors to modify their behavior in order to develop new solutions, coping with a changing environment)**

Both cooperation and learning involve the external environment of a milieu, beyond the local context. Links to the external environment, which may even be international, are ensured by the formation of transterritorial networks.

Both cooperation and learning relate to:

- **The creation of know-how**
- **The development of behavioral norms guiding the cooperation among actors**
- **The ability to detect and mobilize specific resources of different actors and the milieu as a whole**

Fig. 3. The 'ingredients' of an innovative milieu (Adapted from: Maillat, 2006)

The overall picture of a 'glocal' Europe is a fragmented one, comprising leading regions, average regions as well as regions catching up or losing ground. The crucial question is how 'latecomers' can make it in a world where only the rich get richer (Barabási, 2002).

Glocal is a possible future. But how does it score in terms of probability and desirability?

Global competition seems inevitable, *a tendance lourde*, as the French scenario builders call it. The makes the global part of the scenario highly probable. What about the local part? If, in fact,

a wide gap exists in innovative capacity across the regions of the Union and continues to do so, the local part of the scenario will also be quite probable, mitigated by the creation of innovative milieux. The overall, fragmented picture painted by Glocal will be considered as undesirable by those who advocate socio-economic cohesion or solidarity, among them nation states and the EU. This is also one of several arguments in favor of a strong, centralized Europe, our next scenario.

Centralized Europe implies a politically integrated Union. The political is dominating the economical and the cultural. What about the role of regions (cities) and nation states? In Global, regulation policies affecting the circulation of flows appeared as obstacles that transnational companies could rid themselves of. In Centralized Europe, however, companies that want to move goods, capital, services freely, must take into account territories, that is regions and cities. Nation states, on the other hand, lose to both cities and regions and to the European Union. A stronger, politically integrated Europe would be consistent with (among others):

— a spatial planning mandate of the Union, in line with the European Spatial Development Perspective
— the Lisbon strategy or the ambition to make the EU 'the most competitive knowledge-based economy in the world'. 'The European Union cannot boost productivity and employment if Member States do not do their part' (Barroso). There would be less reason to worry about this in a centralized Europe.
— a more effective cohesion policy, fighting the fragmentation of the Glocal scenario
— a more effective environmental protection answering the challenge of climate change
— the European Constitution [2].

A centralized Europe is possible but the abortion of the very European Constitution has clearly shown that a centralized Europe is hardly probable for the time being. The EU is facing the veto power of 27 nation states in important policy matters, apart from the existing exclusive EU competences such as monetary policy with regard to the Euro zone. National refusal to go along with a centralized Europe may well lead to another possible future of a few powerful nations taking the lead (at least) during a period of transition in a Europe 'á plusieurs vitesses'. Does not the Euro zone already incarnate the notion of different pace?

According to the aborted European Constitution, member states were allowed to leave the EU. Pisani goes a step further by advocating that nation states refusing a new Constitution should become only associated members. Some may even find a more radical 'kick-out' clause desirable, applying for those who do not accept the Charter of Fundamental Rights (selecting a President of the European Union, this should be considered). However, Pisani and all those who cherish the memory of Jean Monnet will find a Centralized Europe downright desirable.

The possible futures also include ***National preference***. As the European Union has failed, it is the old nations that become again the main players. However, this does not mean a simple return to old ways of regulation. First of all, nation states are unable to regain economic autonomy as the fact of globalization remains. The relative political autonomy of cities and regions is reduced, but the nation state depends on them for territorial, economic and social regulation. After all, the capital cities are needed in order to finance any national solidarity. And even without a European Union, new varied arrangements for European (international) cooperation emerge from necessity and are handled pragmatically. A revised nation state may even set a new stage for a politically more integrated Europe, starting perhaps with the transitional initiative of a few powerful nations.

How probable is National preference? Is a failure of the EU simply unthinkable? Does not the integration achieved so far seem irreversible? Take the five exclusive competences of the EU and, to a lesser extent, the shared competences, and the supporting, coordinating and complimentary actions (Figure 4 including the proposals made in 'A Constitution for Europe).

Source: http://europa.eu/scadplus/constitution/internalpolicies_en.htm

Fig. 4. 'A Constitution for Europe': subjects and intended actions

These are very complex matters. It is almost ludicrous that they could be decided by simple referendum instead of parliamentary ratification after ample deliberation. At least the economic integration seems irreversible [3]. The bulk of EU trade takes place between member states. Some may argue that the expansion of the common market is based on a modern version of the Marxist theory of imperialism, How high an economic price would a nation state have to pay for leaving the EU? There is no guarantee that one can easily assume the 'freeloading' position of, say, a Norway.

Is it desirable that Europe will be positioned at the global periphery? Those who rather want it to become a global center, will reject National preference. They believe that there should be more to Europe than economic gain or a free trade zone NAFTA style [4]. What about the lofty goals of international order, social protection and solidarity, and freedom of thought? Are there other possible futures that could lead us there?

A ***Subsidiary Europe*** can offer a novel approach to the governance of Europe. According to this scenario, subsidiarity is threedimensional.

First, there is a territorial dimension (as shown in Figure 5 for France).

Put in general terms, 'functions which subordinate or local organizations perform effectively belong more properly to them than to a dominant central organization' (Webster's). Or in other words, functions should be performed at the lowest competent level. By the way, the principle originates from Catholic teaching.

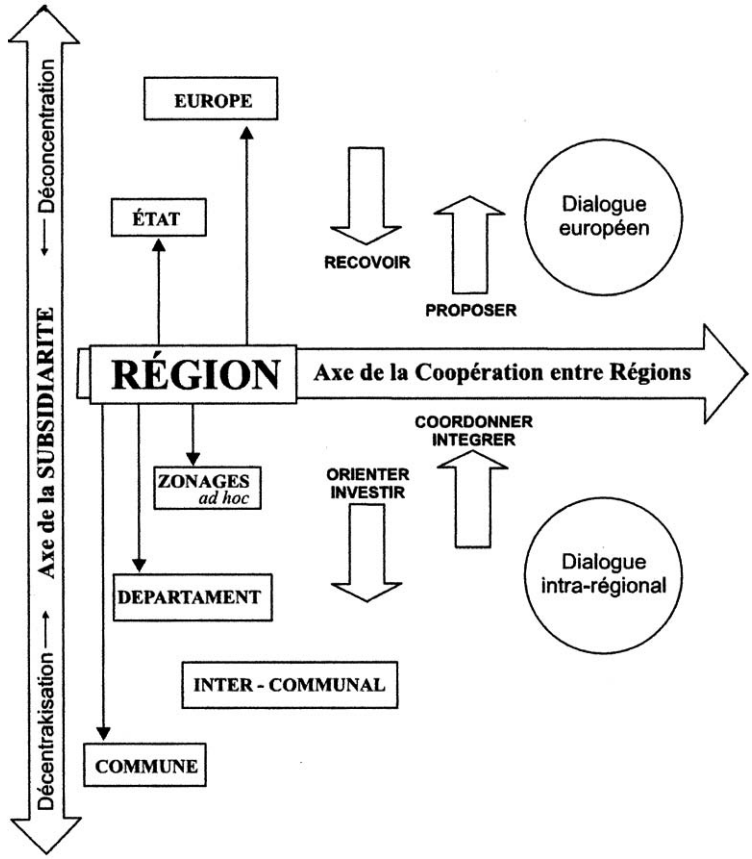


Fig. 5. The axis of subsidiarity (Source: Drewe& Hébrard, 1995: 171)

Until now the principle of subsidiarity has been mainly applied to the division of labor between the EU and its member states. In 'A Constitution for Europe' the official definition went as follows:

> *'The principle of subsidiarity regulates the exercise of powers. It is intended to determine whether the Union can intervene or should let the Member States take action. In accordance with this principle, The Union may intervene in areas which do not fall within its exclusive competence insofar as the objectives of the intended action cannot be sufficiently achieved by the Member States but can rather, by reason of the scale or effects of the proposed action, be better achieved at Union level' [5].*

According to Subsidiary Europe, the principle, too, applies within nation states: 'subsidiarity starts at home' as clearly shown in Illustration 5. It, ideally, includes the neighborhood level not shown in this illustration. Moreover, subsidiarity works over the entire range of spatial levels bottom-up. One does not reform top-down (Pisani) and many social innovations also start at the bottom (Drewe, Klein & Hulsbergen, 2008). This means that the EU, too, has to define subsidiarity in relation to regions, cities, and neighborhoods [6].

Secondly, subsidiarity is a multi-actor form of governance with actors other than territorial authorities. If functions can be performed efficiently by private-sector actors, there is no need for

public intervention. This holds for all levels of governance. Moreover, this may lead to multifarious public-private partnerships. This will put the guidelines for successful public-private partnerships issued by the European Commission (2003) to the test. This involves the issue of services of general interest or the universal service principle and it entails regulation as an antidote to hasty, ill-conceived deregulation and privatization.

Finally, there is a temporal dimension to subsidiarity which offers a way to manage uncertainties. The latter relate to processes, objectives or means. If immediate actions are not called for, one can resort to delayed actions or even to contingency plans. A major weakness of the democratic system is its predominant short-term orientation covering only four or five years. Therefore long-term perspectives need to be explored to provide a countervailing orientation. Those who are creating futures should know them so that knowledge can join action. But as Adam has argued, science, the classical economics and liberal democracy cannot offer the required knowledge.

> *'The 20th century was a century of arrogant predictions, mostly proven wrong. The 21st century will be one of uncertainties, hence of prospective study' (Bindé, 2002).*

See also Drewe (2008a).

One may question the capability of the EU to practice the 'art of the long view' given its past performance in the case of the crisis of the coal crisis, the two oil crises, and –more recently— the changing position of agriculture and the emerging shortage of raw materials. Will the EU do a better job in dealing with climate change? There may be lessons to be learned from the Club of Rome (Meadows, 1972) [7].

How does Subsidiary Europe compare to the other scenarios?

Disparities between regions will not simply disappear, but will be less virulent compared to both Global and Glocal. Much will depend on the Union's strive for cohesion (European Commission, 2007). Subsidiary Europe opposes a subtle coregulation to a Centralized Europe. If member states opt for this kind of political integration they opt for abandoning their sovereignty the possible maximum of which is to be found in National preference. A subsidiary Europe avoids a choice between the Scylla of Centralized Europe and the Charybdis of National preference, the future of the United States of Europe and the future of sovereign nation states.

Taking the position that Subsidiary Europe represents a desirable future, how can it be turned into a probable future? This is a question of controllability or of finding strategic levers of intervention (Drewe, 2008a, based on Arcade, 2000).

Here are a few suggestions:

- The creation of innovative milieu, borrowed from Glocal. This is basically a bottom-up approach, but can be stimulated both by nation states and the EU. There are quite a few concepts that look similar, in particular clusters but also local productive systems or poles of competitivity. But whether these contraptions qualify as innovative milieu depends on the presence of the ingredients listed in Illustration 3. It should be noted that innovative milieux also provide a way of managing uncertainties.
- Another lever of intervention, following Glocal, is cooperation among regions: cross-border, interregional and transnational (see also the transterritorial network in Illustration 3). These forms of cooperation correspond to the three strands of the former Interreg program and the new Interrreg IV. See Drewe (2005) for past cross-border cooperation or Dühr & Nadin (2007) for past transnational cooperation: the case of North-West Europe. Cross-border, interregional and transnational cooperation are bottom-up initiatives supported by national governments and the Union (particularly until 2006 via Interreg [8]. In most cases, however,

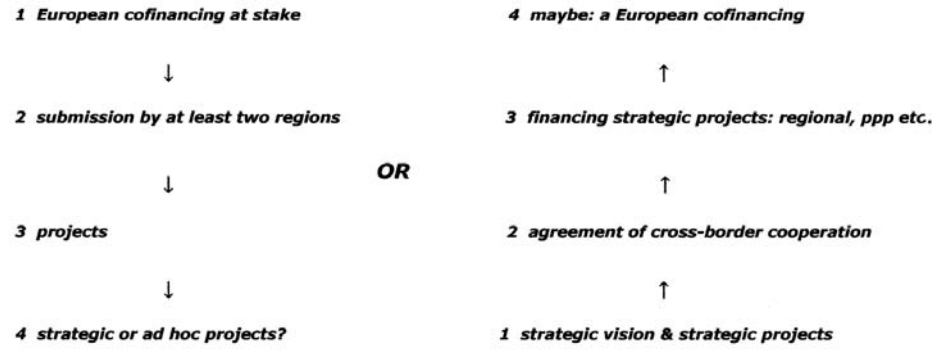


Fig. 6. Dealing with EU cofinancing: two alternatives

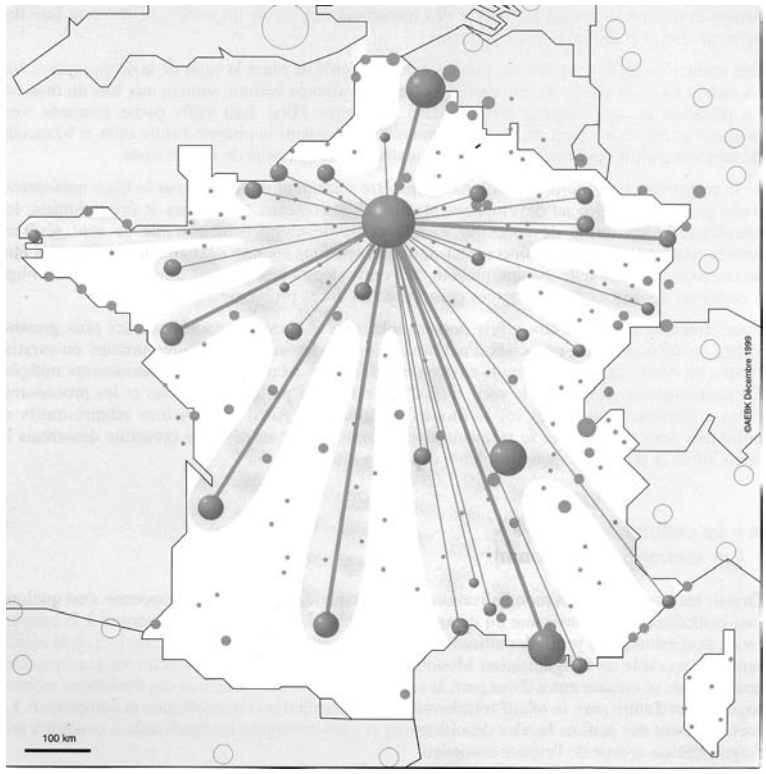
the availability of European cofinancing has dominated strategic visions and strategic projects as shown, in a simplified manner, in Figure 6.

Starting instead bottom-up from strategic visions and projects, could really foster European integration.

- Let us recall, 'implementing' the Subsidiary Europe scenario means three kinds of action: territorial subsidiarity, multi-actor public-private governance, and management of uncertainties. These actions apply to all spatial levels. As a consequence, the EU has to redefine subsidiarity taking into account regions, cities and neighborhoods. But most important is that subsidiarity starts in member nations. France, because of its jacobinical heritage can be seen as an interesting test case (Figure 7).

  A 'bottom-up decentralization' is called for –as suggested by Pisani [9]. It looks as if in France transnational and cross-border cooperation are looked upon as escape routes from the straitjacket of the hexagon (Drevet, 1988; MOT [10]).
- Subsidiarity, to do what? Illustration4 provides a preliminary checklist of sectors to be screened for subsidiarity, that is for the lowest competent level both within Europe and within nation states. How does the new division of labor compare to that of federal states such as Germany, Austria or Belgium? This depends on how these states deal with subsidiarity sector by sector and what provisions are made cohesion, i.e. for redistribution from richer to poorer parts of the country. There may be less disparity measured in terms of personal income (where the income is spent) than in terms of GDP (where the income is generated) as shown by Davezies (2008): because of social transfer payments from richer to poorer regions (and because of public employment expenditures, pensions, commuter revenues and tourist spending. Solidarity is the price to be paid for European integration as well as nation building in general or reunification in the case of Germany(in Belgium, the rich region obviously is no longer willing to pay the price). The demand for a *'juste retour'*, a perfect balance between financial contributions to and financial transfers from the EU, undermines the very European construction. With the accession or Europeanization of countries in Central-Eastern and South-Eastern Europe the situation has become even more complex. The new periphery is certainly disadvantaged compared to Western Europe, but it may also offer new opportunities for 're-bordering' (Delanty, 2007).

So at the end of the day, the future of the nation state may well depend on whether it functions in a subsidiary way in a subsidiary Europe. But then this requires a paradigm change: *'ce royaume est-il de ce monde'* (Soriano). It is going to be a very hard birth after a prolonged



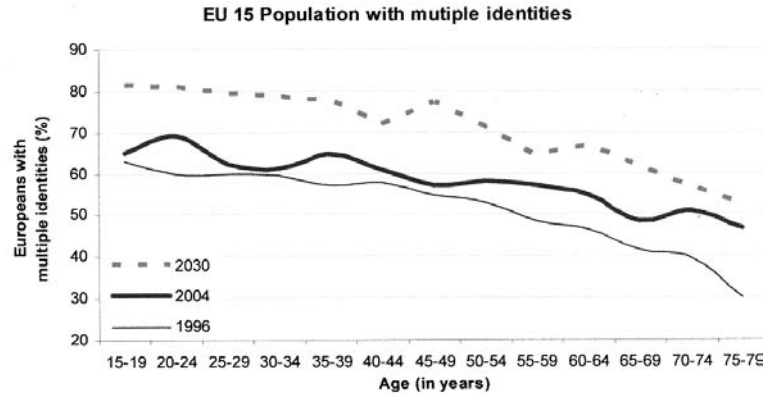
Source: DATAR, 2000: 58.

Fig. 7. 'The renovated centralism' (a neo-jacobinical scenario)

labor. It is easier to 'imagine there's no countries' as John Lennon once sang. And we cannot go home again to the world of our Celtic ancestors.

Nation states are part of the problem. Can they become part of the solution?

But there is hope that once the 'elephants' have faded away, a new generation may take over. Empirical research testifies to the 'demography of growing European identity' [11]. In 2004, already 58% of those over 18 years old felt at least partly as Europeans:



Notes

[1] According to the actress Isabelle Huppert as quoted by Baudrillard (1986):162.
[2] The scenarios of Illustration 2 do not take into account the issue of the European Constitution.
[3] What if integration works with the economy, but not with politics (Cohen, 2003)?
[4] Who wants to study the impact of a free-trade zone without Structural Funds interventions such as NAFTA should take a look at Chiapas or even at some peripheral regions of the US.
[5] Source: http://europa.eu/scadplus/constitution/subsidiarity_en.htm:1.
[6] The latter holds for URBAN Initiative or similar urban programs. For URBAN see e.g. Drewe (2008b). Regions occupy an important place in a subsidiary Europe, but this a far cry from a 'Europe of regions' which is after all a myth. The rhetoric of regionalism, too, should be handled with care. Is Cerdà right when he claims that the appropriate place for the rhetoric of regionalism is 'l'arriére boutique reserve aux articles périmés' ?
[7] However, to does not suffice do deal only with the global level in order not to commit a fallacy of aggregation as with the Kyoto norm or the trade in emission rights. Regional breakdowns are required, too. What does a national Kyoto norm really mean? And what to think about a heavy polluter buying the right to pollute some more from a region with less pollution?
[8] In the recent proposal for the Euroregion of the Pyrenees the three strands are combined.
[9] See also the plea made by Charles de Gaulle: *'Vers un équilibre nouveau...L'éffort multiséculaire, qui fut longtemps nécessaire à notre pays pour réaliser*et maintenir son unité malgré les divergences des provinces qui lui étaient successivement rattachées, ne s'impose plus désormais. Au contraire, ce sont les activités régionales qui apparaissent comme les resorts de sa puissance économique de demain' (Lyon, le 24 mars 1968).
[10] MOT stands for *Mission Opérationnelle Transfrontalière.* See: http://www.espaces-transfrontaliers.org .
[11] See Lutz, Kritzinger & Skirbekk (2006), based on the Eurobarometer.

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IN/SECURITIZATION OF SOCIETY SOME CHALLENGES AND OPTIONS FOR THE FUTURE

Introduction

In this short paper we would like to draw attention to some aspects of the analytical potential provided by the concepts of risk society (Beck, 1992) and ontological insecurity (Giddens, 2001) in view of the research scope delimited by the framework of the New Futurology (cf. Kukliński, this volume). We naturally do not intend to embark on a comprehensive analysis of the trajectory along which the risk society has moved into the future since Beck and Giddens wrote about it for the first time more than two decades ago. This task would require much more time, space and research than allowed for in this paper, especially if it were to lead to assessing the shape this trajectory is likely to take in the more distant future.

Sketching some contours of the globalized risk society, we rather pinpoint here—within limits of a few selected aspects—one of the trends which we broadly identify with *Risikogesellschaft* in its future, 21*st* century shape, i.e. the process of on-going institutionalization of discourses and practices of in/security in Western societies, which we label — borrowing from Ole Wæver and his colleagues of the Copenhagen School (2001)—as *in/securitization*. Within the limits of the present paper we thus offer to describe briefly the process of in/securitization of late modern society focusing on its spatial aspects. We will try to outline the relationships between in/security and space which we see as emergent features of the risk society in its current stage to further intensify in the future. Simultaneously, we will provide an overview of a few current and emergent options for institutional responses to the demand for security on the personal and collective level. By relating the scale and scope of the solutions provided within the frameworks of these options, we indicate some of the tendencies which in the future might lead to a considerable transformation of the model of late modern society in its political and socio-cultural dimensions.

* We gratefully acknowledge the support of the Volkswagen Foundation which made the collaboration possible.

The Production of Global *Risikogesellschaft*

By the beginning of the 21st century considerable progress has been made on the way to establishing (in Europe and to a much lesser extent elsewhere) universal freedom, peace, and welfare — which have featured as the main goals that the Western civilization has supposedly strived to achieve enacting its Enlightenment project of modernity (cf. Foucault, 2000). The promotion of capitalism, science and technology, and (to a lesser degree) democracy, has given rise to an unprecedented economic growth and spread of individual liberties. What we call globalization has involved a world-wide spillover of the many civilisational gains originating in the Western world— in Europe and Northern America. Globalization has in turn contributed to a momentous transformation of social reality, famously described by Manuel Castells (2000) as a transformation of (local) spaces of places into (global) spaces of flows.

However, neither the civilisational gains have been distributed evenly nor their expected and unexpected side effects have been dealt with adequately by major actors driving globalization—transnational corporations, international organizations, and states (cf. Bauman, 2000). Moreover, alongside the gains, many ills and bads have been exported from the West to the rest of the world. Multi-dimensional inequalities have as a result emerged or have been reinforced in many parts of the globe (cf. Bauman, 2000; Harvey, 2005). Furthermore, apart from opening up multiple windows of opportunities for economic growth, individual development, and cultural cross-fertilization, the global, borderless dynamics of flows have also started to backfire in Europe and the West as a whole, rendering their territories, populations and institutions more and more vulnerable to equally borderless processes and phenomena—various catastrophes, crises, and dangers.

Moreover, the spillover of the West-produced solutions to make individuals and societies thrive has—on the whole—produced a very complex and little comprehensible picture of the world. In many instances conventional institutions—such as markets, organizations or states—have proved to be unstable and unpredictable, capable of periodically wreaking havoc on populations instead of stabilizing and regularizing their life. Triumphant Western technologies—by shortening or annihilating distances of time and space—have eventually resulted also in the prevalence of short perspective rarely exceeding the horizon of individual and instantaneous profit apart from making life and work easier for individuals. Dominant Western sciences—emancipating the individual and opening up multiple possibilities to intervene in nature and social life—have also ultimately undermined a sense of ontological security an individual could previously derive both from formal institutions, such as political authority, school, and family, and from collective tradition and individual common sense.

In brief, we are now found living in a technology-ridden, fluid and supposedly borderless world, whose comprehension eludes our individual intellectual powers, while modern institutions promising to offer us stable rules to base our judgment and action on keep turning powerless and untrustworthy — or at least this is the perception which seems to prevail. Facing global challenges—climate change, energy crisis, international migration, terrorism, crunches of financial markets, rising waves of crime etc.—already hitting the individual in his/her local home or at least bombarding him/her every day by means of tabloids, television and the Internet, the individual and society she/he forms part of, is increasingly pressed by a growing concern with perceived insecurity referring to practically all domains of life.

Space and in/security

The imminent—actual, potential, and imagined—risks whose scale and nature frequently seem beyond the scope of intervention available not only to individual people but also to individual institutions and organizations—have thus contributed to deepening of the feelings of uncertainty and insecurity identified by Beck (1992) and Giddens as integral features of the late modern *Risikogesselschaft*. By the beginning of the 21st century the risk society has become fully globalized, the perception of insecurity has turned almost universal, the concomitant demand for security has permeated the sphere of politics, economy, science and technology, reviving also the sphere of religion—once (in pre-modern societies) an ultimate source of discourses and practices to "guarantee" ontological security to people.

The condition of *Risikogesselschaft* has bred a number of responses related to the societal demand for security—all of them might be claimed to constitute a global discourse of in/security. The discourse of in/security has today obscured and or consumed older dominant discourses such as a discourse of poverty, a discourse of war, or a discourse of ideological clash between capitalism and socialism (cf. Garland, 2001). Several action plans could be listed to exemplify its scope and scale, ranging from action plans promoted by established institutions such as states and international organizations to market-driven and communal sets of options to restore security on the individual and/or collective level. Interestingly, these security action plans are as a rule tightly coupled with practices of bounding and/or bordering spaces—quite contrary to the surface image of the borderless global world.

The so called war on terrorism declared by the United States, the European Union's bird flu emergency plan or the United Nations' "Architecture for Sustainable Space Security" programme could exemplify the category of security measures devised recently by political institutions. The effectiveness of most of such responses to the societal demand for security is, however, far from being unequivocal, let alone the issue of their justification. The growing awareness of questionable efficiency of the panacea to risks offered by the conventional (liberal democratic) political institutions coupled with little predictability and seeming unavoidability of the aforementioned (and many other) types of catastrophes, crises, dangers and risks are often translated into personal frustration and/or a tendency to go beyond the available institutional options. The perceived failure of the existing political institutions to tackle the perceived threats and to promise security to the respective populations results *inter alia* in political alienation and/or notable revivals and outbursts of various populisms and authoritarian fundamentalisms (cf. Meny, Surel, 2007; Gąsior-Niemiec, 2008).

On the other hand, the feeling of insecurity becomes may become intercepted by market forces which start to promote extra-institutional solutions to the perceived dangers. These might include for instance new insurance schemes, state-of the art technological tools, novel products and services to avert risks and increase security (cf. Pütz, Glasze, 2005; Barry, 2006). These solutions—quite apart from the issue of their real effectiveness—are, however, both not universal and costly. They target only certain clusters of customers (not being concerned with citizens) and involve several negative externalities, for instance they are likely to export risks to the neighbourhood of the market-securitized segments of society (cf. Gąsior-Niemiec, Glasze, Lippok, Pütz, 2007). Market responses to the demand for security are therefore best described as selective and as such they may only little—if at all—alleviate the general problem of societal anxiety bred out of the feeling of overwhelming insecurity.

Lastly, certain local (grassroots) solutions are also promoted to increase the feeling of personal and societal security (ibid.). These quite often involve a reenactment of more traditional—even pre-modern—mechanisms of social control, sometimes being also aided by new technologies. They

rely on dense local networks acting as a kind of a loosely institutionalized *panopticon* to sense, monitor and counteract specific types of risks—be it environmental pollution, crime or social exclusion. Couched in the idiom of communitarianism or civil society, these solution indeed seem to promise an increase of the feeling of security by investing in participatory action plans which are focused on raising the level of individual and collective (local) controllability of certain areas of reality (cf. Drewe, 2007). Nonetheless, the effectiveness of these local "communal" solutions is also questionable in that their local scale is usually inadequate to deal with the often global dynamics animating many of the risks.

As already hinted, many if not most of the solutions offered within frameworks of all three types of the securitization action plans are directly connected with the category of space. What is even more interesting, they appear to promote solutions going quite contrary to the Castellsian image of the globalized borderless world and networked society (2000). Namely, the discourse of in/security and social practices it animates seem to attempt to immobilize space. This is usually done by inscribing in/security in space, making it a feature of certain spaces. This, again turns space into a space of places—something to be precisely situated (localized), divided (regionalized), contained (bordered), and managed (controlled) (Pütz, Glasze, 2005; Turner, 2007)—rather than a space of flows.

In this way certain risks—even though actually indeed related to flows than to places—become coterminous with certain chunks of space (enclaves). Moreover, the nature of the risks involved might undergo further reconfiguration transforming its image from specific to general, and from concrete to ideational. Certain countries are thus held to be insecure because of being "evil" (e.g. North Korea, Iran), certain districts in the cities are labeled as insecure because of being "criminal" (e.g. *banlieux*, *Gross-Wohnsieddlungen*) etc. (cf. Pütz, Glasze, 2005; Gąsior-Niemiec, 2008), while certain regions appear economically risky because of endemically low levels of social capital (cf. Gąsior-Niemiec, 2007).

As a result, also acting upon spaces—bordering them, guarding them, isolating them, reordering them, surveilling them, purging them etc.—becomes coterminous with recuperating security. Accordingly, the tendency to regionalize space into secure and insecure enclaves and to act upon the isolated spatial chunks entails a significant shift of focus regarding both sources of insecurity and means to restore security. The focus is primarily turned on symptoms and manifestations of insecurity, moving the issue of deeper causes and reasons to the far background of the in/security issue. Furthermore, it is strongly redirected towards material and technological means to restore security—it mostly animates the practices of erecting physical barriers, implanting video-surveillance systems, pre-selecting and bar-coding entrants etc. (cf. Ellin, 1997; Barry, 2006; Gąsior-Niemiec, Glasze, Lippok, Pütz, 2007). Moreover, similar types of securitization mechanisms seem at work regardless of whether what is at stake is to safeguard a country confronted with illegal migration or to safeguard a gentrified urban district confronted with unwanted vagrants (cf. ibid.; Turner, 2007). The answer to the question whether these findings—limited mostly to research on migration and crime as sources of the perceived risks and their relations with the category of space—signify that the described mechanisms of securitization are universal or not is, however, obviously subject to further research and analyses.

Conclusion

At the beginning of the 21st century with old, pre-modern dangers not eradicated (wars, famine, natural catastrophes, diseases), modern risks are born—an increasingly ephemeral character of sources of income (insecure employment, banking systems, stock exchange etc.),

an increasingly unpredictable character of technological developments (invisible and/or deferred pollution, uncontrolled production of lethal weapons, intentional interference with biological and chemical balance of live organisms and nature at large, unwanted invasion of technology into people's private lives etc.), increasingly unmanageable political and social systems (dissolution of most stable social structures responsible for socialization such as classes and families, failing bureaucracies substituted by unaccountable policy networks, fragmenting and porous institutional systems of education, social security, health, prevalence of electoral thinking in politics etc.), and many others.

Out of the old dangers and modern risks an overwhelming feeling of insecurity emerges which is further reinforced and exaggerated by the globalized expert systems and mass media philosophy of "bad news". Individual intellectual and moral capacities show their limits confronted with the scale, overwhelming complexity and unpredictability of late modern reality. Conventional institutions offer limited or inadequate solutions to restore societal security. In the circumstances, a global *Risikogeselschaft* is born. The birth of the global risk society is then reproduced on the level of discourses by a dominant discourse of in/security which obscures previously dominant discourses such as a discourse of poverty, a discourse of war or an ideological discourse of rivalry between capitalism and socialism.

Numerous visions of catastrophe underpinned by equally numerous expert explanations and counter-explanations appearing in the mass media, incessant processions of short-lived scientific and pseudo-scientific truths and institutional frameworks, unceasing promotion of new technologies and life styles follow in the footsteps and co-constitute constitute this dominant discourse of today and of the future. The discourse of in/security is composed of mutually reinforcing logics— this of never-ending animating of the perception of insecurity and that of offering ever new "solutions" to eradicate insecurity and increase security. Moreover, the discourse of in/security is particularly productive—it lends itself to instant and incessant conversion into an ever expanding industry of in/security progressively colonizing the social, the political and the cultural. Hatching today, in/securitization is likely to turn to be the dominant trend in the societies of the future.

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Part II:

Methodological Interpretations

PENTTI MALASKA
KARIN HOLSTIUS

MODERN FUTURES APPROACH AND HUMAN SECURITY ETHOS

Exordium[1]

As motivation for the philosophical consideration of the future we urge along with Federico Mayor, the former Director General of UNESCO, to keep the future in mind! (Mayor 2007). Many things would change for the better, if only we gave the future highest priority when taking decisions, forming opinions, and managing our lives, and counted on that our own success will be realized only with the success of humankind as a whole. The priority of futures awareness that is promoted analytically with this article is motivated with a poem:

Blind evolution,
with no future but only the ever present,
made us learning creatures,
as no other species.

We have made the whole globe
our own lebensraum,
as by no other species.

¿Staying blind as evolution?
with no future but only the ever present,
¿or awakening to futures awareness?
there is the human choice!
as of no other species.

The approach of the paper is academic and analytic. The first chapter deals with futurology as a philosophy of knowledge of the future; the second part analyses good decision making and visionary management, i.e. foresight engineering; the third part introduces the Human Security

[1] The article is based on the authors' presentation in the session 'Eurofuturology 2050' of thesymposiumon Sustainable Development and Economic Growth organized by the Austrian and Polish chapters of the Club of Rome, the European Support Centre, and the Polish Academy of Sciences in co-operation with the Portuguese EU Presidency in Vienna Sept. 12–13th 2007 (ref.: http://www.clubofrome.at/news/newsflash29.html).

paradigm of the UN and promotes it as a frame of the focus for Europe's vision for the 21st century.

I. Modern Futures Approach

1.1. From futurology to foresight

Future consciousness and futures thinking is characteristically a human mind phenomenon which is even observable as activation patterns in the brain; obviously the phenomenon is also culturally conditioned. For more discussion we can here only refer to two comprehensive treatises on the issue, Foundations of Futures Studies by Wendell Bell (Bell 1997), and The Evolution of Future Consciousness by Thomas Lombardo (Lombardo 2006).

A heated and long lasting debate in the Catholic Church between Jesuits and Dominicans in the 16th and 17th centuries has appeared as an essential milestone in the Western futures thinking. It was concerned with the possibility of human free will against divine predetermination (Catholic Encyclopaedia). Louis de Molina, a Jesuit monk and medieval philosopher became the central figure in this debate with his thorough logical analyses and the book Concordia (de Molina 1589). Of contemporary futures philosophers, von Wright mentions this medieval debate (1983, p.1), and de Jouvenel (1967, p.15) and Flechtheim (1966, p.105) recognize de Molina as the "inventor" of the mindset of futures contingencies i.e. alternative futures. Indeterminism with degrees of freedom is a logical consequence of the assumption of a free will, and together they are the basic ontological commitments of the modern futures thinking. Emancipation of people from knowledge and moral authorities during Enlightenment turned the futures thinking in a secular direction.

There are differences between the conventional sciences and futures thinking; therefore it has taken much longer to lay down solid ontological and epistemological grounds of knowledge of the future compared to the fast advancement of the sciences. One aim of the article is to outline the canon of knowledge of the future by generalizing the concept of knowledge in other sciences.

An interesting view to futures thinking can be opened from terminology used since the time of de Molina. A list of "evolutionary traits" has been compiled by the authors. The terms, the inventors of them, and a few other names, subjectively selected, illustrate some aspects of the evolutionary traits of futures thinking for further discussion in the text.

"EVOLUTIONARY TRAITS" OF FUTUROLOGICAL TERMS:

'conditional future contingents'	Luis de Molina, 1589
'social mathematics'	Concordet, Compte, 1804
'long waves'	Kondratieff, 1920s
'futurology'	Ossip K. Flechtheim, 1943
'futuribles',	Bernard de Jouvenel, 1950s
'prospective analysis'	Gaston Berger, 1957
Invitation à la prospective	*Hughes de Jouvenel, 2004*
Theory of futuribles	*Malaska–Virtanen, 2005*
'futures study', 'futures research'	WFSF, 1960s,WFS, 1970s
Why futures studies	*Eleonora Masini, 1993*
Foundations of Futures Studies	*Wendell Bell, 1997*

'scenarios'	RAND Corp. 1950s
Creating futures	*Michel Godet, 2001*
The Subtle Art of Strategy	*Ian Wilson, 2003*
'futuring'	Jerry Glenn, 1972,
Futuring	Ed Cornish, 2005
'strategic foresight'	Richard Slaughter, Ruben Nelson
'strategic management'	different 'schools' and gurus, 1960s
Strategy Safari	*Henri Mintzberg et al.* 1998
Advanced Strategic Thinking	*Holstius-Malaska, 2004*

The first impression of the list is that terminology has changed for some practical or perhaps even contradictory reasons; the different terms may lead to a mess of confused understanding of knowledge of the future without any common agreement behind. Fortunately, this is not the only possible view. Instead we may think of the diversity of the terms as an expression of richness of the futures thinking and understanding, each term revealing some important intrinsic aspects. We observed earlier that the human free will and the concept of conditional future contingencies form a common ontological commitment for understanding. Furthermore, the methods used for acquiring knowledge about the future or influencing the course of events—i.e. scenarios, Delphi studies, roadmaps, strategic management, etc.—are logically congruent with this ontological commitment, thus supporting the expression of richness rather than causing a mess. This does not, however, mean that there is no need to clarify the terminology and use of terms. Particularly we believe that clarification of the role of the terms futurology and foresight would be beneficial for the discussion.

The term *futurology* was coined by Ossip K. Flechtheim in 1943 (Flechtheim 1966, p.1). According to Flechtheim, the term, as he defined it, did not receive general acceptance among 'interest holders', and it is almost forgotten now. However, the term may be most useful in clarifying the futures field of knowledge. Anyway it is obvious that a special term is needed to cope with the philosophical issues of knowledge of the future, i.e. with ontology of the futures knowledge and epistemology of acquiring futures knowledge. Philosophical discourse is an essential part of the intellectual orientation to the future and the time perspective of human affairs in general, and it is not covered by any other term as yet. Futurology is a concise scholarly term for philosophical treatises. Without doubt it is needed also to cover many content speculative and visionary studies of macro-history or other kinds of social development treatises of global nature.

The term *foresight* may be used when applying knowledge of the future for practical purposes and for engineering the future, e.g. technological forecasting or scenario planning for corporate decision making. Foresight in futurology may be seen as analogue to the conventional technology or engineering in the natural sciences. We see this in the definition by the European Foresight Monitoring Network for foresight: "a participative approach to creating shared long-term visions to inform short-term decision-making processes" (www.efmn.info).

Between the two conceptual ends, i.e. 'futurology' and 'foresight', there are other useful terms such as 'futures study' and 'futures research'. They refer to intellectual processes or projects aimed at acquiring knowledge of the future for any philosophical or practical purposes; the difference between these two terms is mainly in the scope and generality of content or in methodological sophistication. Futures study is more general in its meaning while futures research is a more context specific or methodologically disciplined term.

The other terms listed—or those missing from the list –have also a specific role to play in the concept system of futurology: they enrich the field of knowledge with diverse aspects and possibilities. This argument is further elaborated in a semiotic disposition (see Chart 1).

The whole picture of terms and evolutionary traits resembles knowledge inquiry in other sciences. This indicates that the field of knowledge of the future is not different from conventional sciences. It is interesting to elaborate this issue further. In order to do it, we turn next to the canons of scientific knowledge.

1.2. Canons of scientific knowledge

As a point of departure, we choose the old notion of scientific knowledge:
Scientific knowledge is a well-grounded belief.

Usually it is spelled as "... a well-grounded *true* belief", but we omitted the attribute *'true'* here and take it to be included in what is meant by *'well-grounded'*. Truthfulness of the belief, and not the belief itself, is just what needs grounds to be justified. This is a crucial observation, because the grounds for justifying the truth of a belief are science dependent; grounds of justification form a science specific canon.

Ontologically any knowledge is necessarily based on non-knowledge, i.e. on belief. A belief will be justified, or rejected as true knowledge according to conformity of the grounds with the canon of a science. The canon gives foundations for what is regarded as true and real, and rules for how a claim of knowledge is to be verified or falsified within that science.

The canons of the different sciences are different from and irreducible to each other, but they are not allowed to be contradictory. Knowledge of the future is no exception. Let us next briefly look at some basic characteristics of the canons, i.e. on which basis a relevant belief is justified to be true within a science. Thereafter a characterization of knowledge of the future is outlined.

MATHEMATICS AND PROBABILITY
the canon is based on: *pure logical, i.e. rational,* deductive, axiomatic reasoning

NATURAL SCIENCES
the canon is based on: *experimental* observation, rational causal and lawful explanation, extrapolative generalization and prediction

SOCIAL SCIENCES
the canon is based on: *empirical* observation, rational causal and teleological explanation, speculative generalization and forecast

HISTORY AND HUMANITIES
the canon is based on: *documented facts* of the past and present, pragmatic syllogism and hermeneutical interpretation of intents and ethics and other contents of the human mindset, speculative generalization and futuring

FUTURES RESEARCH
the canon is based on: *non-factual, i.e. visionary intents*, complex pragmatic syllogism within the conditional future contingencies, innovative exploration and foresight engineering.

Mathematics (logic) and natural sciences subordinate the others to their terms of the canon whenever it is relevant to consider them. It means that if, for instance, in a futures research or foresight approach such reasoning is present which belongs to the domain of mathematics (in reasoning), then the canon of mathematics is valid, or if material phenomena or events of natural sciences are present, then they necessarily obey the canon of natural sciences. This implies at the

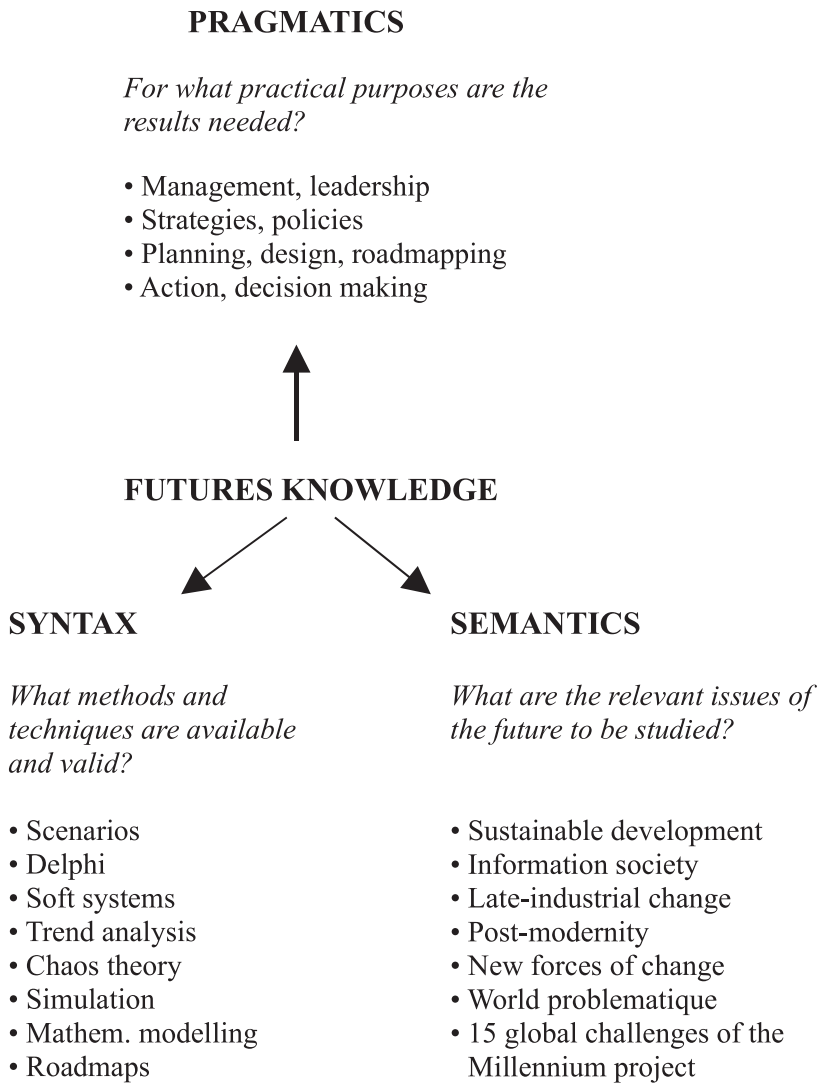

Chart 1. A semiotic disposition of the futures knowledge system

same time that knowledge of the future—if genuine knowledge—cannot be totally reduced to any other fields of science.

One can find, that a field of scientific knowledge from the top down in the list becomes more and more general in its extension (from objective material phenomena to be experimented to merely empirically observable social phenomena, and to intents of human subjects in humanities), and more and more uncertain in reasoning (from pure rational to hermeneutical and to pragmatic syllogism and visionary foresight), and richer in the content of knowledge (from pure logical reasoning to a realm of objective material entities, and to social relations, and factually documented intentional events, and to mind envisioning).

This elaboration suggests that knowledge of the future can be regarded as a generalization of scientific knowledge with a canon of its own as shown in the above list. This can be summarized as follows:

Knowledge of the future is an ontological and epistemological generalization of scientific knowledge of contingent, intentional and non-factual (visionary) beliefs of the future.

Knowledge of the future can be seen through a threefold categorization, which helps to discipline the field and terminology and to arrange knowledge development and accumulation. The threefold disposition is called a semiotic system of futures knowledge.

1.3. Semiotic system of futures knowledge

The semiotic system—or semiotics in short—of the futures knowledge consists of three categories called syntax, semantics, and pragmatics, probably borrowed from early linguistics. The semiotic system with explanations and clarifications of the contents is shown in Chart 1.

The system suggests that it is a benefit to look at a research undertaking from the semiotic point of view and to decide where the primary focus should be and then choose the research strategy accordingly. Sometimes the focus may be mainly on methodological development, e.g. on developing the scenario approach in general, or a theory of futuribles; in another case the focus may be on understanding a semantic issue, e.g. energy future, or climate change, or it may be on the pragmatic side of decision making and foresight engineering. In no case, however, can one omit to consider the other parts as well. The scheme helps to consider what is relevant in a particular case.

Use of futures knowledge for making good decisions based on a shared long-term vision, a choice of strategic direction, and conditioning short-term—next step—decisions for practical execution belongs mainly to the pragmatic side of futures research.

II. Use of Knowledge about The Future in Good Decision Making

2.1. Good decision making

Knowledge of the future is a sine qua non for making good decisions or influencing the course of events in a desired direction or avoiding undue risk and threats. The art of good decision making is an ancient and much appreciated faculty of human intellect (see e.g. Sun Tzu 2005).

Conceptual desiderata for good decision making can be found in Aristotle's thoughts and teachings some 2300 years ago (Nicomachean Ethics). Following these lines of thought we formulated a schematic presentation, called here Aristotelian schema, of how the different requirements can be combined to make a coherent system of good decision making. (Fig. 1)

The first rule for good decision making is that you have clearly stated, in your mind, the purpose and objectives you want to achieve with the decision. A second aspect of good decision making is that you acquire relevant knowledge about the external situation—threats and opportunities—in which the decision is going to be made and executed. The third desideratum is that you know about the means and resources that are available to you as a decision maker in this particular case. Finally, in order to reach a good decision in the partially known but still uncertain situation at hand you have to consider these three desiderata as a whole by using sound logic to be sure that the means are suitable for the end.

2.2. A hierarchy of decisions

Good decisions are needed at different levels of the decision maker's mindset. We can divide decision making and its management into aqualitative hierarchy of three different kinds of

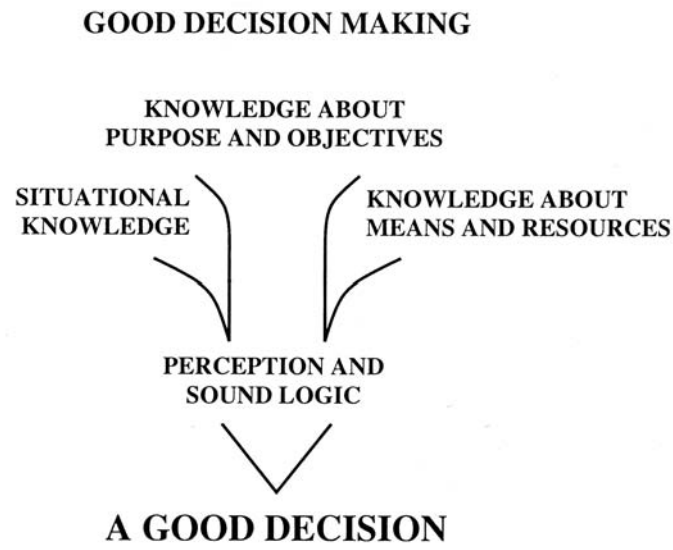

Fig. 1. An Aristotelian schema of good decision making

decisions: tactical or opportunistic, strategic and visionary (see Figure 2). A visionary decision is concerned with an intentional target for the anticipated future. It frames the choice of strategies according to the visionary intention and direction defined. A strategy in turn constrains tactical decisions in the short run.

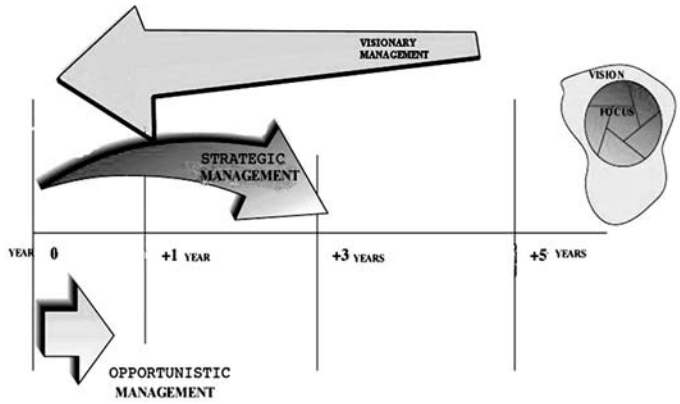

Fig. 2. Tactical, strategic, visionary management

Vision is to be seen as an integral part of strategic leadership. We can say that vision shapes the future of companies, organizations, and Europe, and provides motivation. Vision drives andframes strategy formulation, as indicated by the longest arrow—the backcast arrow of intention in the figure—, and strategy in turn constrains opportunistic, tactical decisions. All three kinds of decisions and their management processes are thus related to each other, although they have quite different time spans. Tactical management hardly ever surpasses one year, whereas strategic management may have a time horizon of three to five years, or even more. The visionary time

horizon may be further away, almost anything over five years. In literature, ten or twenty years have been mentioned occasionally, and, for instance, the Club of Rome is concerned with a future some forty years ahead, and even more. The time span, however, is not the decisive management factor of visionary leadership; it is the accomplishment of development tasks commanded by the shared vision. The time span remains just a book-keeping term for task accomplishments.

It is therefore essential to observe that the three different kinds of decisions also have very different characteristics. This can be well illustrated by relating the different decision-making levels to the scheme of good decision making. Let us take, for instance, the aspect of situational knowledge. When we are concerned with a tactical decision, the external situation is assumed to be known. In the case of strategic decision making, the external situation is regarded as unpredictable but explicable with the help of scenarios or other methods of futures study. But visionary decision making always involves taking into account an external situation which may beor may become unpredictably discontinuous and uncertain.

The different aspects of good decision making are related to the three kinds of decisions in Table 1.

Table 1.

Characteristics of decisions

CHARACTERISTICS OF FORESIGHT DECISIONS

DETERMINANTS OF DECISION	Opportunistic, tactical decision making	Strategic decision making	Visionary decision making
SITUATION assumed to be	Known	Unpredictable but explicable with scenarios	Discontinuous and uncertain creative destruction
PURPOSE and OBJECTIVES	Maximize profit, cash-flow or short term benefits	Adaptation to environmental changes for growth and better ROI	Excellence of long-term performance, finding new arenas, survival in the future
MEANS AND RESOURCES available	Fixed and conditioned by strategy	Reallocation of available and attainable resources within prevailing vision	New skills, reframing of business, envisioning, creating new capabilities
Management	*By control*	*By strategic positioning*	*By visionary leadership*

2.3. Advanced strategic thinking

In our study Advanced Strategic Thinking AST (Holstius—Malaska 2004) we elaborated hierarchical strategic thinking so that it includes a visionary leadership function (cf. also Malaska—Holstius 1991 and Malaska—Kasanen 2003). The results are summarized in a model in Figure 3 showing the key concepts and their relationships.

First of all, the model comprises the three hierarchical levels of decision making: vision, strategies and tactics. The hierarchy is not rigid, but logically tactics is understood as subordinated

Fig. 3. Advanced strategic thinking AST

to strategy, and vision in turn drives strategy formulation and guides the choice of a good strategywithin the visionary frame. The white box "deliberate rationality" stands as an overall headline for allplanned action of AST, and it applies to all the white boxes in the scheme; it is the rationality of the known and controllable. Generally, it can be said that the visions, strategies and tactics can becontrolled by the strategist, by the decision maker. Good decision making can be regarded as deliberate, once we are familiar with Aristotle's thoughts in this respect.

Furthermore we have included the concept "need for requisite variety" in the model. This is based on Ashby's law of requisite variety, in cybernetics, and it stands for the rule that we must be flexible in view of environmental changes, prepared for unexpected events and capable of making corrective actions without losing the vision, i.e. we must be resilient. It is, however, not possible to plan how to do it; these abilities do not belong to the realm of deliberate rationality but rather to the realm of tacit knowledge, experience and leadership. Some researchers call this realm systemic rationality (Sowell 2002, p.45). We prefer to call it unknown systemic causality or overall causality, by which we want to indicate that the phenomena influencing human decision making in unpredictable ways are causal phenomena albeit not knowable to the decision makers. Awareness of this is inherent in the concepts of flexibility and resilience.

How ever well we strive to be prepared, systemic causality is still at work and some events will always emerge contrary to plans. In our figure systemic rationality or causality appears everywhere and always as a grey background, and the terms resilience and flexibility appear in the grey area. The kind of causality, when events emerge quite unexpectedly, can be managed—if at all—only with resilience of strategy and with flexibility of strategic management. When a strategy is resilient, it means that it can restore its visionary drive and goals after unexpected disturbances at least at tolerable cost. And when strategic management is flexible it has the ability to change a plan and move toward the goal in spite of changes in the environment or failure in plan or management. Advanced strategic thinking is based as much on deliberate planning as on leadership and management excellence.

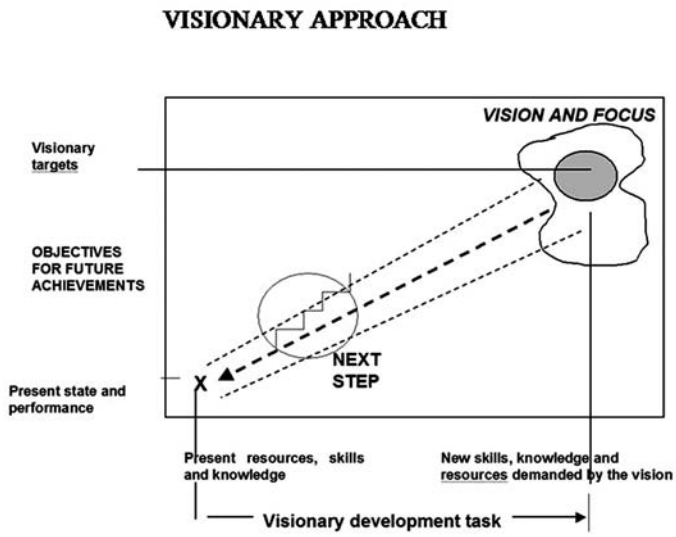

Fig. 4. Visionary view of decision making

2.4. Visionary view of decision making

Finally, we illustrate the three different levels of decision making and management in a figure (Figure 4) which at the same time shows the vision, and the strategic direction chosen, and how one proceeds from the present point in time towards the vision by means of a next-step approach.

The vision is the focused intention at this moment and it is important to make a proper distinction between vision as a frame and vision as a focus of strategy formulation. Focusing gives the basis for specifying visionary targets or objectives and outlining a roadmap in time. A good example of the difference between the concepts of frame and focus was to be found in Financial Times (Sept.11, 2007). The CEO of Peugeot said that they want to become Europe's most competitive car manufacturer by 2015. A vision frame as good as any. When it comes to focusing the vision, it could be spelled, for instance, to improve quality, to lower manufacturing costs, to concentrate on developing environmentally friendly cars at the expense of the present models.

Backcasting, the arrow from right to left in Figure 4, represents intention of deliberate action at the present, i.e. we create intent to move the situation from its present "coordinates" to the new coordinates of the vision. The situation is set into a new position in the mind. This intention defines the strategic direction in relation to the current situation. The horizontal axis of the coordinate system stands for the skills, knowledge and resources to be developed for the future or available at present. The vertical axis stands for the targets and objectives to be achieved. New targets and objectives cannot be achieved without first developing suitable new skills, knowledge and resources. It means that we have to approach the vision first along the horizontal axis and after that along the vertical axis, step by step. When we reflect the present situation against the focused vision we realize how the organization's present performance and capabilities are inadequate compared with the requirements of the vision. We therefore have to acquire or develop new competences and resources before any progress is possible. But as this cannot be made in one single step, the organization's visionary development necessarily becomes a step-by-step process during which tasks are defined and prioritized. Then the strategically most

important next steps are executed first, and with them new results are added to the performance, etc.

Next steps interlink tactical and strategic management, and development tasks in turn interlink strategic and visionary management. Interlinking means that strategy gives the end for which the next step is to be a means, and that vision determines the direction of the tasks to be accomplished. The next steps themselves are executed by tactical management, and at the same time they illustrate how the whole vision can be reached only step-by-step.

III. Human Security Ethos—a Visionary Frame for Europe

3.1. Visionary approach applied

Let us take one more look at the logic of the visionary approach in Figure 4. In the upper right corner, "a cloud of a visionary frame" is depicted, which in turn encircles a focus of the vision. A focused vision cannot be created in a "vacuum" as envisioning is conditioned and constrained (framed) by the realities which have to be taken into account when making a good decision (according to the Aristotelian schema in fig.1). Therefore, differentiating the visionary frame and the focused vision from each other clarifies foresight work. The envisioned focus is defined with the goals or objectives intended to be achieved (quality of targeted performance) and with the development tasks or projects necessary in order to accomplish the intent (quality of capacity). The schema in Figure 4 depicts it in a two-dimensional coordinate space. Thus the current state of affairs, e.g. the state of Europe's performance and capacity, can be seen in relation to the desired performance and capacities. This information determines the direction of strategic leadership and visionary competence, wherefrom the choice of strategy and measures of tactical management are to be derived with due consideration of flexibility and resilience.

3.2. Human security ethos

Coming from logic to substance, we propose the Human Security ethos of the UN as the visionary frame upon which Europe should focus its vision for the 21st century. The Human Security paradigm was initiated when UNEP in its *Human Development* report 1994 claimed that security has been defined too narrowly. Kofi Annan invited a human security commission to elaborate the initiative, and a more comprehensive report *In Larger Freedom* was published by the Secretary General in 2005. Thus the term and paradigm became well accepted by the UN. Here, however, an article by Dan Henk (Henk 2007) and a report by Seija Korhonen (Korhonen 2007) are used as the main sources of information.

The United Nations has declared a development program for each decade since the 60s. The 1960s ethos was *Development Decade*, which was followed by the *New International Economic Order* in the 1970s, and the *Sustainable Development* ethos in the 1980s and 1990s. Each of them has in turn advanced and deepened awareness of global human responsibility and widened its scope by paying public attention to the most important foresight challenges of humanity at the time. The Human Security program is a new link in this chain, and it can be regarded as the global vision of human development for the 21st century.

The Human Security paradigm constitutes three ideals of human life to be attributed not to security of the state but each human being individually. Accordingly, everyone should be able to live in *freedom from fear and freedom from want*, in*freedom to take action on one's own behalf*, andin*freedom to live in dignity*.

The Human Security paradigm has been categorized into seven main sub-paradigms each calling for assurance of specific quality of life and mitigation of threats. The sub-paradigms are briefly stated below.

1. *Economic security* that assures every individual minimum requisite income, alleviating the threat of poverty

2. *Food security* that guarantees physical and economic access to basic food, alleviating the threats of hunger and famine

3. *Health security* that guarantees minimum protection from illness and unhealthy life-styles, alleviating the threats of disease and injury

4. *Environmental security* that protects people from the short term and long term ravages of the nature, man-made threats in nature and deterioration of the natural environment, alleviating the threats of resource scarcity, pollution and environmental decay

5. *Personal security* that protects people from physical violence, whether from the state, from external states, from violent individuals and sub-state actors, from domestic abuse, from predatory adults or even from the individual himself/herself (as in protection from suicide)

6. *Community security* that protects people fromloss of traditional relationships and cultural values and from sectarian and ethnic violence, alleviating the threats to cherished traditional values and a community's loss of control over its own destiny

7. *Political security*that assures that people can live in a society that honors their basic human rights, alleviating the threats of political repression

The UN has not been the only agent that embraced the new formula of the development paradigm. In 1999, a group of countries launched the Human Security Network at the ministerial level of political decision making; by 2007 the Network included twelve countries. Many of these countries, e.g. South Africa, Canada, Japan, Switzerland, and Austria have worked out a unilateral commitment to the new paradigm. In 2004 the new paradigm received still another endorsement, when the European Union published the Barcelona report, entitled "A Human Security Doctrine for Europe". In this sense the Human Security paradigm can already be looked at as a vision frame for Europe as well.

Peroration

The Human Security paradigm gives the world community a visionary framework of challenges. It constitutes the strategic direction to the future. Concretization of the vision, i.e. a choice of strategy and determination of the next step tactical measures, is a vital foresight problem and a task of futures engineering. Realization calls for global visionary leadership and advanced strategic management, the logic of which has been outlined in this paper. The Club of Rome with its intellectual capacity of global dialogue should, as before (Club of Rome 2005), accept citizen responsibility for contributing to the desired visionary leadership, because

this kind of security could not be imposed by the state. Nor could it be donated by the state. It will be possible only through a genuine, synergistic partnership between civil society and global public dialogue and cooperation.

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ZDZISŁAW SADOWSKI

MOOT ISSUES OF SUSTAINED DEVELOPMENT

In discussing the future of the world there is always a temptation to extrapolate the long-term trends as recognized today in order to get a picture of what will be. But what can be obtained by using this method is only a theoretical scenario which most probably will never materialize, as the knowledge of past and current trends does not suffice to determine the actual course of events. Four major trends belong to common knowledge. First, it is the prevalent orientation towards rapid economic growth with continuing industrial expansion. It gets enhancement from the mode of working of market mechanisms which dominate over the world economy. This mode is open to appraisal. Second, this orientation, though contributing to material improvement for a considerable part of world population, tends to create serious dangers for humanity which may even imply the prospect of an overall catastrophe resulting from man-caused climate changes and other detrimental side effects of industrial production. These tendencies towards self-destruction represent the highly unwanted course of world development. Thirdly, the world finds itself in a new revolution in science and technology which may well result in developments exceeding present-day imagination. This, by contrast, is the most desirable course. Fourthly, the unevenness of economic performance causes a tendency for major geopolitical changes in which new world powers are steadily gaining ground.

The co-existence of these four tendencies must lead to the observation that there is no way to predict the actual further course of events. Anything can happen. But in such circumstances the wisest approach is perhaps to give up endeavours to predict the future and, instead, focus attention on what we do not want to happen and what should be done to avoid it.

Indeed, nobody can know what further amazing results and when will be brought by science. If, e.g., scientists succeed in harnessing nuclear fusion, world conditions will be improved diametrically. On the other hand, nobody can evaluate the real impact of catastrophes which can occur if the international community is not able to agree upon such programmes of action as seem necessary according to the present state of knowledge.

Warnings about the imminent dangers have been issued over the last three decades. Initially, they were not treated very seriously. But in 2008 they seem to have acquired broadening attention and began to cause increased disquietude. On top of all the earlier phenomena the world was suddenly faced with a critical upward swing of basic food prices which may well mean imminent hunger for millions of very poor people, particularly in the poorest countries. This food crisis tends to be readily treated as a manifestation of what lies ahead for the world economy. What is it really? A global crisis just around the corner, a current fluctuation indicating a remote possibility which need not ever materialize, or perhaps only a fully unjustified fear?

In this paper I propose to discuss briefly: (i) what we know today about the prospective dangers; (ii) what programme of action to avoid them can be recommended ; (iii) what are the reasons for the difficulty of launching it; (iv) why and how efforts to launch it can and should be pursued.

I. The warnings

A first in-depth analysis of the dangers implied in the prospective course of world industrial activity was presented in 1972 in the first report to the Club of Rome published by Dennis Meadows and his team in their famous book "Limits to Growth"[1]. Their model of the world economy showed, on a high level of aggregation, the links and feedbacks between the population explosion, increasing demand for food, industrial growth, depletion of natural resources and environmental pollution. This led to the conclusion that unrestrained continuation of these tendencies could eventually be expected to result in a critical worsening of living conditions throughout the world. As a follow up, the Club took up the challenge of trying to find answers on how to revert this course of events and determine such lines of action which would be conducive to a general betterment of the fate of humanity. But the warning did not receive much understanding until much later, except partial actions taken under the auspices of the United Nations with regard to the ecological aspect.

But the processes of destruction went on. The second book published by the Meadows team 20 years after the first one[2] showed that none of the previously identified negative tendencies was weakened. Only the rate of population increase was somewhat reduced, but not enough to reduce seriously the annual increments in absolute figures. Thus the overall situation grew distinctly worse than it was 20 years earlier. The bundle of negative tendencies taken together acquired the shape of a global trend towards self-destruction.

In their third book published another ten years later[3] the Meadows team showed an important change in the perception of long-term problems by the general public: it began to be more widely understood that negative tendencies were really at work and that they were caused by human activities. It followed that also the need was better recognized for action on a global scale to defend the future of humanity against global destruction. Let me quote here the authors' own words:

> *"Now we routinely observe, acknowledge, and discuss the ozone hole, destruction of marine fisheries, climate change and other global problems. In 1972 we had to talk in our first edition of Limits to Growth about future problems. Now, in the third edition of our book we can quote from many, many studies and reports by scientists who have looked at existing global problems, and who are extremely worried about the possible consequences of trends already existing. In 1972 our studies showed that humanity's activities were still below sustainable levels. Now they are above. In 1972 our recommendations told how to slow growth. Now we must tell people how to manage an orderly reduction of their activities back down below the limits of the earth's resources".*

[1] Meadows, D.H. & al.: Limits to Growth, 1972

[2] Meadows, Donella H., Meadows, Dennis, Randers, Jurgen: Beyond the Limits: Confronting Global Collapse, Envisioning a Sustainable Future. Chelsea Green Publishing, 1992. The main idea is indicated by the very title of the book.

[3] Meadows, D. & D., Randers, J.: Limits to Growth—The 30-Year Update. Chelsea Green Publishing Co. 2004

Overshooting the limits resulted from uninterrupted industrial expansion which caused depletion of natural resources and increasing pollution of air, water, soil, with industrial waste. The results of research showed that in the first years of 21st century the overshoot was so advanced that even optimistic assumptions concerning technological progress could no longer be considered sufficient in preventing the approach of a downfall.

Contrary to the situation of 30 years earlier, the fact of exceeding the limits was now recognized by many researchers not related to the Meadows' team. The newer writings made use of the wording "ecological impossibility of maintaining over the long run the present scale and form of consumption".. This impossibility was documented by the omnipresent erosion of ecosystems. It was also reflected in direct indicators of global resources, as collected in various research projects[4].

The useful concept of "ecological footprint" measures the difference between the existing total productive capacity of any given region or the globe as a whole and the capacity needed to maintain the present level of consumption[5]. An application of this measure shows that the production potential required to meet the needs of an average inhabitant of the earth by 2002 was 2.2 hectares and doubled since 1962 (consumption of energy from oil, gas and coal increased in this period 8 times). Meanwhile the productive capacity of the globe per capita was evaluated at 1,8 hectares. This implies that humanity arrived at facing an ecological deficit of 0,4 hectares per capita on a global scale, with considerable differentiation between various countries and areas. No such deficit existed in 1972.

II. The concept of sustained development

The first serious endeavour to initiate international action on these challenges was made by the United Nations in the form of the UN Conference in Rio de Janeiro in 1992 focused on the processes of environmental decay. The Conference adopted a promising international action programme called Agenda 21, and a special body—the UN Commission on Sustained Development—was established to take care of implementation. The concept of sustained development as introduced in this way was clearly meant to indicate the need for defence against man-caused ecological destruction. The work done by the Commission and the related Division for Sustained Development deserves appreciation, but its real impact was limited.

With the gradual worsening of the general situation the concept of sustainable development must have risen in importance. But it also had to evolve. During the last decade it became clear that ecological destruction is not the only danger facing mankind. Growing menaces arose in the social area: mass unemployment, spreading poverty, marginalization of large social layers and atrophy of social cohesion. The increasing relevance of these phenomena can be seen in the rapidly growing income disparities both between rich and poor countries and in internal income distribution in individual countries, including those representing highest levels of development. This results in growing antagonisms and conflicts between social groups, nations, religions and civilizations, with their most acute expression in the form of global terrorism. Over the last decade

[4] Research of this kind was conducted by a number of institutions including—World Bank (World Development Report 2000); World Resources Institute (World Resources 2000–2001: People and Ecosystems, Washington, DC.; Worldwide Fund for Nature (Living Planet Report 1999), as well as independent researchers, see: Mathis Wackernagel et al., Tracking the ecological overshoot of the human economy (Proceedings of the National Academy of Science. 2002) and Wilson, E.O., The Future of Life. Knopf, New York 2002.

[5] Both of them are expressed in terms of land area which does not mean that the problem is reduced to agricultural output but represents a conventional formula used to express the total production potential.

social problems became a major international concern. They were the subject of the 2002 UN Conference in Johannesburg, where a programme for combating world poverty was formulated.

The present understanding of the concept of sustained development encompasses measures against ecological destruction and those against poverty. In this shape it presently has the status of a widely accepted set of priority objectives.

In the European context this line of thinking found first expression in the Lisbon Strategy of March 2000 which formulated objectives for the development of Europe. While setting the ambitious goal of making the European Union "the most competitive and dynamic knowledge-based economy in the world", the Strategy document underlined the need for securing sustainable economic growth as well as more and better jobs and greater social cohesion. This was followed in 2001 by the presentation by the European Commission to the Gothenburg European Council of a proposed outline of a strategy for sustainable development in which the objectives were convincingly designed.

But the most serious problem remained that of implementation. By 2005 it became quite clear that sustainable development goals tend to grow every day more important, in pace with the worsening general situation. As a result of such assessment the European Council adopted in June 2006 a revised strategy for sustained development which shows not only growing understanding of what is needed, but also offers elements of a new approach, particularly with regard to the implementation of ecological goals.

The state of the world in 2008 shows that at least one aspect of the prospective dangers acquired better understanding and real action on it is prepared. This is the climate change resulting from the progressive warming of the atmosphere and its ominous consequences in the form of rising sea levels.

It is a fact of life that certain important notions find access to general understanding only over a long time and under the impact of direct challenges. Thus, after years of mild indifference to what was repeatedly emphasized by researchers, suddenly people in general became aware of the imminent danger of global climate change, and policy makers began to propose measures against it by trying to reduce substantially the level of emissions of carbon dioxide. As a follow-up, in March 2008 the leaders of the European Union adopted a climate plan deadline to be enacted within a year which envisages a 20% cut in greenhouse gases by 2020, as compared with 1990 levels.

Highly commendable as this may be, according to present assessments it is already too late to overcome fully the phenomenon of global heating. Hence what is adopted as a target is not to allow the average temperature on earth to rise more than by two degrees Celsius in the second half of the 21st century. This will imply a significant diminution in size of the two ice caps and a rise of sea levels is going to swallow much low land neighbouring with the sea, such as many isles and a good part of Bangladesh.

At least it can be said that ecological challenges are taken some care of. Much less is done (although a lot is said) with regard to the other danger area, namely that of the social threat. The idea of eradicating extreme poverty and hunger acquired the status of the leading objective among the Millennium Development Goals of the United Nations. The idea was adopted of halving world poverty by 2015. Recent appraisals show, however, that current results are far from satisfactory. It seems difficult to arrive at a clear idea of the nature of possible solutions. This is not surprising in view of the complexity of problems which begin with demography and lead to vast areas of destitution and hunger. The world continues to develop in the direction of increasing disparities

and polarization[6]. The war against terrorism does not provide any solution, hitting symptoms rather than causes.

III. What are the real difficulties?

It can hardly be denied that massive emissions of harmful gases, notably carbon dioxide, do generate air pollution and the "greenhouse effect"; that waters are heavily polluted by industrial wastes; that cutting down tropical forests has highly detrimental consequences for the environment; and that mass poverty is a major concern for the world community. Why, then, it is so difficult to arrive at a general agreement with regard to the scope and scale of a realistic action programme against these evils?

The causes of this inability are threefold. First, it still remains a controversial issue to what extent the main dangers as recognized today are fully attributable to human industrial activity. If not, the need to adjust the nature of this activity may have limited significance. Second, even if the need to intervene by joint international is agreed upon in general terms, ample space remains for discussion on the levels of participation of individual countries. Third, the recognition of the need for adjustments does not rule out the idea that what is necessary can and will be introduced in due course by the self-regulatory mechanism of the market.

With regard to the first issue it can be said that, from a pragmatic point of view, it is wiser to try reduce the harmful emissions than to cherish the belief that all climate changes are caused by fluctuations in the activity of the sun or some other natural phenomena. This approach can be substantiated by the observation that international action taken some time ago towards reducing the emissions of freons (chlorofluorocarbons) helped to reduce the dangerous ozone hole. But endeavours to reduce seriously the emissions of carbon dioxide remain unsuccessful as a result of the stand taken by the main polluting countries.

On the second issue it is observed that, whenever it comes to finalizing an agreement on any programme of action, negotiations tend to become difficult.

It is useful to remember the remarks made in the review and appraisal report on the Lisbon Strategy known as the Kok Report[7]. It described the implementation of the strategy as highly disappointing which was attributed mostly to the lack of political will. It is interesting to try decipher what this really means. It means that national governments of the Union countries were rather reluctant to adopt policy measures which would help to secure the necessary level of investment in R&D (at three per cent of GDP) and the proposed employment rate of 70 per cent. Similarly, when it comes to validating the programme for reduction of the emissions of carbon dioxide, national governments drag their feet worrying about its consequences for their heavy industry and for international competitiveness of their businesses, as well as for their financial stability and cost in terms of jobs.

Experience shows that in spite of efforts made at the international level it proves extremely difficult to arrive at agreed upon action programmes. A sad example is provided by the fate of the Kyoto Protocol—an important measure against global warming. It committed signatories to reduce gradually over 20 years their output of carbon dioxide and other greenhouse gases by about

[6] It is worth noting that, according to Haruhiko Kuroda, president of the Asian Development Bank, the world's fastest growing economies in Asia, particularly China and India, are experiencing widening income gaps. Although rapid growth helped to improve the living standards of millions of people, it is leaving the other millions far behind. BBC News 2007/02/08

[7] It was presented to the European Commission early in November 2004.

5%. However, the main pollutant—USA—refused to sign the Protocol.[8] More recent UN climate change conferences[9] took up the planning of longer-term action beyond 2012 when the Protocol expires, on the assumption that further emission reductions are unavoidable to avoid continued global warming. But, again, they only showed great difficulty in arriving at any agreement except continuation of talks. The Bali conference failed to produce any agreement on the adoption of fixed numerical targets for the reduction of greenhouse gases emissions. The main obstruction comes now from the less developed countries led by China which feel that such restrictions would curb their freedom to expand their industrial production and promote further economic growth and development.

The third issue is that a general reluctance can be observed to adopt policy ideas which would fit to the concept of sustained development. The main reason seems to be the difficulty to agree on understanding the role of the market system. This seems to be a crucial issue because of a serious contradiction it implies.

IV. The role of the market system

The broad version of the concept of sustained development implies a recognition of the fact that free market, although needed as a basic instrument of efficiency, when left to itself becomes the creator of the negative tendencies referred to above, including the tendency towards self-destruction. This is the reason for recommending deliberate introduction of corrective measures at the national and international levels.

By contrast, the Lisbon Agenda is focused on the idea of industrial growth based on regulation of the economy through market and competition. Macroeconomic policies are needed only to support the market with reforms meant to promote competitiveness and innovation, with reductions of company tax levels, and with introducing greater flexibility of labour markets. It is worth noticing that the Growth and Stability Pact which is a cornerstone of economic policies of the European Union and sets clear targets for the acceptable rate of inflation and level of public debt, pays no attention whatsoever to the issue of unemployment which was not even mentioned in the document, as if it were not a major concern for contemporary economic thinking.

This approach very clearly belongs to the neoliberal school of economic thought devoted to supply-side policies which proved to be totally ineffective in dealing with unemployment problems in Europe[10].

Neoliberal ideas are linked to the fundamental belief in self-regulatory abilities of the free market. According to this line of thought, free market competition sets in motion automatic reaction to the negative tendencies by streamlining entrepreneurial innovational activity towards solutions which provide all the necessary adjustment. Hence every aspect of the tendency towards self-destruction finds response from the self-regulatory action of market competition. This ultimately leads to an optimistic assessment of the prospects for future development.[11]

Thus we are faced with two opposed approaches in the assessment of world development prospects. One of them stresses the importance of the tendency towards self-destruction and tries

[8] President George W. Bush at the very outset of negotiations announced his decision not to accept the call for joint action.

[9] Buenos Aires, December 2004 and Bali, December 2007

[10] See, e.g., a study of the German experience by Laski, K.: Three ways to unemployment, in Sadowski, Z. and Szeworski, A. (eds.): Kalecki's Economics Today, Routledge 2004.

[11] Cf. Kahn, Herman: The Year 2000—A Framework for Speculation on the Next 33 Years, 1967; and Kahn H., Martel L. & Bron W.: The Next 200 Years—A Scenario for America and the World, 1985.

to find non-market safeguards against it. The other is based on a belief in the mechanism of self-regulation. As we can not know for sure the further course of world economic and social development, it is impossible to decide which of the two is ultimately right. The real issue is not a controversy of opinions, but an objective contradiction between the two tendencies with the resulting question which of them is likely to prove stronger in the long run.

Is it right to believe that the self-regulatory mechanism of the market, despite all the negative phenomena which accompany present day development, is able to secure stability and safety for next generations? Can this be attained owing to the impact of the newly born civilization of information and knowledge-based economy with its emphasis on creativity and innovation? Or are there more reasons to recognize the preponderance of the self-destructive tendency which would lead to admitting the necessity of deliberate policy effort to combat the ecological and social challenges and attain the goals of sustained development?

There can be no doubt about the advantages of the self-regulatory mechanism of the market. It certainly has played for two centuries a crucial role as a driving force of economic development by continuously changing the patterns of resource allocation. However, a closer look shows that all such changes need time and effort. First, investment involves risk. Firms do not make prompt decisions without careful scrutiny of the projects. Also, they tend to think in terms of their own interest, not that of mankind. Secondly, the implementation of relevant projects requires specialized know-how which may not be readily available. Thirdly, major projects often require participation of governments which implies the need for attracting the understanding of politicians. This means that such reallocation of resources as may be needed is subject to considerable delays.

But there are no delays in the working of the self-destructive tendency. Self-regulation may be effective in slowly growing economies. In the present period of very rapid changes in technology, in the economic system, and in patterns of human behaviour, it may be impossible for the self-regulatory mechanism to gain advantage over the self-destructive tendency.

There is no way to determine for certain the future course of events. Future will certainly bring new discoveries and inventions, some of them not even conceivable in terms of our present-day knowledge. These may change fundamentally the whole economic and social set-up. But it seems hardly rational to rely upon things unknown. The present-day performance of the free market shows that, for the time being, it is not able to revert the tendency leading to self-destruction. It would follow that the basic requirement of the modern economy is to combine the free working of the market mechanism (needed to boost entrepreneurship, innovation and progress of science) with rational control (needed to promote the desired patterns of development). It is the concept of sustained development which helps define these desired patterns.

The challenge is to find a method of implementation. Policy measures recommended over the past decades failed. Liberalization of trade and capital movements, instead of narrowing the gap between rich and poor nations, brought about increasing disparity. Not only it did not help to stimulate growth and development in less developed countries, but made these countries to enter into uneven competition with much stronger partners.

Nobody was able so far to design for the market system a built-in mechanism which would contribute to the implementation of sustained development. a certain progress in overcoming some ecological troubles has been achieved in recent years. But, on a global scale, the picture remains far from satisfactory. The level of environmental pollution is still growing due to industrial refuse, air and water pollution, global warming, deforestation and wasteful exploitation of soils resulting from utter poverty of millions of people.

Thus visibly there is no organizing power capable of making materialize the concept of sustained development. The concept remains a desideratum, helpful in orientating the thinking, but having little significance in orientating action. Neither the world trend towards self-destruction

nor the limitations of the market mechanism in its self-regulatory capacities are as yet fully understood by the decision-makers. What persists is pre-occupation with maintaining high rates of growth of the GDP based on market-led resource allocation, while what is needed is to change the composition of GDP towards such lines of output which would increasingly contribute to combating the self-destruction tendencies. One most serious example is the need to shift away from fossil fuels to renewable sources of energy. But the current cost of the needed investment outlays exceeds the capacity of private firms, while state budgets are not yet orientated that way. Besides, the construction of a network of wind and sun power plants would call for industrial output not very different from what it is in terms of materials, emissions and waste.

There is so far no political will to work out a joint action programme at the fully international level. The United Nations Organization is clearly incapable of inducing its members to arrive at any such agreement. The present-day world seems to be overpowered by the hegemony of USA, but this probably has its limits. A tendency towards a polycentric formula in which China has a substantial role to play is easily decipherable. It remains to be seen what role can fall to the European Union.

The current experience of the European Union shows that the necessity of a basic reorientation of its economic policies is far from being fully recognized. It is true that the European Sustained Development Strategy represents an endeavour to fit development policies into a broader context and have them orientated towards encompassing both pertinent social issues and ecological concerns. But this does not seem to find expression either in current policy programmes or in the proposed constitution of the Union. the European Commission. Instead, ideas are put forward of dealing with the labour market by means of the concept of "flexicurity"[12], firmly rooted in the neoliberal doctrine. Such neoliberal bias can hardly be combined with the requirements of the strategy for sustained development. The objective of economic growth cannot be well served without being combined with care for social cohesion and the natural environment.

V. The story of neoliberalism

Neoliberalism as a phenomenon deserves special attention because Its universal adoption meant, indeed, a major turn in world economic history. A re-orientation of world economic thinking towards neoliberalism was started in late 1970's. What followed was a complete refurbishing of the 'Weltanschauung' of economic decision makers which resulted in a fully-fledged reversal of economic thinking and policy making. The new policies eventually became largely responsible for the course adopted by world economic development, including the tendency towards self-destruction.

By contrast to the earlier tradition, neoliberalism was against active economic role of the governments, and in particular against social expenditure and all forms of welfare state and/or the social market economy. It was thus against public spending and active fiscal policy, recommending balanced state budgets or, better still, budget surpluses. It contended that the success of the economy and the welfare of the society depend on making full use of free-market methods.

Neoliberalism gained important support from the British Prime Minister, Mrs. Margaret Thatcher. She became the author of the renowned slogan 'There Is No Alternative' (abbreviated into 'TINA') which was meant to present neoliberalism as the only legitimate economic philosophy, almost given by Revelation. Further support was given to it somewhat later by President Reagan and his administration which earned it the title of 'Reaganomics'.Owing to the decisive role played

[12] The concept is based on the idea of greater elasticity of the labour market which always implies a weakening of the position of labour.

by the United States and Britain in the International Monetary Fund and the World Bank, the neoliberal doctrine became for the next two decades the economic philosophy of these two main financial institutions of the world, and through these channels was spread to the whole world economy.

Any economic historian would note the sharp contrast between economic policies which prevailed in the advanced capitalist countries in the third as compared to the last quarter of the 20^{th} century. The first of these two periods, often denoted as the 'Golden Age' of capitalism, was characterized, at least in Europe, by full employment, high growth rates, relative increase in the share of wages in national incomes, and recognition of the responsibility of governments for public welfare. Governments followed policies of the Keynesian type which helped to maintain high aggregate demand owing particularly to liberal monetary policy[13].

All this was diametrically changed during the late 1970's and early 1980's. The orientation of macroeconomic policies returned to old ideas of a free market, limited role of government and financial stability. This was followed by a general shift to monetarist policies, in full contradiction to the Keynesian approach. The basic role was assigned to fully autonomous central banks which were to control money supply and lead consistent anti-inflationary policies. Employment lost its role of a primary policy objective. This doctrine has dominated in the market economies of the world until present days.

The neoliberal advocacy of the IMF was largely detrimental to the less developed countries. They were urged to liberalize their markets for manufactured goods but did not get reciprocity from the developed economies which continued to protect their own agricultural markets. As a result, the last decade witnessed not only the beginning of transfer of resources from the developing to the developed countries, but a steady increase in the size of that transfer.[14] In developed economies its policies, supported by legal constraints on trade unions, led to an increase of the share of profits in GDP's, to a marked increase in unemployment, stagnation of real investment in manufacturing and a general slowdown in economic growth. As a result, mass unemployment and quickly widening inequalities in income distribution became most sensitive issues throughout the world.

It is interesting to find out what were the real factors responsible for the shift to neoliberalism. In the past major re-orientations in human thinking were caused by unexpected appearance of new factors or conditions. The invention of the steam engine followed by the industrial revolution of late 18^{th} century brought about a re-orientation towards liberal thought and the idea of free market. The great crisis of the 1930's caused a re-orientation towards interventionism. What caused the neoliberal re-orientation?

It seems that in this case the triggering factor could well have been the world oil crisis of 1973.[15] Let us recall some basic facts[16]. The stable oil market, run for decades by the well established international oil corporations, was suddenly put out of balance in October 1973 by an unexpected decision of the Arab members of the OPEC[17] who imposed embargo on their oil

[13] It is true that in most countries these policies were accompanied by budget surpluses which shows that full employment resulted from private rather than government spending. Hence active fiscal policy was not needed.

[14] UN World Economic Situation and Prospects 2008, p. 69–70

[15] I do not want to enter here into the discussion on how legitimate is the belief that the world-wide triumph of the neoliberal doctrine in the 1980's was mostly due to a deliberate and well financed propaganda which included both public administration and educational institutions. Moreover, it was in some cases introduced by means which were far from peaceful, as shows the example of Pinochet's Chile.

[16] A closer examination of the crisis can be found in my paper "The Oil Crisis of 1973 as a Turning Point" in A. Kuklinski, B. Skuza (eds): Turning points in the transformation of the global scene, The Polish Association for the Club of Rome, Warsaw 2006.

[17] Organization of Petroleum Exporting Countries

exports to developed countries of the West, specifically to the United States, to Western Europe and Japan. This was done in revenge for their support to Israel in the 'Yom Kippur' war.[18]

This move meant a basic change in world geopolitics. For the first time in history the oil producing countries took over the power of decision-making from the oil companies. The unchallenged position of the great Western oil corporations was suddenly undermined by the emergence of a unified bloc of producers.

The immediate repercussions of this move consisted in energy supply shortages in the leading countries, particularly severe in the United States[19], a country highly dependent on road transport. A sudden shortage of the supply of oil meant a serious blow to the population and the whole economic life of the country.

In such a situation demand for oil is inelastic to price changes. Profiting from this turn of events, the OPEC-member states raised substantially the prices of crude oil[20]. The world economic system found itself suddenly under the pressure of high cost-led inflation.

The increase in the price of crude oil had indeed a dramatic effect on the world economy. The traditional flow of capital was rapidly reversed. The oil exporting countries of the Middle East began to enjoy a huge inflow of revenues[21]. By contrast, the oil-importing market economies entered a period of chaotic development. On the one hand, the price shock caused an outburst of price inflation. On the other hand, the energy shortages resulted, particularly in the United States, in a recessionary fall of output and rising unemployment. The impact of the new level of oil prices on the world economy was much more important than that of the embargo itself. This remained true after the embargo was lifted. In the world of today sudden steep rises of prices of crude oil became a re-appearing phenomenon. In recent years they occurred in 2003, 2005 and 2007, bringing the prices of oil to what earlier seemed unbelievable heights (at the time of writing well exceeding 100 dollars per barrel and continuing their upward drive). Though obviously this does exert a major influence on world markets, the phenomenon is no longer surprising and leads nowadays to automatic market adjustments.

But back in 1973 the situation was largely different. The effects of the price rise required quick policy response. Measures to reduce oil consumption led to economic contraction. Driven by the fear of deepening recession the central banks of Western countries brought down their interest rates in an attempt to stimulate growth. But this move could not have stopped further price increases.

A new blow to the world economy came from the second oil crisis of 1979, which this time was caused by the revolutionary change of power in Iran. It brought about a downfall in the Iranian production of oil and, subsequently, a new, more than twofold, upsurge of oil prices. Inflation in the advanced market economies received a new boost.

What became needed was a re-orientation of economic policy towards containment of inflation. A ready-made recipe could be found in the monetarist approach which recommended tightening money supply while avoiding any action contributive to the creation of excess demand. Hence

[18] The 1973 Arab-Israeli War fought from October 6 (the day of Yom Kippur) to October 24, 1973, started by an attack by the joint forces of Egypt and Syria.

[19] The USA were responsible by that time for about 1/3 of the world consumption of oil. The Arab embargo was never equally addressed to all the Western countries because of their differentiated attitude to the Arab-Israeli conflict. In Europe only the Netherlands were directly affected, while Britain and France were supplied without serious interruption. Moreover, the embargo was soon lifted for all members of the EEC after they adopted a joint pro-Arab resolution. By April 1974 the embargo was lifted altogether as a result of successful negotiations which implied full recognition of the new sovereign position of the OPEC.

[20] The increase was to a level four times higher than what was considered normal for years, ie. from 3 to 12 dollars per barrel.

[21] It is interesting to note thatamong the beneficiaries of the great increase in prices of oil was the Soviet Union. This probably caused an extension of the cold war.

budget deficits were *a priori* condemned. This turn of mind brought about an important institutional change: the increased role of the central banks as fully autonomous decision-makers responsible for determining the monetary policy.

The causal chain started by the oil crisis of 1973 led to an entirely new situation. The neoliberal doctrine, accentuating market freedom as the best way to regulate the economy, played down the early warnings related to the dangers it tends to create. As a result, world development made serious progress on the way towards self-destruction.

It is worth remembering the prophetic words of Karl Polanyi: "To allow the market mechanism to be sole director of the fate of human beings and their natural environment...would result in the demolition of society" [22] This was not remembered by the advocates of neoliberalism in their search for a way out of the critical situation created by the consequences of the oil crises of the 1970's.

VI. Need for a new re-orientation

Today the need for a new re-orientation of economic thinking stems from the rapidly changing conditions with regard to the real growth potential of the world economy. There is a growing recognition of the necessity to find a way of avoiding the ecological and social perils created by the tendency of the market economy towards self-destruction. For the general public It comes as a sudden blow, fully unexpected in the economic system overwhelmed by the paradigm of rapid growth. Once the notion of global heating found its way to the man in the street, every mild winter is interpreted as its symptom. Similarly, a rapid rise in food prices is treated as the beginning of general famine. The truth of the matter is that, although for the time being these are only current fluctuations, they are also a presage of what may really happen within a few decades if nothing is done to change the self-destructive tendency of the world market economy.

While many people would agree that the essence of the new re-orientation is in the concept of sustained development, the main challenge is in finding ways to launch it into real life by internationally accepted action.

This subject was taken up by the Meadows' team. In their third book which was mentioned earlier they made an attempt at drawing constructive conclusions from what was described as the impossibility of maintaining for the long run the present level of world consumption. Their approach, in spite of visible weaknesses, deserves careful attention. Its basic thought is a plea for what is called 'sustainability revolution'. Its nature is considered comparable to two crucial socio-economic revolutions of the past: the agrarian revolution and the industrial revolution. Similarly to the two it should bring a vital change in the information structure of the society, which means the set of aspirations and development ambitions of human societies.

This revolution should begin by bringing the world's natural rate of population growth to a stationary condition, ie. to zero level. It does not mean to support the present population decline in some developed countries. To the contrary—a satisfactory rate of reproduction is advocated to be maintained everywhere in the world. The implication is undoubtedly a necessity to curb the rate of population growth wherever it takes the form of population explosion.

This, of course, is the first weak point of the proposal. Logical as it may be, it implies the need of adopting a world-wide population policy without specifying, to whom such requirement can be addressed. As is widely known, views on this issue are widely divergent and there is not much

[22] The Great Transformation,1944, p.73

of a chance to expect support for this proposal from either the Catholic Church or the Moslems in general.

Of course, the argument put sometimes in defense of the growing population numbers that enough food can be produced in the world to feed any number of people does not suffice. First, it was already pointed out that not only food, but the total productive capacity counts in assessing the prospect for maintaining the present forms and levels of consumption. Second, it is a well-known fact that the world was never able to solve the problem of imperfect distribution of food: advanced countries may enjoy impressive food surpluses while millions of people in less developed ones suffer from food shortages and outright famines. Hence there is every reason to treat seriously the population problem. But this does not help to find a solution.

The second requirement is to reduce material aspirations of people by revising the concept of economic growth in its role of a paradigm for development policies in all countries of the world. A similar postulate was put forward by the World Bank, which in its fairly recent publications underlined the fact that economic growth is essential to limit poverty and fulfil so called millennium goals[23], but growth at any cost can hardly be recommended as it does not lead to sustained development[24]. Responsible growth, as it is referred to, means growth which ensures ecological stability of the system and social development. Growth of this kind is essential to increase well-being understood as embracing material consumption, health care, human capital, and social equity, ie. all the millennium goals as set by the United Nations.

The leading one of these millennium goal is to eradicate extreme poverty and hunger. As is well known, the aim to reduce poverty in the world by half is to be attained by 2015. Most recent evaluations indicate that it is definitely not attainable within this dateline. Average indicators for less developed countries are today influenced by the high growth rates of China and India. But there remains a substantial number of countries unaffected by the desirable aspects of economic growth[25].

The authors of the Meadows book to which I refer are aware of the weakness of formulating the right postulates which fail to have a clear addressee. Accordingly, a most interesting aspect of their book is their observation that the sustainability revolution can hardly be imposed on the world by a controlling authority. What it requires is the mobilization of a large scale worldwide civic movement.

Such civic movement, aimed at changing the model of human aspirations, is a prerequisite for the success of the revolution of sustainability. The authors formulate what they consider five necessary features of the movement. These are: visioning, 'networking', truth-telling, learning and loving. My understanding of these features is as follows:

(1) 'Visioning' means developing an ability to think in terms of the long-run, ie. to create a vision of the future. One has, of course, to be aware of the absence of such understanding in general public comprehension, and particularly among political decision-makers. It is a feature which still waits to be developed.

(2) 'Networking' means creating social relations on the basis of the rapidly expanding information networks. This may be considered a key requirement for international cooperation based on a civic movement. It can be expected to help in arriving at agreements and in organizing joint activities thanks to increasingly efficient information networks. With the rapid development and increasing accessibility of the latter this feature seems to be within reach.

[23] Millennium Development Goals, United Nations,

[24] This issue caused a conflict between Word Bank and the International Monetary Fund, which supported the economic growth paradigm.

[25] I believe that both India and China soon will have to be separated in statistics from other developing countries and form a special group of rapidly developing countries to give a more realistic picture of what is happening in the world economy.

(3) 'Truth-telling' should be interpreted as a plea for realistic assessment of circumstances. The truth which is sought consists in proper determination and analysis of facts related to overall development trends and in drawing appropriate conclusions. The need is also emphasized for making correct, rational appraisals of existing situations and prospects. Reassuring forecasts which obscure reality deserve only rejection. The question remains how to decide on what exactly is the truth, taking for granted that no prediction can be treated as certain in view of the unlimited potential of new discoveries.

(4) 'Learning' means providing open access to continuous public education, but also emphasis on unlimited promotion of scientific research. This does not require further explanation, as on this ultimately depends the success of mankind in implementing the idea of sustained development.

(5) 'Loving' means universal adoption for a moral norm of the idea of developing love towards others, mutual understanding and need to cooperate. This concept was presented by Dennis Meadows with some timidity, probably because of his awareness of its utopian character. He felt, however, that the time has come when its open and courageous presentation became essential, as It represented a basic pre-condition for the success of the revolution of sustainability. I think it should be understood as an expression of the desire to permeate visions of the future with humanistic values.

A scenario for the future which assumes success of the sustainability revolution presupposes joint activities of scientists and politicians as well as widespread civic movements. Such cooperation would be, of course, highly desirable. It is difficult not to support this line of thought, as it is more than an expression of a personal opinion, but represents a search for most effective solutions to the great dangers which humanity must face. This should be respected.

My comment is presented in two points. First, to abide by the requirement of 'truth', one has to raise the problem of a realistic appraisal of the feasibility of what was proposed. My trivial remark is that we are living in a highly diversified world where only in affluent societies the level of consumption may be considered excessive. In terms of numbers the world is dominated by people who not only live on a very low level of material well-being, but also represent a very low level of education. It is difficult to expect finding ready access to them with ideas of love and restraint in terms both of consumption and reproduction. It is hard to imagine gaining such access to half-literate or completely illiterate people who live in extreme poverty, although this may be more probable than to persuade the cohorts of semi-educated but presumptuous people in advanced countries. The concept of continuous public education may help improve the situation, but it needs a long time for implementation.

Secondly, it seems necessary to consider an alternative future scenario, in which future adjustment processes would not result from conscious preventive actions of a broad civic movement, but would be forced by a global economic crisis. A crisis would, of course, first affect the poorest rather than the rich, but gradually would spread to become generalized.

In parallel to the campaign for the desired scenario action should therefore be taken without delay to identify ways in which such an undesirable alternative scenario can materialize. This means trying to describe the process of adjustment to a situation in which forced limitations begin to become reality. Such approach gets motivation from the concept of 'visioning'. It seems indeed unavoidable if realistic long-term visions are to be formulated.

But I share the contention that it is necessary to concentrate our concern about the future around humanistic values. I am also in support of the orientation towards a great civic movement. With the lapse of time, a movement of this kind will perhaps prove able to alter the direction of world development. It would gain strength from the gathering storm of negative phenomena.

At the same time it has to be taken into account that these negative phenomena are bound to lead to growing antagonisms and conflicts between social groups, countries, religions and

civilizations. This may aggravate the general situation. For this reason I hardly can see a solution in an attempt to build a world government. Even if it could be established, which is highly unlikely, it would not unite people but rather introduce restrictions to civic activity and consequently add to conflict.

The problem is in correcting the course of overall world development which is an ongoing process influenced by a multitude of various factors. A substantial role in shaping it is played by technology. Its role is two-fold. On the one hand science and technology react to what is happening, finding solutions to new challenges which appear in the course of development. On the other hand, however, scientific and technological imagination incessantly and spontaneously is creating new products which shape new reality. But the crucial role in determining the directions of development is played by the economic objectives of people, their aspirations and ambitions connected with their material level of living. In view of what was described above the necessity of their reorientation should be obvious.

We are not in a void. It would be wrong to disregard the increasingly intensive attempts to improve the situation by reinforcing the self-regulatory tendency and dampening the self-destructive one. Reference should be made to the alter-globalization movement which, with its many weaknesses, does aim at launching a widespread civic movement representing the philosophy of humanistic concern about the future. Within the institutional framework the Sustained Development Strategy of the European Union is at least an expression of will to construct programmes able to meet the real needs of world development. Top and foremost, what is really needed is a collective sense of responsibility for the future of human race and of the world as a whole.

Warsaw, Poland, May 2008

WŁADYSŁAW ŚWITALSKI

FUTURE ORIENTED STUDIES (economic growth: issues, methodology, models)*

Abstract

The article concentrates on exploring the seldom hitherto addressed issues that revolve around the premises and methodology adopted by the research team commissioned by the Club of Rome to study the wide and long term implications of growth. It stresses the innovative features of the applied models and points to the advantages the system dynamics has over the traditional approaches towards growth modeling. The article is concluded with suggestions concerning the possible extensions of the model, to render it more realistic.

1. Motivations for prognostic studies

The future oriented studies stem from divergent motivations. The thorough understanding of stimuli or circumstances that push academics and research groups to work on presenting the images of things and situations that might happen or materialize in the future, should allow one to better assess the end results arrived at and to appraise the conclusions that follow the results of future oriented research.. We briefly outline below different motivations that could be seen behind various future oriented studies.

a. Freshly discovered facts or newly sketched hypotheses on the direction or the strengths of impact exerted by factors under investigation, might stand behind a desire to ascertain whether these facts or hypotheses can be used to better explain the observed phenomena or processes. In equal measure one might be interested in studying the extrapolations of this how the new knowledge helps to understand the implications of present day situation for the future. A natural extension of this desire leads to the studies of systems with poorly researched structures, cause-effect dependencies among elements or overall rules of their operation. We can regard such cases as manifestations of researchers' curiosity that is not propelled by expected commercial benefits or by immediate gains to be appropriated by supporters or executors of these studies.

b. A similar, albeit stemming from differing premises, motivation to engage researchers' time, resources and effort into future oriented studies, can be seen in attempts to test a new methodology or a new set of research instruments. We attribute this similarity to the fact that the researcher, again, does not express any preferences regarding the future state of the studied system, nor is personally interested in presenting a particular shape of the future.

* The author wishes to thank Dennis Meadows for his contribution to render this article more exact in relating the facts as well as the intentions of the authors of publications referred to.

c. Activities preceding projects that aim at achieving commercial, political, military or sporting success also contain the element that is centered on building forecasts. These forecasts most frequently address the issues revolving around the most probable conditions governing the environment in which an entity that commissions the forecast will pursue its goals or they are to predict the potential reactions of the environment as well as of entity's rivals to its decisions and actions. Future oriented research of that kind normally belongs to a vast domain of strategic studies that are commissioned by nations' governments, boards of corporations and leaders of teams that participate in sport games or automobile rallyes. The literature on forecasting in business is numerous[1]. It is usually based on standard procedures and models. The characteristic feature of such studies is that their scope and depth is made dependent on interests of entities taking part in rivalry or head-on competition; curiosity of the researcher is nonexistent or reduced to a minimum.

In all cases of enquiries into the shape of the future—irrespective of motivations—the proof of correctness of the adopted premises and assumptions, relevance of hypotheses, operational faculties of reasoning and validity of end results is provided by the consistence between the forecast and the state of the investigated system. A success brings in recognition and fame—a failure necessitates the examination of data, assumptions, hypotheses, formulae for logical, algebraic and functional calculus, and the interpretation of results. In some cases, especially in those in which time horizon is very remote, the real validity of end results can not easily, or at all, be established, as the prognosticated future has not yet arrived. That situation obtains in studies in which direct, short term interests are absent but, on the contrary, the investigations are oriented toward more distant future and the individual stakeholders in the outcome of long term processes can not be directly identified.

2. The first report for the Club of Rome

In 1972 "a slim paperback from an unknown publisher" appeared in print under a title that, together with the book's subtitle[2], was announcing something that has never before been reckoned with. Limits to growth? What a strange assertion! Economies and nations are growing and there are no limits. The view that unlimited growth is a natural destiny of the world was not only prevailing before the publication of the book, even official reactions to the contents and conclusions of the study tended to disregard the very notion of limits. Nevertheless the book quickly gained notoriety, it was printed in millions of copies in at least 30 different languages.

The appearance of the book constituted an event for general public and for academic circles. The names of four authors were unknown[3], their previous publications were hard to come by, and their academic backgrounds or specializations could not be easily identified. What was baffling the more involved readers was the fact that although the book was addressing growth issues, none of the authors was a theoretical economist. A team of young researchers from the Massachusetts Institute of Technology was initially composed of 17 members. Dennis Meadows formed the team

[1] A theoretical approach toward analysis of risk, uncertainty and profits and the need to build predictions for business was probably initiated at the time when competition started to be reckoned with. Important contribution to the field is owed to Frank H., Knight [1921]. Since then hundreds of monographs, textbooks and articles have been printed on the subject.

[2] *The Limits to Growth. A Report for the Club of Rome's Project on the Predicament of Mankind.*

[3] Donella H. Meadows, Dennis L. Meadows, William W. Behrens III were Americans while Jorgen Randers is a Norwegian.

and was its leader but he devoted the first place in the list of authors to Donella[4], his wife and the principal author.

The research project has been commissioned by the Club of Rome. An extensive list of issues and questions formulated by the then *spiritus movens* of the Club of Rome, Dr. Aurelio Peccei, has in fact posed a challenging task for the team.

The team had, initially, a mentor. Professor Jay W. Forrester of MIT, although not a formal team member, had culminated his earlier studies on the dynamics of various systems with the book on world dynamics, [Forrester 1971]. Thus the philosophy of models that constituted the backbone of approach into the study of limits to growth was provided by Jay Forrester's work. While the Club of Rome should be credited with the courage to initiate this large and uncertain project, one has to bear in mind that without Forrester's intellectual input, as well as the creativity and stubbornness of the research team, the final report of the effort that had started in 1970 would not have reached such inquisitiveness and quality.

The task was tremendous and it necessitated the gathering of relevant data from many fields, precise specification of cause-effect relations of the model, calibration of various coefficients in model's equations and the development of operational software capable of conducting simulations of long term trajectories of many layers of model variables.

The task taken on by Dennis and his team, considering the scale of the problem, importance of questions to be answered, time span of studies, was not only innovative and unique, but it also was opening new perspectives for studies of mutual dependencies among variables such as consumption *per capita*, world population, level of technology, availability of raw materials for production, contamination of natural environment etc. Inclusion of such variables into models of growth constituted a marked reduction of the paucity of modeling methodology and, by the same token, was a prompter for growth economists how to embrace phenomena and processes that traditionally escaped their comprehension. Alas, that point has never been noticed by professionals of the field.

After two years of intensive work the team managed to develop a complete formal model and to collect a set of the relevant data. Primary identification of cause-effect relationships among variables and processes (changes in population, production and exploitation of resources, consumption, sedimentation of waste in the environment) allowed the team to run initial simulations. Since there were no previous experiences with the operation of models of such a specific type[5], and the ones that would cover time span of two centuries (1900–2100), in the absence of firm official statistics on the trajectories of changes in processes and their interplay, it was necessary to introduce 12 sets of assumptions concerning the initial conditions (known at the very beginning of 1970.) as well as the most probable directions and intensities of impacts that certain variables exert on the remaining ones. These original assumptions could be regarded as pre-scenarios for full scale simulations.

The assumptions and the corresponding results of simulations were presented and commented upon in the book. In consecutive chapters the authors discussed the dynamics of, and constraints for the processes of exponential growth (chapters 1 and 2), described the most essential features of growth, that have been replicated in the model called World 3[6], (chapter 3), explained the modalities by which technological advance influences limits to growth (chapter 4) and in chapter 5

[4] At the moment of book's publication Donella was 31, she graduated in chemistry and in 1968 earned a Ph. D. in biophysics. The remaining members of the team belonged to the same generation, some of them were graduates in management, others in science or technology fields.

[5] Although much larger models had been earlier constructed by other teams, the innovation introduced by Dennis' group relied on the fact that they in fact had endogenized many variables which previous models either ignored or treated as exogenous.

[6] Jay Forrester's previously developed models were named World models 1 and 2.

they expressed their views on chances that the world attains and maintains a global equilibrium in long term.

3. Language and modelling methodology

While the scale of the object system and the time span of investigations were following the interests of project's sponsors and the character of questions that had been posed, the methodology of the study, selection of the language of the model and the final specification of model's equations and parameters have been left to the choice of the team. In fact the team could rely on one or several methods of modelling developed in the past. These methods were characterized by long tradition and experiences gained in their use, they also enjoyed high esteem among theoretical economists. The research task in its essence was touching the categories, phenomena and processes that economic *theory* was studying since long time (production, technological advance, consumption, composition and productivity of factors, growth, general equilibrium).

The developments in modern economic thought over more than two hundred years, with achievements such as:

— *tableau économique* (F. Quesnay, 1758);
— mathematical foundations of theory of affluence (A. Cournot, 1838);
— enquiries into the structure of economic systems, known as input—output analysis (V. Leontief 1941. 1951);
— theory of games and economic behaviour (J. von Neumann, O. Morgenstern 1944);
— general equilibrium models (K. Arrow, G. Debreu 1954);
— economic growth models (R. Solow 1956, 1957, 1970, and many others),

could have supplied inspiration to build appropriate models. The authors of *The Limits to Growth* had a wide spectrum of available paradigms: various econometric methods, mathematical programming, Harrod-Domar approaches, Cobb-Douglas production functions etc. As it appeared, economic sciences were not in position to offer hints how the observed in the past interactions among pertinent variables and processes influence the shape of the present state of affaires and in turn, how the present situation, dynamics of autonomous change and the newly emergent forces can imprint their trace on the future. To a still lesser degree economics could provide experience in the realm of constructing mathematical models of global trajectories of the most important determinants of the state of the world. It should be stated, however, that neither the deficiency of economic knowledge nor the non-mastering of modelling methods applied in general equilibrium or growth theories, stood behind the choice of a new and the untested in macro or mega economic research approach.

System dynamics which should be regarded as a specific instrument of simulation methodology (or simulogy in short) derives its relevance and strengths from its focusing on cause-effect relations and from the observance, in a way, of the principles of Newtonian physics—in particular— dynamics. The metaphor of Newtonian physics which we use here, could be perceived as a distant source of inspiration for the rules that govern the application of system dynamics in simulation studies:

1) each use of force (active employment of inputs of energy, matter or information) on an entity (body, system) evokes a reaction of the entity affected, the force of the reaction is oriented in reciprocal direction and normally is equal to the strength of the initial force exerting the influence;
2) when the forces exerting impact on a body (entity, system) are not in equilibrium, then the speed of such a body in its space (physical or conceptual) increases proportionately to the

excess of strength of the force that could not be counteracted by all other forces acting on that body;

3) when all forces that exert influence on a system remain in mutual equilibrium, then either the system remains in a given point of its space or it moves within that space with a constant speed.

It might seem that the above rules are oversimplified. In fact they are, to the extent that Newtonian dynamics was explicating the situations observed in the realm of simple physical bodies. Meadows and his team have not addressed the behaviour of physical bodies—they dealt with complex social and economic systems that are driven by their internal and very specific forces, respond to stimuli from the environment and react accordingly. These systems are subjected to inertias and time lags and only when the account is taken of the mutual interaction of social/economic, technical and natural environment systems, then the rules of Newtonian physics can acquire proper meaning and exposition in terms of the behaviour of the systems under study[7].

One marked difference between purely physical and the real world systems, in which the human, technical and biological processes are to be reckoned with, is the fact that in the latter processes aspirations, knowledge, ability to formulate designs for actions desired by people on one hand, and the delays in implementing the designs (caused *inter alia* by time lags in perceiving the interests and implications of actions, in reaching consent and eventually in seeing the outcomes of actions) on the other, are very dissimilar to the behaviour of physical bodies. On top of it there comes the not fully researched and not fully known question of response of the natural environment to forces applied by the mankind in exploiting its resources and its absorptive capacity. Moreover, the time lags present in actions and reactions, even if known, are not easily accepted, due to the interests of general public of individual countries and their elected representatives.

Dennis Meadows opted to enter a novel area of methodology in modelling interactions among demographic, social, economic, technological and informational factors and processes. A promise to achieve realistic answers to questions having been addressed (realistic in the sense that problems and conclusions are defined in the same set of notions, concepts and categories) was seen in the application of system dynamics methodology. System dynamics paradigm emerged in the 1960. during the studies of properties and behaviour of technical and small scale microeconomic systems. While Jay Forrester was aiming at elaborating the methodology to replicate the dynamics of various systems that differ in scale and the type of their constituting elements [Forrester 1961, 1969, 1971a, 1971b], the objective of Dennis Meadows was to construct a model, together with the supporting procedures, that would be fully subordinated to the logic of questions, that followed the interests and concerns of Club of Rome's members[8]. It did not suffice to have an internally consistent model. The Meadows' and their team had to develop a whole computer based superstructure for the model, entailing adequate programming languages [Pugh 1970], data bases and computational procedures. As if this were not enough, the research team had to secure an appropriate configuration of computer hardware and its peripherals. All these, one by one, contributed to the fundamental innovation in modelling methodology and to the proving that

[7] In a recent (end of November, 2006) privately expressed opinion Dennis Meadows was not willing to share this observation. Perhaps I overextend the argument, albeit it seems worth risking that disagreement for the sake of seeing wider connotations of the methodology.

[8] World 3 contained system dynamics equations and formulae that were many times more involved, complex and sensitive to changes of parameters than the most advanced models used at the time in managerial practice. It called for the development of a new generation of feedback loops and for the introduction into the operational model of many layers of such loops. Single loops were made dependent on multiple time lags, originating in other feedbacks, with the former, in turn, controlling the values of parameters in coupled cause-effect equations.

organic modelling[9] paradigm can not only be successfully employed to specify the model, but it also yields directly interpretable outcomes.

The modelling innovation was in fact composed of several additional novelties that had not been known theretofore. Apart from the formal functionality and the language of the model (technically speaking, the language of the initial model was DYNAMO, at present the language employed to run the simulations is STELLA), the adopted approach allowed the team to weld together several macro scale processes into a unified structure that was capable of producing values of final outcomes resulting from the mutual interplay of such distant variables as birth and mortality rates, changes in the size of the world population, intensity of use of non-renewable natural resources, speed and success in generating new technologies, agricultural and industrial production, consumption, human attitudes toward environment protection and ways to reduce the environmental burden of production and consumption wastes. The truly dynamic property of the model allowed to use the results generated by the model in previous years as input variables for successive years while the corresponding input/output transformation parameters were made respondent to newly achieved states of the whole system.

A second, but in a way connected to the above mentioned innovation, new property of the model, hinged on resignation from the assumption that production technology (in food, industrial goods, services production) is given from the outside and constant. Input/output coefficients were made dependent on the rates by which technologies mature and become obsolete, on R&D expenditure devoted to the generation of new technologies and on the speed of their diffusion. This has been one of the first incidents (apart from the Joseph A. Schumpeter's writings) when academic literature documented the endogenous character of technological advance[10].

The third important innovation can be spotted in the inclusion in the model of the calculus of available resources (renewable and non-renewable). The observed exponential use of hydrocarbons (solid, liquid and gaseous), confronted with the rates of discovery and accessibility of new deposits and the ensuing costs, enabled the researchers to signal the declining availability of majority of natural resources in general[11]. This fact is replicated in the model by the continuously changing values of parameters in the related equations. The earth surface was also treated as a non-renewable resource: the available space to contain productive activities was shrinking (erosion and removal from production due to the location of technical infrastructure and urbanisation) together with the increase in population and outputs.

One may enumerate many other innovative features of World 3 model. We want to point to one that would end this list of innovations introduced into modelling of mega systems. Until the publication date of *Limits to Growth* none of the formal (i. e mathematical or econometric) models entailed the account of the environmental consequences of the steadily increasing production of agricultural and industrial goods and of their consumption. World3 model, in a noble tradition of natural sciences, follows the principle that to every action there corresponds a reaction. On the one hand production and consumption processes generate waste and, on the other, natural environment, the recipient of all these contaminants, answers with a process of neutralising and absorbing effluents, solid as well as gaseous garbage. The authors of the book have realised that the mutual interaction of these processes is subjected to its own, very specific, dynamics.

[9] By organic modelling we mean an approach in which dependence of results (generated by a model) on causes and stimuli of change is achieved *via* natural replication of relations taking place in real world. That quality of the model stands in contrast to symptomatic modelling (e. g. employed by classical econometrics), which relies on proxies for real variables and calls for the use of exogenously defined mathematical functions that are expected to resemble the factual dependencies.

[10] It is worth noting that theoretical economics of the main stream has formulated a hypothesis that the endogenous factors are responsible for the level and speed of technological change some 15 years later, [Romer 1986; Lucas 1988].

[11] Fossil fuels were not included explicitly in models authored by Meadows' team.

They have introduced into the model a category of the absorptive capacity (or tolerance) of natural environment *vis-à-vis* the sedimentation of waste. To our knowledge, no other research or publication, even the unnoticed by other growth theorists study by Vasily Leontief [1970], have taken into account the phenomenon of slower, than production of waste, process of natural regeneration of the sustainable quality of the environment and the resulting therefrom accelerated deterioration of its state. In a dynamic world, more complex and growing in volume organic and inorganic waste call for more outlays to neutralise their impact on living conditions. That property of the real world has, for the first time in history of modelling, been reproduced by the model in question. It is a pity that a later study by Leontief, devoted to the structure of the world economy [1974], could not successfully tackle the issue of world's limits to growth.

4. Enhanced versions of the World 3 model

The results of the pioneering work started in 1970 and published in 1972 had been so far revised twice. In 1992 we witnessed the publication of the book bearing an ominous title *Beyond the Limits* [Meadows, Meadows, Randers 1992]. The enhanced model that constituted the machinery for converting newly gathered data into results and conclusions was labelled World3–91. It was based on the same modelling methodology but data basis was extended to cover 20 more years. The authors of the new book, drawing from new and fresher evidence, were inclined to formulate a hypothesis that mankind has already overshot the limits of sustainable growth. Sadly enough, the response to hypothesis was lukewarm, at best. Only a few enthusiasts received the book with understanding or comprehension. Others, as the results of Conference in Johannesburg (Rio + 10) have indicated, were in business as usual.

A remark here should be made. Even if one does not agree with the way the conclusions have been drawn (the use of system dynamics framework), more responsible experts and opinion forming circles should have recognised the fact that there is something alarming contained in the factographic evidence amassed by, independent from D. Meadows and his group, researchers[12]. Perhaps a different model should have been developed to analyse the hard data available at that time and to falsify the method or to question the results and conclusions. Nothing like that took place. The academics and growth theorists remained silent. Growth processes were studied within intranational framework, with traditional models and, at times, comparative studies were made to corroborate the results arrived at.

After more than a decade later a new book reached the public. This time the title was framed in a technocratic style[13] [Meadows, Randers, Meadows, 2004]. In what follows, we address some changes that have been introduced into the exposition of the limits during the course of all those years since 1972. Having noted earlier the fundamental innovations that are present in World3 model, we now want to devote some attention to incremental innovation that is present in the update. There are several main changes and additions that render the update more realistic:

1) an improved modality of recording the costs associated with the introduction of new technologies—while previous versions of the model were based on the cost of available technologies, the new approach takes into account the costs of already applied ones;
2) extension of the model by adding a new aggregate variable (Human Welfare Index—HWI), composed of variables generated internally by the model which are the indicators of life expectancy, education and GDP; the inclusion of this variable constitutes a marked achievement,

[12] E. g. the National Science Foundations report (released in 1976) on the depletion of ozone layer.
[13] *Limits to Growth. The 30 Years Update.*

as it quite closely approximates the trend shown by indices independently exploited by United Nations agencies[14], with the latter being computed without the model, *via* an independent procedure of data gathering and processing;

3) the introduction of a new composite index (Human Ecological Footprint—HEF) that is recording the sedimentation of the negative outcomes of human economic activity[15]; as in the case of HWI, that value of that indicator is calculated as a model output variable made dependent on input and intermediate variables that are listed in the initial specification of World3–03 model; HEF takes into account the effects of: a) the steadily increasing use of artificial fertilizers and pesticides, b) growing area of land surface being occupied by urbanization processes, by the scale of productive activities and by enlargement of transport infrastructure, and c) the land needed to absorb and neutralise the pollutants generated by human activities.

In addition to extensions of the original model that were centred on its contents (reformulation of equations, changes in the composition of coefficients and inclusion of new aggregate variables) the team was able to exploit tremendous achievements as far as the computer related back-up is concerned. The use of these achievements has not affected the substantial contents of the model or the value of results it yields, yet they greatly speeded up the simulations and facilitated interpretation of results.

5. Results of simulations

Results of simulations of the World3–03 model are not dramatically different from the results obtained earlier. What seems to be important, however, is that these results have been derived from much wider factographic basis (more precise data covering the passed 30 years were available), while the model builders had been aware that some distancing of professional growth experts from the methodology applied and the distrust towards the results produced on the part of many politicians, require from them a very cautious approach to commenting upon and drawing conclusions from the results. What we get in the update of passed 30 years after the initial account of the limits to growth should be treated as an expression of deepened knowledge and an improved insight. The authors decided to be very precise in presenting their understanding of the meaning of numerical results. They formulate six main conclusions:

1) a global transition to a sustainable society is probably possible without reductions in either population or industrial output;
2) a transition to sustainability requires actions to minimise the HEF by reductions in family size, lower industrial growth, better efficiency in resources' use;
3) these reductions need not be introduced with the same intensity in all countries and locations;
4) as the numerical characteristics of trade-offs between the size of earth population and the individuals' level of living quality depend on so many hard and soft factors and, by it, they can not be established as constants for all times and places, the active search for a sustainable HEF levels should be independently started as soon as possible in many parts of the world;

[14] Human Welfare Index corresponds to a similar indicator that was put into use by UNDP (Human Development Index—HDI). HDI is an aggregate measure (computed as an arithmetic average) of three important aspects of human development level: a) life expectancy at birth; b) human intellectual assets, being the result of adult literacy rate and the actual total primary, secondary and tertiary enrolment rate; c) GDP *per capita*. HDI is measured for most countries of the world on individual basis, ; its values are published annually since 1993.

[15] Human Ecological Footprint indicator has been formulated on the basis of studies conducted by Mathis Wackernagel and his team, [Wackernagel *et al.* 1999].

5) the longer it takes to implement measures to reduce the HEF, the lower are to be the sustainable levels of world's population and of material standard of living;
6) the higher are the goals for population number and living standards the more imminent are the risks of lowering the level of sustainability, (p. 252 and 253).

To many these conclusions seemed to advocate zero growth. Such a stance is a sign of an oversimplified approach and a misunderstanding. Growth is possible, but the one in which qualitative development is introduced into growth processes at the expense of physical expansion in the indiscriminate use of earth resources.

As if conclusions were not enough, the authors move to formulate recommendations, which they call guidelines for restructuring in the direction toward sustainability. They are addressed to the opinion forming societal circles and decision makers. A short enumeration of these guidelines is included here for documentary purposes. They are the following:

1) effects of the contemplated decisions should be appraised within much longer time span than heretofore:
   a) cost–benefit analyses of all decisions (in business, administration and government policy making) should be based on long term considerations, free of reasoning based on short term market advantages or electoral cycle goals,
   b) appropriate procedures, incentives and criteria should be elaborated, so that people responsible for actions will feel accountable over decades for decisions they take at present;
2) an improved system of collecting and disseminating information on economic, social and environmental conditions should be developed and implemented in place:
   a) governments and general public should incessantly be kept informed about the actual state of affaires and the real impact human actions might exert on the world's systems,
   b) all external costs should be internalised into market prices,
   c) macroeconomic indicators, such as GDP should be reformulated, so that statistics would not confuse material consumption with welfare[16] or local factor productivity with rationality of their deployment;
3) reaction lags to signals carrying information about environmental or social distress should be reduced, so that governments can respond with adequate measures in the shortest possible time—to achieve this it will be necessary to:
   a) install systems that are capable to prevent the occurrence of problems,
   b) make technical and institutional contingency arrangements,
   c) education and research entities should be reoriented, to be in position to educate people how to be creative in redesigning technical, economic and social systems and in problem solving;
4) consumption of non-renewable resources should be minimised and all efforts should be spent to disseminate recycling processes;
5) the loss in accessibility and quality of renewable resources should be staved off by maintaining equilibrium between their usage and renewal—in order to support the equilibrium sanctions and inducements, that prevent overuse of resources, should be put in place;
6) each exploitable resource should be used with maximum rationality, this recommendation entails not only technical efficiency and high individual productivity of resource's inputs but also economically reasonable allocation of available resources among different uses.

[16] A similar appeal is voiced in an article contained in a recently published book on growth and competitiveness [de Groot, Nahuis, Tang 2006]. The authors argue that although there is a gap in income *per capita* between the US and Europe (resulting *i. a.* from the fact that Americans work on the average 265 hours longer in a year than Europeans), that difference does not translate itself into the dramatic disparity in welfare, as income statistics ignore the value of leisure and household production.

The recommendations listed above address individual issues that Meadows and his team singled out as requiring consideration and action. But they are of the opinion that even following all these recommendations would not be enough to achieve sustainable growth. So, the ultimate guideline addresses the necessity that the rates of population increase and the augmentation of the size of physical assets that support the existence of world's population should be lowered and eventually brought to an absolute stop. It is important to note that in 1972 global use of resources and energy was below the limits, at present it is, as the model shows, above the limits. So the humanity not only needs to stop growth, but also to reduce the flows back down to below the limit.

Implementing this recommendation in real life would require a decisive alteration of philosophy of approach, creation of the new, or a change in the *modus operandi* of the existing, institutions and the introduction of social innovation. We might agree with all guidelines, but the last element, namely the social innovation that is required to imprint the quality of sustainable existence of mankind on earth seems to be a little vague. What kind of an innovation have the authors nurtured? Reform of a capitalist system, return to the ideas of centrally planned economies, a rethreaded social market economy[17]? Reckoning with the infallible logic and consequence of the authors of *Limits to Growth* it is hard to imagine what sort of social innovation they could have envisaged to redress the situation.

6. Reception of the results of studies

6.1. Attitudes towards the *Limits to Growth*

The discussions on the contents of consecutive publications on limits to growth, on the factographic evidence employed by their authors, on the applied methodology (pre-scenarios and model specification), on the mathematical apparatus used to render the methodology computable and capable of producing sensible results and on conclusions that could be drawn from the arrived at results were conducted by model builders (adherents and adversaries of system dynamics), historians of technological advance, ecologists, economists (mainly those that were outside the main stream, which was concerned with the use of orthodox mathematical growth models), popuralisers of scientific achievements and policy makers. The latter, were entering the debate being guided by concern for political correctness and the results of upcoming election, but they were not moved by the conclusions nor they were minding the ultimate outcomes of their decisions. Even if negative results of overshoot over the limits to growth were to become visible or painfully felt by the society, it would have happened after the passing of several decades. At that time new generations of voters will elect their leaders from among fresh candidates for parliamentarians, prime ministers or presidents.

In general, a sort of polarisation of attitudes towards the *Report for the Club of Rome* could be discerned. On one side of the dividing line are discussants who address intellectual issues that concern modelling methodologies and tools, data basis, noble objectives of development and growth, and conclusions derived from the numerical results of simulations. The members of the opposite group (business leaders and active politicians) believe that discussion on academic achievements should be delegated to academics. They are concerned with practical issues of everyday activities

[17] We refer here to the ideas that constituted the backbone of Ludwig Erhard's reform of post-war economy of the Federal Republic of Germany. The term *Soziale Marktwirtschaft* has been very popular at the time, the principles of social market economy, when implemented in practice, have created an economic miracle. Could that be repeated in our times? Would that constitute the social innovation thought of? Comp.: [Erhard 1964, Reuter 1998].

in politics and business—this what might happen in 20 or 30 years from now should not bother decision makers of today. Although some efforts of politicians, motivated by care for the state of natural environment, brought about initiatives that aim at the reduction of pollution or the overuse of natural resources[18], but these efforts have been not enough to induce national governments or international organisations to commit more substantial funds for establishing a world or a regional centre that would be devoted to the studies on building an alternative methodology of studying growth processes and their long term impacts within the scale of the whole earth.

A word should be told about the managements of large, transnational, frequently global corporations. Their neutral attitudes towards the conclusions from *Limits to Growth* should not be attributed as resulting from the belief that *après nous le deluge*. The message contained in conclusions calls for self-restraint. By businesses that could be translated into appeals to:

— abandon the formulation and implementation of competitive strategies based on the unrestrained use of resources;
— resign from the principle that shareholders' value should be maximised at the expense of social obligations or the overexploitation of external (to the company) costs;
— eliminate all or most of research projects focused on innovative products and processes that might increase net income, the return on sales, assets or equity while disregarding social and environmental costs of their implementation.

Such directives could not be followed by CEOs or presidents of large (and even small) corporations. On the contrary, conditions that govern the globalised world economy, force companies to pursue aggressive strategies for reaching new markets, to win new customers for new products and offer to new consumers products that buyers of saturated markets refused to purchase. Success of the company is the success of its management and *vice versa*. Corporations are the ultimate engines of growth and providers of innovation that fuels that growth. Their resignation from this role borders—under present economic order of market driven forces of progress—on an attempt to commit suicide. In the business sphere of societal life, even the most dramatic appeals for self-restraint, would not change the attitudes, objectives and strategies in behaviour of owners, managers, employees and the rest of stakeholders in corporations.

Equally significant is the attitude of the passive beneficiaries of growth processes, that is, of ordinary citizens of the world. They sell their readiness to work for firms, organisations and statal institutions and they purchase goods and services, supplied to them by companies. They are interested in getting more and better products. Citizens of developed countries are convinced that the increased consumption is their natural privilege—why should they resign from it? Their forefathers built the affluence, they are continuing in bringing more abundance, in producing innovation and in keeping the world order as it is. Why should they support any reforms or changes bringing-in refrain or the rejection of their life styles? On the other end, inhabitants of poor countries have nothing to lose if some growth reaches them—they know what to aim at, imitation of consumption patterns of rich countries can only improve their standard of living.

A natural outcome of these perceptions and attitudes is that academic discussion is relegated to peripheries while business supports and people vote for those politicians that promise more growth and higher incomes, social benefits and more abundant choice of ways of life. In the chain-linked dependencies that schematically can be presented in the following way:

policy making → limits to growth → perception of issues → business → voters → politicians;

the feedback closes itself in a positive, self-fuelling loop. Businesses, voters and politicians are for growth. They say if there emerges an academic problem with growth let it be solved by academics and researchers.

[18] We may refer here to Kyoto Protocol or Whaling Agreements.

The general discussion on limits to growth tends to fade off, despite some concerns related to the state of natural environment, fight against poverty or financial (not the real) equilibrium. Some traces of this discussion resemble a scholastic discourse on issues that are far removed from the real problems and challenges that confront the mankind now and might inflict damages in not so distant future. Intellectuals and academics employed in particular disciplines tend to address fragmentary issues. Even the foresight programmes occur to suffer from myopia when it comes to discuss more general problems. The message on limits to growth and the threats that might come to being when these limits are transgressed remains in symbolic or theoretical sphere.

Independently of the regular discussion among the contemplated or intended addressees of the report, there emerged a group of individuals that took the arguments contained in conclusions from model simulations in a very direct manner. They were made uneasy, first about facts that the fast deforestation of earth surface (in particular the annihilation of tropical forests), disappearance of many flora and fauna species from the earth surface, falling number of wild animals, decrease in weight of wild animals killed in hunting, increasing piles of post-production and post-consumption refuse. Secondly, they realised, reading the report, that these facts are not unrelated. Growth, in their perception, can not be based on aggressive attitudes toward the natural environment and wild life. This group has no voice in actual policy making, moreover on current business decisions. Their activities, however, contribute to the growing awareness of the public opinion. While the "greens", as the members of this group are called, can not influence the course of affaires directly, they stage demonstrations and protests.

Summing it all, one might see the absence of rational reaction from the centres that shape the world economy[19] and the economic policies of individual nations, as well as the attitude of relegating the problems of the world's sustainable growth to the realm of intellectual speculation, produced a situation in which the results of Meadows' analyses are supporting the activities of the "greens", who then can easily be termed as misfits or zombies.

All these observations and comments were inserted to raise the issue of a turning point. The turning point (incidentally, this phrase was used in the second Report to the Club of Rome[20]) is a complex notion. While one can easily identify turning points that have occurred in the past [Kukliński 2006], the issue rests with the discerning of premises, primary causes, the inner mechanics generated by the turning point and system wide implications that might affect the course of affaires in the future, [Świtalski 20006]. It is our belief that *The Limits to growth* in all their published forms [1972, 1992, 2004] constitute the turning point, if not in the reality of growth processes, then at least in the way the problems are perceived, analysed and presented for discussion and reflection.

6.2. Rebirth of neomalthusian thought?

There is a point in attitudes toward limits to growth that requires a sort of side reflection. As theoretical economists were unable to discuss the contents of data base or assumptions and were reluctant to examine the formal properties of the system dynamic model, the main argument against the results of the whole study was found outside the method and model specification. This argument touches the issue of population growth. Meadows and the group was accused that they

[19] As a typical reaction to the announcements that mankind should reckon with the limits to growth we can quote the pronouncement of Ronald Reagan (whom we, personally, regard as one of the most effective statesmen of the world): "there are no such things as limits to growth, because there are no limits on human capacity of intelligence, imagination and wonder", [http://www.quotedb.com./authors/ronald_reagan].

[20] Mihailo Mesarovic and Edward Pestel have written the book entitled *Mankind at the Turning Point*, [Mesarovic, Pestel 1974]. They have not defined the essence and the real meaning of this notion. The research on the contents and relevance of this notion is continuing. [Switalski 2006].

based their whole research on Malthus' hypothesis[21] that the growth rate of food production does not match the rate of population increase. At the time when Norman E Borlaug's achievements enjoyed world wide triumph and his green revolution seemed to many people like a promise to remove the threat of mass starvation on a global scale, the simple population theory by Malthus had to be perceived as not only invalid but also discredited. After all, Borlaug even received the Nobel Peace Prize. Indeed, the reproach seemed to be heavy and difficult to counteract. The critique went along the line that it can not be that young technocrats, who have not published any paper in respected academic journals devoted to academically approved growth theory, return to the long ago rejected hypothesis (with a hidden innuendo that they are not proficient in economics or history of economic thought).

If the view of contemporary historians of economic thought (that Malthus population theory can neither be rejected on statistical grounds nor empirically tested and approved[22]) is accepted, then the whole attack on Meadows looses its academic value. First, because it is ideological in nature, secondly because it is not the Malthus population theory that supports the model. Just the opposite, the logic of the model has led to the results obtained. They are to be treated as outcomes, not the premises of the study. Results of simulations point to the role of population size, together with other categories, in either reaching or missing the target of sustainable growth. The volume of food production, contrary to the assumptions of critics of *Limits to Growth*, is not the only critical factor. Thus the whole argument on this issue can be treated, mildly speaking, as misdirected or artificial.

7. Orthodox models of growth

Economic theory and the theory of modelling economic processes has yet to come to terms with system dynamics and simulation[23]. The mechanistic replication in orthodox growth models of the simple rule: more input produces higher output (and *vice versa*) does not allow model users to study the effects of changes taking place in the milieu of growth processes. Absence in those models of multi period feedback loops, that would reflect the true dynamics of the modelled system, and their persistent reliance on smooth, differentiable functions of continuous independent variables, limits the scope of potential new findings as well as the area of research field. Growth models (irrespective of the character and origin of technical advance—exogenous or endogenous, depending upon the source of innovation) do not have an inbuilt mechanism to account for barriers to growth that would originate outside the amounts of factors of production applied. Having such limitations, orthodox growth models become unmanageable when discrete variables or special functions (e. g. Liebig function [24]) are to be employed. In modelling of economic processes there always exists a contradiction between the scale and the degree of detail

[21] Thomas Malthus wrote a short treatise (taking a stance in the discussion on economic policy) on causes of suffering of poor people in England (1798). In 1803 he published a whole book that was regarded as the exposition of population theory. Malthus assumed that population increases in geometric progression while food production can only grow at arithmetic one. At the time the resultant conclusion was accepted as plausible.

[22] Harry Landreth and David Colander in a chapter devoted to mathematical economics, statistics and econometrics question any validity of Malthus theory [Landreth, Colander 1994, p. 520].

[23] Simulogy is concerned with modelling of cause-effect relations, or to put it in other words, with action-response situations; this what most frequently is termed simulation in economics boils down to simple parameterisation of input data and repeated calculation of results, with the assumption that the latter depend only on values of input variables. In the whole tool box of modelling in economics one can hardly find instruments capable of replicating action-response principle.

[24] It is an important for economists function, it has a form of: $y = min\ (u/a,\ v/b)$, where u and$v$ are e. g. available inputs of some factors whereas a and b represent joint unitary demand for these factors by a certain process,

contained in the model and their computability. Simple models (that is models with the lower number of modelled subsystems and processes) pose lesser demand for data, coefficient calibration and yield results faster than complex models. Moreover standard models based on Cobb-Douglas production function (with some variations in countries or time spans covered) run on standard formats of data and generate similar arrays of results. These results are then easy to interpret, comment upon and compare with results obtained by other researchers.

In the real world processes of production and consumption and growth of GDP do not follow the mechanics of Cobb-Douglas. These former processes have their own intricate specificities manifesting themselves in time lags, feedback loops, dynamics and the all permeating presence of human factor. In orthodox growth models these time lags and feedbacks are relegated to the pre-assumed form of functions and equations. In those functions and equations, time is continuously flowing as each variable is equipped with *dt*, something is moving because time coordinates change. But the real dynamics of the modelled system is reduced to kinetics (only the movement) as true cause-effect dependencies among variables are absent. The human factor is totally absent, the parameterisation of input variables only allows to obtain a set of different results, but still depending on the same computational formulae. In simulogic models the human factor has its proxy in the form of feedback loops, by which it is possible to reproduce the impact of results of previous decisions on the current trajectory of computation inside the model. When new assumptions are entered into the modelled system, the parameters change according to the logic of the process (without the intervention of the model user). This change of value of parameters in fact creates a new model which is capable to reveal a completely new behaviour of the modelled system.

A model of demographic, technical, knowledge generating and economic processes taking place in the world system, to be realistic, needs to reproduce various aspects of the operation of the modelled system during the whole period (those aspects cover physical balances of resources, inputs and outputs; the responses of R&D sector to inputs of money; the changes in technology; the interaction among economic actors and its results etc). In addition, such a model needs to be supplemented by a mechanism that reproduces the responses of the nature to activities of the production/consumption system. The latter system does not operate in the void—it changes the properties of its environment. To build models that are capable to take account for these aspects the model builder needs to command wide knowledge. We do not claim that theoretical economists and model builders are not in possession of the required knowledge. This what seems needed is the divorce from overexploited Cobb-Douglas production function and the employment of a new paradigm to the studies of growth processes and phenomena.

8. The world changes, its models should follow

Several times in this article we pointed to the strengths of the World 3 family of models and to the innovative achievements of their builders. One may ask, however, several questions concerning possible paths of modifications and improvements that could be implemented in further studies on the future of growth in a changing world. These questions and the ways of looking for answers could, in a way, start together with the identification of seeming and real weaknesses

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the maximum output of the process (y) is controlled by the factor that remains in shortage. In economic modeling, to relax the difficulties that result from such a stringent condition imposed on the dependent variable, an idea of elasticity of substitution among factors is employed (CES, VES). When no substitution takes place, Liebig's function is the only way to cope with the case. Justus von Liebig was a botanist, living in the XIX century.

of the model. Every model, no matter how sophisticated and innovative at the moment of its first implementation is derived from certain simplifications and reductions of the reality being modelled as well as from inescapable aggregations or approximations that are the results of data paucity and even unavailability. Every model gets also older together with the passage of time. Model building methodology may stay the same but them, models should reflect better insights and should incorporate new possibilities in making them closer to reality and more relevant.

The original World 3 model treats all nations, all economies and all processes as though they were concentrated in one point of earth. Although the inequalities in resources and food availability had been recognized, the model lacks the variables denoting geographical locations and the distances that separate them. In fact, at the expense of incorporating many diverse processes and a very long time horizon the model became dimensionless as far as geographic space is concerned.

The purpose of that the Almighty God created time could be seen in the desire to avoid a situation in which everything happens instantaneously and at the same moment. Meadows and his team mastered the treatment of time in an ingenious way. Similarly, the reason why geographic space exists is that each process can be conducted in its proper place and people engaged in their activities do not have to crowd in one point. The elimination of geographic space[25], that should play a the role in separating physical processes and events, introduced some confusion in the perception of model results[26]. The cost of the reduction of the whole earth into a single point (a thing that is frequently done in orthodox growth models) is probably negligibly low as far as the global results and their relevance are concerned. There emerges, however, a weakness of the model in the sense that it is unable to replicate interactions among different economies and regions[27] that are characterised by their specific potentials, by endowment with natural resources, by their cultures and scale of values and by differing patterns and levels of consumption. These interactions might not only affect growth but also might produce tensions and conflicts between regions. Conflicts, in turn, especially conflicts in accessibility to resources could generate threats that are more acute for sustainability and the size of population than overshooting certain limits to growth. It remains a challenge for model builders whether, taking into account the advances in computer hardware and software that have been made in recent decades, it would be possible to integrate within a single mega-model of the world, sub-models of individual regions, while each of these sub-models would have the same specification as World3? One problem touches on technical issues of integration, the other is related to data availability. The most difficult problem, however, would probably be posed by the construction of interaction mechanisms.

The concentration of all processes in one point produces another avenue for enhancement of the model. The problem at issue is the absence of economic and policy making agents who would be guided by their own strategies and their own perceptions of benefits, chances, costs and threats. In the known history of civilisations we observe not only relocations of development and growth poles (ancient China, Mesopotamia, various areas of the Mediterranean, the Low Countries, England, the US — to name a few) but also movement of the centres that were political and intellectual leaders and that exploited very specific methods of benefiting from the gained

[25] Geographic space comes into being in the model as a something that is shrinkable due to the expansion of human settlements and transport infrastructure.

[26] Readers that were aware of the multidimensional aspects of human geography, locations of human activities and their sedimentation [Pred, Kibel 1970], or the writings of Paul Krugman on economic geography and international trade, were experiencing some sort of discomfort when they found that geographic space in a global model has vanished from the specification of model variables.

[27] In an article published some time ago we have discussed several issues that are characteristic of regional dynamics. Dynamic changes result *i. a.* from the interaction of subsystems within one region as well as from interaction among regions, [Switalski 1988].

absolute or comparative advantages over their rivals. The absence of political and economic actors playing their roles causes that the Mankind of the World inertially moves along time axis while its path is defined by the physical, chemical and mechanical regularities contained in feedback loops of the model. So there is no room to introduce such variables that would stand for policy making instruments that could, in turn, be employed by individual countries or power centres. In place of these political variables we only have the responses of economic and environmental variables to constraints and barriers that are derived from balance equations. The model is sufficiently rich but it could become more independent of pre-programmed reactions. Perhaps a gaming simulation exercise on the decomposed into regional sub-models World3 model, with individual players acting on behalf countries, regions and international organisations presents a way to evoke more interest among policy makers in the fate of our world.

The far reaching unification of technologies that are in use in different regions of the world has led to a situation in which production proceeds in the model along the path controlled by the averaged coefficients, irrespective of regional specificities and resource endowments. As far as this could be acceptable in view of the existing globalisation trends, by which the diffusion of manufacturing technologies results in the unification of industrial products and equalisation of inputs, in case of agriculture the application of a single technology should be regarded as a factor that increases the distance, together with the laps in time, between the reality and the model. It suffices to note that the methods of grain growing in Iowa, Saskatchewan or France can not be adopted in places like China or India. Evolution of methods of production of grains or tubers in North America and South-East Asia not only goes along differing paths in each of these regions but may also be confronted by deeply differing constraints to growth or even the maintenance of the achieved yields levels. Again, as in previously mentioned remarks, the way to improve the model can be seen in reformulating the approach so, that regions maintain their individual characteristics and specificities.

A final remark in this part of the paper is directed toward the way conclusions and guidelines are formulated. Our impression is that they are formulated in a too general manner. By this they do not have concrete addressees. The recent lukewarm reception of the update indicates that despite all the relevance of findings and conclusions resulting from the simulations can be blamed on the absence of the institutional framework[28] in the model. What institutions are responsible for reorienting our societies and economies so that we all or majority of them, enter a path leading to sustainable growth? We do not venture to answer this question. It deserves a conference (at least a working seminar devoted to this problem), in which the most critical issues that revolve around the addressees, modalities of handling the conclusions and guidelines and designing measures to resolve the ensuing problems are approached and discussed. The discussions, however, should not be left to the umpiring by traditional growth theorists.

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[28] We are referring to institutional economics (or new institutional economics for that matter). The understanding of the variety of institutions and of their roles in societal and economic life may help to develop adequate institutional frameworks for the future model studies of growth processes, [North 1990].

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'MOVINNOVATION' AS A DRIVING FORCE OF THE 21ST CENTURY'S SMART TERRITORIES

Many advanced regional economies have evolved away from production toward knowledge-intensive non-production activities, involving major changes in their economic compositions. One of the most striking changes has been the reduction in the prominence of manufacturing as a source of employment and the emergence of service jobs as the cornerstone of most regional economies. Such a process of deindustrialisation has raised the profile of knowledge-intensive services as a regional competitive advantage. Advanced regions retain strong headquarter functions, R&D, design, marketing, software and support services, and other high value-added service activities, with or without production. In the meanwhile, according to *The Economist*, dated January 12th–18th 2008, "*foreign direct investments (including mergers and acquisitions) from developing economies had reached $174 billion, 14% of the world's total, giving such [emerging markets, as China, India, Brazil, Russia and Mexico...] a 13% share (worth $1.6 trillion) of the stock of global FDI. In 1990 emerging economies accounted for just 5% of the flow and 8% of the stock. Their slice of global cross-border [mergers and acquisitions] has been climbing. It reached 14% in value terms in 2006. That year they spent $123 billion in more than 1,000 cross-border deals*" That is, there is something new in global business since recently emerging-market multinationals arrived in force!

Nevertheless, today's strong economies are knowledge-based, and this kind of world's state of the art stresses the relevance of R&D and intelligence in S&T policies for the development of such main places. Fast growing accumulation of knowledge affect all sectors of the society, with ever S&T content embedded in products and services. As a consequence, there is a need for more and better qualified human resources, pushing world economies to focus on more knowledge-intensive activities, while territories are eager to improve their competitiveness with more intelligence... As knowledge has become the most important resource for companies, the successful open innovation new concept will need to be embedded in the overall business strategy that explicitly acknowledges the potential use of external ideas, science and technology in value creation. That is why it has been hereby considered to stress the advantage of some regions managed to construct in a constantly moving world and the profit each region could draw from not only the share of knowledge within its territory, but also by cooperating with other territories on global concerns.

Thus, this fourfold paper will first observe that European enterprises, and, consequently, European regions yet entered a space of competition which is fully characterised in this early 21st century by a new era of knowledge.

Secondly, similarly to companies' advantage, resilient territories also need the information edge to make better and faster decisions concerning technological opportunities, while analyses of emerging technologies and their uses turn vital to today's societies.

Thirdly, this could lead us to understand our economies are participating in a global battlefield whereby attractiveness and flexible strategies are the main assets for facing the new emergent economies' competition.

Eventually, in such a perspective, since mobility of capital, ideas and talents are the main competitive advantage of the regions, evidence from other parts of the world could be considered as illustrations of cross-border cooperative projects and prove to be relevant for the European regions, provided they could rid of their arrogance. They could be regarded as the most instructive lessons to be drawn with respect to the take-off of a major development trend with a long term vision, served by an ambitious target setting and a global approach.

1. The new 4-D landscape of the knowledge economy

Since the *European Council of March 2000,* the European Union aims at achieving "the *knowledge economy the most dynamic and the most competitive in the world by 2010".* It has adopted a strategy which could lead the European nations within the *Lisbon framework* to enter into the global competition and to reach the top level in terms of knowledge economy and society. Some regions even realise the need to improve the climate for enterprises and for citizens to participate and innovate.

How useful are allegations in terms of international benchmarking?

Meanwhile, regardless of the speed at which the private sector innovates, overall economic growth will be limited by the speed of government policy and their strategic accuracy. According to the *"World Economic Forum",* as "The *Lisbon Review 2004"* report, released four years after the *European Council* results are less than satisfying. All the axes of development showed that Europe was lagging far behind the US and was, to some extent, yet threatened by emergent countries while a new brand of multinational company had emerged and started challenging the Western developed economies. By 2004, the *United Nations Conference on Trade and Development (UNCTAD)* also noted that five companies from emerging Asia had made it into the list of the world's 100 biggest multinationals measured by overseas assets and ten more emerging-economy firms made it into the *Top 200.* A recent study of *Boston Consulting Group (BCG)* also found 100 companies from emerging markets with total assets in 2006 of $520 billion, more than the world's *Top 20* car companies. In this more open world, emerging economies are spawning their own giants, but outperform in many other terms the European nations and regions including knowledge issues in addition.

But, do really Europeans know instinctively that the way forward is to become more open, more experimental and to embrace the unknown? What is sure is they cannot turn inward, nor can they allow their institutions to become overly centralised, calcified and risk averse.

Given the importance of clusters to a particular region's economic health, as well as their importance for national competitiveness goals, the policies are developed at different policy levels. The risks involved in such policies are often related to insufficient private sector engagement. The long-term effectiveness of such policies depends on the private sector continuing to act after a programme ends. Even during a programme period, it is the private sector that is best equipped to react in a timely manner to market changes. Several programme evaluations have noted the

excessive public sector role and an unsuccessful public sector exit strategy. One common problem is the ability of the public sector to mainly—only—"pick winners".

What is more, Europe itself spends a lot of money on higher education and has a number of top universities with leading academics and researchers who produce excellent papers and win Nobel prizes. The problem is that their ideas tend to stay in their ivory towers. Part of the explanation is that innovation is still seen as being driven by government spending in R&D, when in fact most of it is now in services and business models. With the official target of the *Lisbon Agenda* and its *Objective of Barcelona* about 3% of the GDP devoted to R&D expenditures, we can reveal what is wrong. With the *EUROSTAT* figures, broken down by region and industry, of research spending, patents filed, scientists employed and other important-sounding variables, it is observed that Europe only focus on inputs into the innovation process, not outputs. There is only a cursory discussion of venture-capital and no attention paid at all to entrepreneurship—the most powerful way to turn ideas into valuable products and services. Europe's innovation malaise is the result of a complex mix of factors.

Entrepreneurship as a central comparative advantage

Actually, the Europe's best and most competitive and innovation clusters fall far short of *Silicon Valley.* Compared with the US, Europe turned as a lousy place to start a new company, whereby it can cost a lot of money, takes too long to set up a business and is too much difficult to run a new business after failing a first one while "small serial creators" are mushrooming in the US. In 2006, venture capitalists invested only about €6.4 billion in the EU, while their American counterparts splashed out some €32 billion on new ventures.

In real terms as previously observed by Richard Florida between 1992 and 2000, US GDP grew by 36%, compared to 19% for the UE. While the US remains the world leader in tech & its ability to attract top talents, few European countries appear to have similar competitive assets. Carl Schramm, president of the *Kaufman foundation,* which studies entrepreneurship and innovation, says that *"For the US to survive and continue its economic and political leadership in the world, [they] must see entrepreneurship as [their] central comparative advantage. Nothing else can give [them] the necessary leverage to remain an economic superpower.*"

Such sets of measures, at different levels and to divers extents, would aim at investing and performing business R&D, nurturing and boosting the related population of business with a priority to young innovative companies and, eventually, transforming Europe in a more attractive place to do business. Regions should create local and regional knowledge synergies by providing incentives for interaction between small business and educational institutions and resources. It should also sponsor research into the processes involved in teaching creativity, inventiveness and commercialisation in technical environments. This culture should seed traditional technical studies with new exposure to methods for creative thinking and translating ideas into commercial applications.

While everybody seems to be haunted by the idea of risk and wants to be aware of any continuous and pervasive warning, as a result any strength of creativity are quite damaged. People are becoming anxious and restless citizens, covered with phobias, clad in safety rituals and mistrustful closing in on them. In the shade of such an obsidian climate; the eventual and true risk of the risk shouldn't be to call for the worse, by letting ourselves be persuaded of its omnipresence and pervasiveness.

Some regions are wrongly obsessed with the relocation of manufacturing activities to other countries; rather than encouraging initiatives, every effort is made to keep uncompetitive firms in business artificially, just able to dream of a knowledge economy fuelled by major programmes

for research and development, instead of creating a new collective pattern of growth based on a network of skills, individuals and organisations. Some regions, especially those which are determined to remain mired in a state of *"suspended animation"*, are condemned to slowing down any progress likely to pull them out of their condition of dependency.

2. A crucial information edge for emerging opportunities in terms of markets and technologies

The focus might especially be on the role of knowledge creation, with, in addition, valorisation of the capacities of the local enterprises, as well as an R&D more specifically in a well-structured and well-designed interplay of local and non-local knowledge flows. Similarly, local behaviours changing with open minds, risking challenges and entrepreneurship spirits might prevail instead of being locked by well structured but rigid organisations. This, of course, emphasises a need for developing the endogenous capacity of firms and regions to innovate, but also calls for even more open-minded spirit.

Henry Chesbrough, *University of California at Berkeley,* have with his two books *"Open Innovation"* and *"Open Business Models"* (2003, 2006) popularised the notion of looking for bright ideas outside of organisations. Thus, such an "atmosphere" advocates for corporate labs welcome and work with universities, suppliers and outside inventors. Ones might wonder whether this necessity of open business models facilitates access to external knowledge, without preventing to exploit internal knowledge—in R&D, marketing. -, and makes industry borders, as well as subsequently regional frontiers, shift or even disappear.

The sourcing or knowledge

The main motives for joining forces between territories is the timely seizing of new business opportunities—as well as between companies -, the sharing of risks, the pooling of complementary resources and the realisation of business synergies. Patents are becoming much less important nowadays than brands and the speed at which products can be marketed. What is more, the incidence of outside-in and inside-out processes is not only related to the development of the technology in its life cycle.

As a result, companies increasingly collaborate with universities and companies that have complementary technology, knowledge and skills and as such share the costs and risks of the exploration phase. The open innovation model is a much dynamic and less linear approach where companies look inside-out and outside-in. Increased R&D cooperation and higher reliance on external sources have become important ways of knowledge sourcing in order to generate new ideas and bring them quickly to the market. The inbound side of open innovation concerns the sourcing of technology and knowledge from outside partners like universities, research organisations, competitors, suppliers, customers; this sourcing aspect of open innovation has already been on the rise for the past decade as companies are confronted with continuous technological advances and an increasing multi-disciplinarity of knowledge. Whereas in the sixties and seventies the tendency was to centralise R&D, since the eighties firms have continuously tended to outsource a larger part.

A new commitment to social innovation for an evolving societal landscape

Collaboration between partners facilitates learning by accessing new knowledge residing outside the boundaries and by collaboratively leveraging existing knowledge with partners. Within Europe, creating a resilient region will require a new commitment to social innovation—changing mind-sets, practices, and institutions fundamentally in both the workplace and the community. In this way, European regions need to re-start from a learning and collective intelligence process that is, moving in a given territory, from pure comparison—*Benchmarking*—to benefit from the knowledge and experience of the others and creating a real learning climate as suggested by the so-called *Benchlearning.* This is a responsible process for the construction of a regional advantage whereby essential functions lie on: a) what can be learned from relevant examples, whatever success or failure; b) how can be investigated cause and effects; c) capacity to change in behaviours and attitudes what result from observing the others; d) how to get away from classic attitude of autarchy as there is always some place out there from which useful lessons can therefore be learned. Starting from scratch, some regional policies might emerge as a —late, but—necessary means to prevent from the regional sclerosis.

As a matter of facts, the *Kok* report (2005) witnessed that this benchmarking spirit could *"prevent Lisbon from becoming a synonym for missed objectives and failed promises."* Coupled with forecasting studies—analysis of strong trends and weak signs, plus extrapolations -, this concept gives place to the creation of a *Regional Observatory* in a top-down process. Sometimes, there also is a real 'investment willingness' with an 'investment readiness', but most often, we must fear the syndrome of the *'Cathedral in the desert'* that Kevin Morgan *(University of Cardiff)* used to blame.

In parallel, instead of fearing the future, it is possible to explore an idealistic world. Preventing from looming any creativity crisis, choosing a "preferred future" in order to understand blockages for achieving it, could offer an iterative exploration of times and contexts. George Bernard Shaw yet advised us a long time ago that *"We are made wise not by the recollection of the past but by the responsibility for the future."* Instead of just trying foresight exercises and while forecasting aims at exploring and anticipating the future, it is then considered to follow a reverse way to be regarded as an *"Iterspective":* from the wished future, towards the complex present. in order to make the future help understand and reshaping the present.

From one side which represented by the *Bench-Learning* axis—promoting the local image and re-tuning the societal landscape—and the other one axis for the so-called *Iterspective* in order to *"remember the future",* it is possible to generate a creative tension between a current position and the future! Thanks to this behaviour and openness in learning from others, but also thanks to the association of the whole population within the territory, the regional competitiveness can be reinforced and propose a resistance to centrifuge socio-economical forces, such as brain-drain, capital-drain, so-called "delocalisations", industrial disinvestments, students' disaffection, etc.

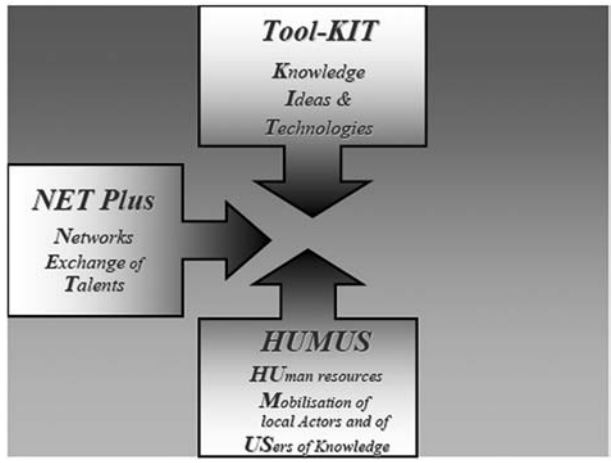
Either Systems of Innovations or Innovation of Systems

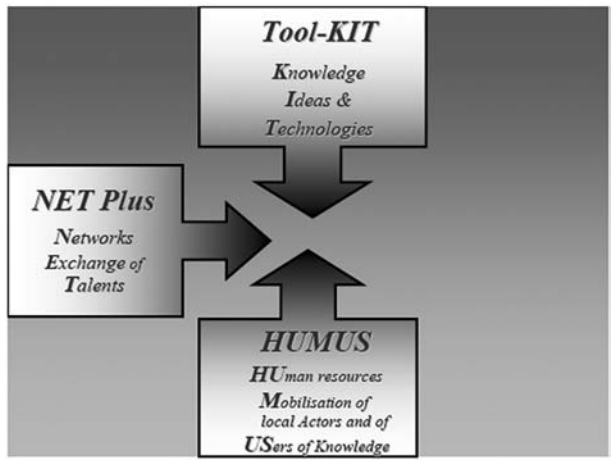
Thus, a major key to a robust 21st century economy will depend, in addition to physical infrastructures, on policy that enhances innovation. Such a methodology requires the definition of a regional vision based on a broad consensus, the analysis of supply and demand and the implementation of demonstration projects. Applied to knowledge, such a strategy should enable regions involved in a similar process to:

a) A KIT-Tool, as *Knowledge, Intelligence (Ideas) and Technologies,* which could put in motion the learning process, a validation of new ideas, in order to face with scepticism and resistance to knowledge...

b) HUMUS, as ***HU****man resources and* ***M****obilisation of local Actors and of* ***US****ers of Knowledge,* for shared strategies, motivation of actors in terms of common values, common objectives and mutual projects...

c) A NET-PLUS Process, as *Networks and Platforms for Exchanges of Talents,* which is backed by a sustainable institutional framework, as internal cross-fertilised networks and builds up public-private partnerships and interpersonal relations...





As a consequence, there is a need for more and better qualified human resources within the territories, pushing world economies to focus on more knowledge-intensive activities and synergies within platforms of exchanges. Regional *"Innovation Systems"*, knowledge-oriented policies of development should contribute to increasing the capacity of the regions, whatever economical and technological advanced or lagging behind, while preserving their environment in a sustainable development for the future generations. Ultimately, place matters because people matter. Talented and creative people want to be where the action is, where their ideas stand the best chance of coming to fruition. Moving from a traditional economy—based on land, labour and capital—to a knowledge-based economy—science and technology, research and development, reliable networks

with cross fertilisations, industry and academic partnerships and venture capital—from an economy of use and waste to a sustainable economy and eco-development.

3. Construction of regional advantages within global approaches

Indeed, we should wonder to what extent competitiveness is changing this global deal. In fact, in the last few years new players are revolutionising again the global scenario we live in: America, Japan, and Europe to a less extent, are maintaining their outstanding edge, but. today, even the US technological edge may be slipping and the most serious challenge is not from the EU. In this revolution, Asian countries are at the centre of a geographical battlefield, especially China. Large increases in foreign R&D investment in developing Asian countries, in particular in China, have attracted much attention in recent years. There is a new set of drivers for the internationalisation of R&D as the cost coupled with a large availability of researchers. However, it seems not to be especially the lower wages per se, but merely the large availability of skilled scientists and engineers. Information provided by *OECD* by last December 2006 let us know that China was now second prior to Japan in absolute terms of R&D investments. and then, should out-perform Europe in R&D intensity.

New Challengers and Merging Strategies within Rising Markets

According to a recent report from *BCG,* thousands of companies are expanding sales and production advantages. Rapid growth gives companies scale and spare cash to invest abroad. Costs are low. The difficulties of operating in an emerging market may make managers adaptable and resilient. *Chery Automobile,* China's leading car exporter, which aims to build plants in Eastern Europe, the Middle East and South America, is watched by western analysts. *Embraer* of Brazil has become the world's third-largest aircraft company, specialising in regional jets. To such an extent and with respect to those new phenomena, *BCG* thus identified a set of strategies, of which the first and most pervasive one could be about bringing brands from local to global. China's *Hisense,* a $3.3 billion consumer-electronics group, is a prime example. With over 10% of the market for TV sets at home, it has turned its attention to the wider world with a product range that includes air conditioners, PCs and telecoms equipment and manufactures in Algeria, Hungary, Iran, Pakistan and South Africa. It now sells over 10 million TVs and 3 million air conditioners a year in more than 40 countries. *Hisense* owns the best-selling brand of flat-screen TVs in France.

A second strategy is to turn local engineering excellence into innovation on a global scale, as *Embraer* has done, with an initial support from the Brazilian government, later extended to a largely privatised for overtaking Canada's *Bombardier* to become the world's leading maker of regional jets. In addition, Embraer has a joint venture with *China Aviation Industry Corporation II.* In this it was even ahead of *Boeing* and *Airbus,* both now scrambling to transform themselves from rich-world exporters into global producers, with long, difficult-to-manage supply chains spanning the world.

A third strategy for such a international success is going for global leadership in a narrow product category, as two Chinese companies are doing, while B7D, the battery-maker, uses a more labour-intensive production system than the Japanese firms it competes with to take advantage of low labour costs and *Johnson Electric,* which though based in Hong Kong now produces chiefly in mainland China for cornering half the world's market of tiny electric motors. Brazil's *Sadia* and *Perdigao* both exemplify the fourth strategy by taking advantage of natural resources at home,

and boosting them with first-class marketing and distribution. They have built sales organisations around the world to make the most of the abundant resources for producing pork, poultry and grain in Brazil, complemented by ideal growing conditions and low labour costs. Simultaneously, another Brazilian firm, *Vale,* has exploited its home country's huge, cheap sources of iron ore to become one of the world's leading suppliers.

Is the "Localised Modularisation" worthy to be applied in Europe?

China succeeded these last decades to be established itself as the *'world's factory'* and one of the biggest recipients of foreign direct investments. It is now staking a claim to becoming a world-leading high-tech and innovation country. In a few years, the Chinese government worked actively to support the development of internationally successful firms, so-called ' *national champions',* as well as more and more services, processes and design-oriented policies in catching up the most advanced economies. The emergence of those world-beaters exemplifies the two forces driving innovation, globalisation and the spread of information technology, which both allow the creation of unexpected and disruptive business models. One of them is the one developed by Chongqing's motorcycle-makers, for example: half the world's motorcycles, but more important than the numbers produced is the way these motorcycles are made—especially the way designers, suppliers and manufacturers have organised themselves into a dynamic and entrepreneurial network. Instead of dictating every detail of the parts they want from their suppliers, the motorcycle-makers specify only the important features (size, weight, resistance) and let outside designers improvise... "*Localised modularisation*" approach not only does mean big cost reductions and quality improvements, but furthermore does allow openness to and conquest of new huge markets.

It is typically the sort of business-model innovation which is far more radical than conventional product or process innovation. In this world game, the Japanese firm *Honda* has previously wanted its Chinese suppliers to get better, because their parts fit only *Honda*'s bikes. Chinese bike makers, in the other hand, use interchangeable parts that might also be used by dozens of rivals, and, as a result, even the suppliers' suppliers have shown dramatic improvements in recent years. In 2006, 80 % of these second-tier forms could meet the international standard, compared with just 28 % three years before. *Chongqing Lifan Industry Co. Ltd* is the biggest individually-run motorcycle manufacturer in China. Yin Mingshan, its general manager, together with other 9 persons, established *Lifan Hongda Vehicle Assembly Research Institute* in 1992 with RMB 200,000. After 12 years' efforts, *Lifan Group* rapidly grown up and developed to be a state level large-scaled individually-run enterprise focusing on S&T development: there are more than 8,700 staffs in *Lifan Group,* more than 2,000 of whom are students graduated from university/college or secondary specialised school. *Lifan Group* possesses now ten enterprises, three marketing companies, one technical centre at state level, and has the capability of producing two million units of engines and one million units of motorcycles annually. Up to December of 2004, it has owned 2,098 patents at home and abroad, 866 copyrights, 556 domestic registered trademarks and 68 foreign registered trademarks. With such a rapid growth, *Lifan* never forgot to mention its huge contribution to the enhancement of the region and the surrounding society by actively participating for example in prevention of SARS disease, as well as building schools, libraries, and many other educational infrastructures... Regional advantage speaking, Chongqing's *"localised modularisation"* is a model of organisation and differentiated development. By conceiving end-products, procuring the materials, fashioning the parts, assembling them and marketing the results, this whole major City-Province—32 million inhabitants—participates in the chain of production which is contained within a myriads of firms. Some observers fear that these Chinese small, modular manufacturers

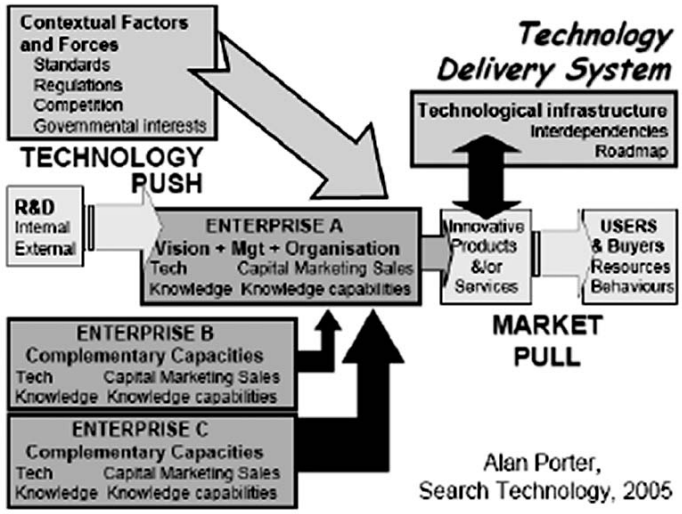
cannot evolve in this way, but since the parts they provide can be of use in many products, no lead firm has reason to nurture them or help them improve. These firms are not part of a corporate family, but without close collaboration with more advanced sponsors, such young waifs and strays learn more than elsewhere in the world and share the benefit of a whole region, as well as a great part of the Chongqing people.

4. How to be boosted by an ambitious target setting embedded in a global approach?

Alan L. Porter *("Tech Mining" to Drive Open Innovation, 2007),* from *Georgia Tech*, considering emerging technologies in terms of the technical platform as vital to forecast innovation projects, distinguishes many ways to characterise innovation activities and emphasising within-firm innovation.

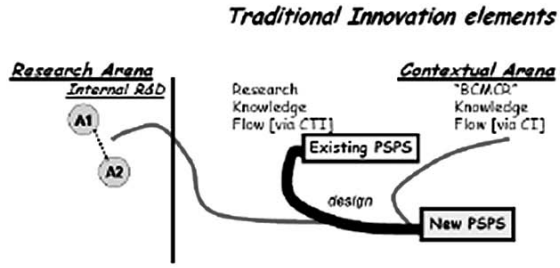
He has with other American scholars (Hobbay, 2006) conceptualised innovation processes as following: *'Technologypush* is initially conceived as the essence of innovation, while in parallel, '*Market pull'* proves to be the critical aspect, and then coupled sequential advancement offers additional feedback from this later stage to the earlier one.

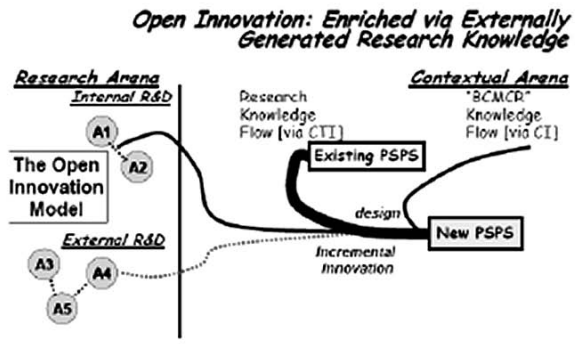
Integrated multifaceted development—i.e., couple to suppliers and customers -, bring in manufacturing early in product design for sustainability, etc., and integrated with active employment of information technology facilitate widened linking.

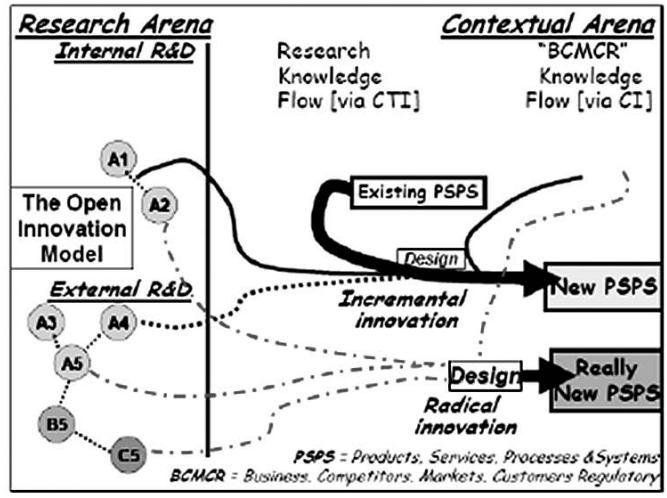


Tech Mining is about generating and communicating competitive technical and contextual intelligence. Until quite recently, the audience for the Competitive Technical Intelligence that Tech Mining has to offer has been limited. Analyses of emerging technologies and their implications, as well as all the other forms of innovation—not only products and services, but also processes and systems, *PSPS*—are vital to today's economies societies and companies. Such analyses inform critical choices including the institutional level and territorial areas.

Decisions that need to be well-informed concern: setting priorities for research and development efforts, understanding and managing the risks of technological innovation, exploiting intellectual property, and enhancing technological competitiveness of products, processes, and services.







Circulation of Capital, Ideas and Talents

As AnnaLee Saxenian pointed out some years ago with "The *European disease*", *"entrenched actors, both institutions and firms, are getting stuck in this innovator's dilemma. They can't see beyond their own institutional environment to start doing things differently. It is certainly*

not a lack of capital or skill or technology, but they are not able to experiment and be flexible and respond. When regions are not globally connected, they are probably not succeeding either." By the same way, she also demonstrated that resilience in face of disruptive forces gave *Silicon Valley* the edge over its nearest high-tech rival, Boston's *Route 128* technology corridor.

Both clusters were riding high until the personal computer and distributed-computing changed the market. Firms went through wrenching change, but those in Northern California, as *Hewlett Packard* and *Xerox*, emerged stronger than those near Boston, as *Digital Equipment* and *Wang*—which no longer exist. *Silicon Valley's* champions were nimble and networked but those on *Route 128* were brittle, top-down bureaucracies. *Silicon Valley* doesn't have better ideas and isn't smarter than the rest of the world, but it has the edge in filtering ideas and executing them.

Curbing environmental threats and achieving a more harmonious society, thanks to global co-operations

As for the North-eastern Heilongjiang Province, the other model to be hereby stressed and exemplified, it is important to signal that the poor quality of environment, a legacy of decades of coal mining and steel production may also slow the pace of restructuring by even discouraging possible foreign investments. In the meanwhile, the most environmental problems—contamination of land and ground water, pollution of the air and the water—yet occurs, and threats for the people as well as the whole society and the economy to be 'suffocated' are more and more pervasive. Heilongjiang instead could anticipate and be creative! This Province doesn't start from scratch, as it could benefit from its huge industrial potential, in addition to its high valued tertiary education system and its relevant public policy makers. provided the option of clean-techs and eco-development could be elected to the wider extent.

Thus, it proved necessary to identify the potential constraints on such changes which can, accordingly, stop economic growth and then prevent Heilongjiang as well as many—if not all—of the other Provinces of China from achieving higher levels of real income. The matter could lead to consider this Province as either a dust belt in a wasted decline or a potential green belt evolving within—and thanks to—an eco-development process. Starting from these evidences, Heilongjiang could advocate a strategy of regional development, specifically focused on four main issues:

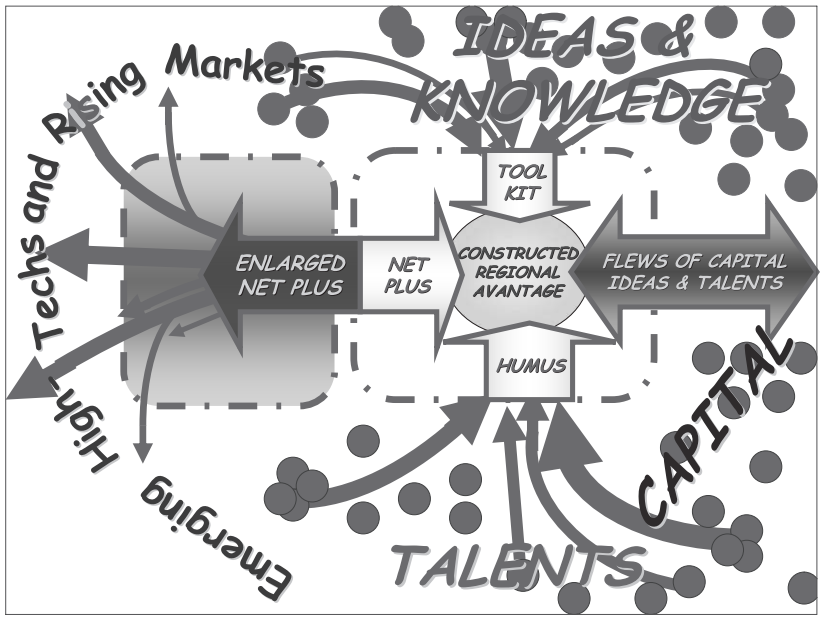
1) an integrated approach in the fields of the environment and energy;
2) an energy system management within a regional concept of development;
3) a programme of new energies as substitutes to dirty resources;
4) a participation to the industrial and technological autonomy of China in terms of new energy equipments' supply.

A huge need for more stringent measures proves to be adopted in the whole China to curb those threats and achieve a more harmonious society. European regions should propose to launch from Heilongjiang a dynamic cooperation for addressing such concerns as a pilot leader in China with valorisation and industrialisation of cleantechs, as well as drawing mutual benefits in terms of sustainable development. and new rising markets. Cleantech is a sector receiving increased attention from policy makers, public companies and private investors, due to the heightened awareness of environmental issues and an appreciation that business and environmental goals can coexist. Some venture projects and technology watch about cleantech help tracking promising companies that create products and processes that use energy more efficiently and reduce waste.

A Smart "Movinnovation" to help strengthen linkages across all actors

Thus, the coincidence of an apparent acceleration of globalisation over the past decade with significant employment losses in manufacturing in many regions has raised concern that the comparative advantages of advanced regions in different industries, often built up over decades, are no longer robust foundations for their economies. Such a concern over the future of manufacturing is partly explained by a perception that what these regions can offer in terms of skills, business environment, etc.

Often a compelling problem or crisis serves as the trigger for co-coordinated action, and there is a strong risk of complacency when regions fail to anticipate future trends because current indicators are positive. For sure, the most important role for regional strategies is to favour adaptation to change. While public actors are not well-placed to predict the future, they can play a clear role in developing an environment that supports private actors in their efforts to best adapt and seize opportunities. Tools are needed both to understand and monitor how research and educational assets interact with enterprises with the goal of designing policies to help build more systematic linkages across all actors. To reinforce these strengths, the strategies could also seek to attract investment that complements the regional system and taps into particular strengths—that is R&D, engineering, innovative firms, etc,—but over all, to attract capital, ideas and talents.



Coupling of non-linear innovation models that combine technology push and market pull could include important feedback effects as well. Taking into account local needs in terms of protection of the environment and sustainable development, not only could regions catch-up the main economies of the planet, but also might they be in position of technology-edge and economic leadership in these broad and promising fields of new technologies. In particular, territories will gain, by responding to the *"green agenda"*, then by circulating capital, ideas and talents, to make a commitment in policies of *Territorial Intelligence* and *Smart Movinnovation.* The new world of global innovation is more volatile than anything that we have known before. We must learn how to ride constant waves of innovation, which cause "creative destruction" with major consequence for

both organisations and people. The challenge will be to nurture technological innovation continually and to promote social innovation.

Regions nowadays are struggling to remain competitive and adapt in the context of globalisation. The regional specialisations built up over decades are transforming rapidly. The question for policy is how durable are the competitive strengths on which regional economies are based. Insufficient economic diversification and over-reliance on key firms are among the main dangers associated with resilient regional economies. Other concerns relate to how effective the regional policies can be in identifying instruments that can help react to very rapid changes in global markets and production systems.

Regions, worldwide and on both sides of the world, have shared and vested interest in such a win-win concept! In addition, such cooperative interregional projects are more likely to be successful when people, companies and communities are eager to mutually adapt to increased economic volatility and a high degree of flexibility.

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GERD SCHIENSTOCK

INNOVATION SYSTEM AND FORESIGHT

During the last decade the concept of a 'systems of innovation' has become widely accepted as a fruitful approach to study technological change and has even influenced policy-makers on the regional, national, and European level. The concept analyses relationships between innovation activities and economic growth, competitiveness, employment, and recently also social welfare and ecological sustainability. There is wide agreement that foresight has to be understood as ameans to support innovation systems, national innovation systems in particular. The function of foresight is seen as 'wiring up' innovation systems (Böhle and Rader 2003). But how exactly both concepts are linked is quite unclear. My argument is that to some extent the 'systems of innovation' concept can structure the research agenda of foresight. Foresight on the other hand can support the 'systems of innovation' approach in the attempt to analyze fundamental transformation processes. My third argument is that both, system analysis and foresight imply a new perspective on policy making.

The structuring of the research agenda of foresight

My first argument is that the research agenda of foresight is strongly influenced by key ideas of the system of innovation approach. I will demonstrate this by referring to three aspects: the social dimension, the geographical dimension and the actor dimension. Let me start with the social dimension. The system of innovation concept is based on a radical revision of basic neo-classical assumptions. While neoclassical economics interprets technical change as a phenomenon external to the economic process, the systems of innovation approach understands technological change as a fundamental and inherent phenomenon of capitalist economies that plays an increasingly important role for the competitiveness of firms as well as regions and nations. Particular critique has been associated with the single factor analysis, which interprets technological change either as 'technological push' or as 'market pull' process and is dominated by the linear model of innovation. Contrary to this single factor analysis the application of the system concept in innovation research is motivated by the aim of capturing the systemic, interdependent character of innovation and technical change.

The approach integrates a number of different factors that shape and influence innovations, including organizational, institutional and cultural ones, and it also stresses their interdependency and mutual interaction. The most important message, coming from the system concept is that institutions matter. At the same time the linear model is replaced by a 'circular' or 'recursive model', which means that we have to take into account complicated feedback mechanisms and

interactive relationships involving science, technology, learning, production, and demand (Edquist 1997: 1). The important problem posed by the system approach is that innovations are generated not only by individuals, organizations and institutions, but also by the complex patterns of interaction between social actors with different competencies, capabilities and knowledge.

We can conclude that the most fruitful lessons gained by system-based research is that technological change and innovation has to be explored within the social fabric in which the innovative activities are actually developed and used. The process, which nurtures and disseminates technological change, involves a complex web of interactions among a range of different subjects and institutions. Consequently the system of innovation approach goes beyond an analysis of each individual innovation and instead examines aggregated patterns of innovation activities (Kelvey 1997). It is less interested in technology as an artifact, but more in technicalization as a social process; consequently it focuses on the analysis of organizational and institutional aspects of technology-based interactions. We can conclude that 'systems of innovation' has two major implications:

— technological changes is shaped by organizational and institutional aspects, and
— essential conditions for success emerge out of the interplay of different actors.

How is the social dimension of innovation reflected in foresight studies? It seems that the so-called first generation of foresight studies (Georghou 1996) did not pay great attention to social aspects. This is already expressed by the term technology foresight, which suggests some kind of inherent logic of technological development. Foresight was mainly associated with methodologies that could identify and prioritize key technologies or emerging new technologies of importance for growth and competitiveness (Miles and Keenan 2003). The concept of technological foresight hardly reflexes the idea of systems of innovation that new technologies are the outcome of a number of different but closely related and interacting factors including organizational, institutional and cultural ones.

Later studies moved beyond the technology focus to examine the opportunities that arose from the interaction of innovation in science and technology with wider social and market trends. Also studies occurred focusing on visions on future societies hardly dealing with technology at all. But do these studies capture the social dimension as conceptualized in the system of innovation approach? Foresight is mainly interested in long-term developments of social structure such as the development of the total populations and its age-structure, the development of the employment structure, the demand for skills and competencies.

Concerning the institutional aspect foresight has focused primarily on formal institutions such as the education system or the labor market. But institutional aspects include the basic norms, rules, conventions and habits of the society (Scott 2001). So fare foresight has widely ignored these institutional dimensions. Of core it is very difficult to foresee how legal regulations, basic norms or cultural elements will develop and to understand the mechanisms that influence institutional change. But when these institutional aspects excluded from foresight we will miss important factors that shape the process of technological development.

What about the inclusion of organizational aspects? A main argument of the systems of innovation approach is that firms and other organizations have to develop new learning capabilities, to be able to survive in an increasingly innovation-based competition. Although firm-based foresight activities have started recently, future demand of organizational capabilities has not been on the agenda of micro-level foresight. And for foresight studies it is even more difficult to take into account the fact that innovations are the outcome of continuous interactions between various collective actors. We would need to know, who will be the most influential actors and how will they interact with other organizations. Will the relationships between key social actors become more trust-based or will technological development become a power game? So

far foresight has not dealt expressively with the complex web of interactions among a range of different subjects and organizations. Summing up we can argue that foresight has widely ignored organizational forms, institutions and interaction patterns that have been identified by systems of innovation as key factors that influence innovation and technological change. The question is of course how to integrate these dimensions into foresight activities.

Geographical dimension

Most research on innovation systems focuses on a geographic scale. Initially innovation systems are characterized as national in scope. In each country, so the argument, there are specific organizations and institutions that provide security for, support and regulate innovation activities of firms. And it is the shared language and culture that binds the system together and gives it its national character. There are scholars who argue, however, that particularly due to the increasing globalization of the economy the national boundaries of innovation systems disappear. Nation-states are losing their influence both upwards and downwards to transnational institutions and organizations as well as to regional actors and networks.

Particularly the regional dimension of innovation processes is seen as becoming increasingly important, as regions are more suited to develop un-traded interdependencies and relational capital due to geographical proximity. Context specific tacit knowledge, the key ingredient of innovation processes, is best transmitted through frequent and continuous direct interaction. But researchers are more skeptical concerning .the existence of fully autonomous innovation systems; regions hardly develop all the elements and relationships existing in national systems, they represent more focused parts of the national innovation system. Nevertheless the regional dimension has become a key part of 'systems of innovation' research.

Foresight activities have been conducted mainly on the national level but they are now spreading to the regional and transnational level. There are of course possibilities to make use of national foresight data at the regional level but also separate foresight activities have been conducted at the regional level. Until now, as Cuhls (2003) argues, not many successful regional approaches have been realized. It might be too early assessing whether this trend for regional foresight is sustainable or if it is just a fashion. One can have some doubts whether systemic foresight can be conducted at the regional level, taking into account that fully developed regional innovation systems hardly exist. It might make sense to conduct region specific foresight activities integrated in national and even international programs, but this really needs a lot of coordination, which seems to be very difficult to manage.

The role of consumers

The concept of recursive innovation argues that new products and processes develop out of feedback processes between different actors of the innovation system. Particularly the producer/user relationships and the producer/regulator relationships have been researched intensively. More recently also the interaction between end-users and producers has become a subject of research. But the way, how these relationships have been conceptualized has caused fierce critique. The role of the end-users is a passive one, mainly attributed to the decision to buy or not to buy. The active part is mainly attributed to the producer, who in order to make a sell

needs to inquire about the users' needs and work to satisfy them. Thus the user is constructed as a passive demanding object.

The 'systems of innovation' concept is not sufficiently sensitive to the social and cultural processes that constitute end-users' transformation of a given piece of household technology into practice. Social learning in using may be characterized as a combined act of discovery and analysis, of understanding and meaning, and of tinkering and the development of routines. In order to make an artifact work it has to be placed, spatially, temporally and mentally. It has to be fitted into the existing, heterogeneous network of machines, systems, routines, and culture. So far putting a technology into practice has not been analyzed as an important part of the innovation system approach. But as can be demonstrated using the mobile phone as an example the use practice and therefore the cultural dimension of this artifact may be more important than the technological dimension.

The involvement of a broad range of stakeholders is seen as an important aspect of foresight activities to avoid a one-sided perspective. It is quite obvious that the reflection of the future of technology should not be left to technology experts alone, when we accept the argument that as long as a new technology has not been integrated into a social practice, it cannot be interpreted as an innovation. But it is one aspect to involve end-users into the foresight process, and another to develop visions of future use practices of new technologies. I think that the role of the end-user in foresight activities needs to be reflected more carefully.

How can foresight support 'systems of innovation'?

The answer to this question can best be given when we analyze systemic change. One can criticize the 'system of innovation' approach for its rather static perspective. It is mainly interested in the functioning of an existing innovation system, but it has little to offer to analyze processes of change. Only if an evolutionary approach is integrated a dynamic analysis of national innovation systems becomes possible. To analyze the dynamics of innovation systems the concept of 'path dependency has been introduced. The concept was first used to analyze continuities in the process of technological change. The path dependency perspective can be expressed in the following way: Whenever we encounter an artifact, no matter what its age or provenance, we can be certain that it was modeled on one or more preexisting artifacts.

It is seen as a strength of the path dependency concept that it does not separate technological innovations from past developments, but assumes some kind of continuity in the process of technological change. Path dependency defines certain boundaries for technological progress and indicates directions in which technological progress is possible and desirable. The main argument of the path dependency concept is that technological innovations and their knowledge base are closely linked with earlier developments. New innovations line up with earlier technological change; they have historical antecedents of progress. And today's knowledge base and technological advantages lay the foundations for succeeding rounds of technological development.

The concept of path dependency is based on the idea of some kind of channeled technological change or 'positive lock in effect', which means that the options for technological development are continuously reduced within the change process due to the cumulative nature of knowledge creation. Through concrete technology projects and selective processes of technology closure functioning production patterns and use practices stabilize, new technological development paths solidify and 'effects of irreversibility' become stronger (David 2000, Dolata 2007: 5).

Because the concept of path dependency assumes some kind of continuity in the process of technological development it seems to understand new technologies as an extension of existing

technological systems. This means that the path dependency approach focuses on incremental innovations, even radical innovations are conceptualized as the cumulative effect of a great number of incremental innovations. The attempt to explain radical innovations by referring to small events, including happenings, dominated by chance rather than by systemic forces, that can have tremendous consequences, is hardly convincing (David 1985: 332). This argument is not capable to explain how we can break away from path dependency (Greener 2005). It remains unclear how the change over from an existing technology path to a new path takes place. One can criticize that the model of path dependency represents a world which is governed by insignificant events and not by social actors. Without social actors, structures and social relationships, events are essentially arbitrary.

Distinguishing between technological paradigms and technological trajectories Dosi (1988) claims to account for both continuous as well as systemic or regime change. Continuous incremental changes are related to learning processes along the existing technological trajectory, while discontinuities in technological development and breakthrough innovations are associated with the emergence of a new techno-organizational paradigm. But the process of path creation cannot be explained by referring to single factors or simple models. The transformation of a new technological paradigm into a national trajectory is a highly complex process. Consequently path creation represents a multidimensional phenomenon which involves a group of social pioneers, new organizational formations and technical systems, as well as new institutional and cultural setting. The originally technical concept of path creation needs to be extended to a comprehensive concept of national development and growth paths.

The 'systems of innovation' concept has contributed to our understanding of systemic change by studying processes of knowledge creation, diffusion and use within firms and networks of specialized organizations. For example the development of organizational capabilities and core competencies or the creation of a specialized knowledge base have become a key research issue. More recently also institutional change is studied as intentionally initiated process to enable the establishment of a new national path. The focus we can conclude is on the mechanisms and processes of change but not on possible pictures of the future. Consequently systems of innovation depends on the development of a vision of the future, which can be created in foresight activities. The study of fundamental transformation processes and the creation of new growth paths, we can conclude depends on the integration of a systemic analysis of innovation processes and of foresight activities.

But such an integrated approach involves some typical pitfalls. First, the development of a new path is often conceptualized as a sudden break from the old one and not as a long-term process. On the one hand, the development of a new techno-organizational paradigm and its transformation into a new national path takes time and the creation of a new path in its earlier stage, remains often more or less unrecognized; it cannot challenge the traditional paths in any way. On the other hand traditional paths in the economy will hardly disappear in a short period of time. Instead, they will continue to develop; but they may integrate some knowledge, technologies, organization forms and institutional structures from the emerging new path.

Second, the importance of stabilizing a new path is widely ignored. But the successful establishment of a new path is dependent on a successful path dependency process (Wicken 2005: 1). This means that the successful change over from one path to another depends upon the establishment of a new institutional infrastructure that strengthens the diffusion capacity of an economy (Hertog and Bilderbeek 2000). Only if the 'homing' of a growing number of economic actors into the new path takes place can we speak of a successful transformation process. Third, it is assumed that the new path will completely replace existing ones. But an emerging path does not replace the old ones; it rather becomes a new 'layer' in the wider national economic and

innovation system and thereby creates increased complexity and heterogeneity. The new 'layers', however, do not represent additional economic activities separated from the old 'layers', instead the new path interacts with old paths, and the interaction creates dynamic processes that may both transform old paths and sectors, as well as shape the new path. Consequently, is probably more realistic to argue that a nation's economy includes a multitude of paths. (Wicken 2005, 2).

And fourth, path creation cannot be conceptualized as a rational decision-making process; it involves vested interests and power games. The path creation period is a period of trial-and-error experimentation and confrontation between the forces and interests of change and those of persistence, but also between different groups of modernizers, because it is widely undetermined in which direction a new path develops. The development of a new path, therefore, has to be conceived of as a 'contested terrain' (Schienstock 2004). While one can possible agree that ignoring these aspects may produce less valuable results it is difficult to avoid these pitfalls.

Policy perspective

It has often been criticized that 'systems of innovation' has hardly produced any hypotheses that enable us to explain or predict technological change. As these are the key functions of a theory, 'systems of innovation' cannot be characterized as a theory; it is seen as a conceptual framework that helps us to describe reality. Consequently policy-making relaying on the concept, cannot be based on proofed scientific knowledge. Benchmarking and identifying good or best practice can be seen as a key methodology associated with the system concept.

Benchmarking can help to identify weak parts of a national innovation system and it provides possible solutions for key problems. Freeman expressed the idea that by comparing various national innovation systems and their institutional structures, we might be able to identify good practices and new tools, which could then be 'borrowed' by other nations to improve their innovative and economic performance (1987). It is widely agreed, however, that simply copying good practices is not functioning. Countries are characterized by systemic differences and therefore what is best practice in one country or region will not be best practice in another (2001: 122). What benchmarking can do is informing us about functional equivalents in dealing with innovation problems. It is therefore important distinguishing between mechanical and reflexive benchmarking. The idea of reflexive benchmarking is to gain a better understanding of one's own solutions, their strength and weaknesses, when seen in light of what others do and what options they see.

Benchmarking may be a useful instrument in periods of path dependency, as it informs us about possible opportunities to slightly improve the exploitation capability of the existing institutional or organizational framework. But this methodology is hardly useful in a period of a techno-organizational paradigm shift, when countries have to create a new growth path. In a period of systemic transformation we need a fuller understanding of the forces shaping long-term future which should be taking into account in policy formation. Consequently innovation policy needs to be based on future-oriented methods and instruments. But we need to accept that we cannot predict the future, which would be closer to "forecast". Foresight takes into account that there is not a single future. Depending on actions or interactions between social actors at present many futures are possible. Consequently foresight aims at developing pictures of the future or scenarios of possible developments (Cuhls 2003).

Taking into account that both: system analysis and foresight produce results that cannot directly influence policy-making, we can argue that the process aspect becomes more important. This is indicated by terms such as "social dialogue", "knowledge sharing" or "interactive learning". We can argue that these concepts indicate a shifting in the focus of both concepts: from the state

as a major actor in science and technology policy-making to a broader range of stakeholders. This is also reflected in the concept of Fully-Fledged Foresight, which involves networking of key agents of change and sources of knowledge around the development of strategic visions based on anticipatory intelligence (Miles and Keenan 2003: 41).

Consequently the role of the state in the policy process is also changing. We cannot assume that policy makers have a superior understanding of the mechanisms of scientific and technological progress, market opportunities as well as organizational efficiency and institutional functioning; rather what they do enjoy is superior co-ordination ability across a diverse range of institutions (Metcalfe 1997). Consequently a new policy approach based on system analysis and foresight activities sees the state no longer as a sovereign economic actor directly intervening in the process of techno-economic change, but as a partner in the adventure of creating a new growth path.

This does not mean that in periods of fundamental techno-organizational change the state is losing its influence; but it has to change from direct control and bureaucratic steering to context control and enabling. The new role of the state can be described as a catalyst for innovation processes, a supporter of research and innovation activities, a facilitator of cooperation in innovation processes, a moderator of divergent interests, an organizer of a dialog between various actors on future developments and as an initiator of questions and new tasks.

Vision creation and discursive coordination can be seen as key elements of a new policy approach (Schienstock 2004). A 'systemic vision' or 'guiding model' or to use foresight terms 'strategic vision' or 'lead vision model' looks for the role of ideas about given or future possibilities on how to do things. Such ideas condense into concepts which look ahead and which act as frames for orientating interpretations, thinking, decisions and actions for individual and collective actors in innovation systems. A major advantage of a systemic vision is that it makes communication among social actors possible, even if they have different interests, perspectives, orientations and understandings.

Social discourse aims at coordinating the activities of various actors through continuous and rich communication. Systemic discourse can be viewed as a platform for jointly creating and exchanging knowledge among different actors. Discursive coordination is not primarily intended to create consensus among the participants, as is intended in consensus conferences, rather it aims at initiating interactive learning processes. Vision creation and discursive coordination can be seen as forming the framework for connecting existing knowledge stocks and competencies, for creating learning opportunities through the exchange of expertise, and for opening up new communication channels between actors in the innovation system.

Because of the growing integration of various stakeholders in the process of policy shaping and formulating, the policy network becomes a new form of governance in the field of technology and innovation policy. It replaces top-down policy making in the form of direct state intervention as well as more businesslike market-oriented governance. Policy networks are more or less stable patterns of social relationships between interdependent actors, which take shape around policy problems and/or policy programs (Kickert, Klijn and Koppenjan 1999: 6). Policy formulation within policy networks cannot be understood as strictly rational management of technological change, consisting of clearly defined stages of procedure. Instead we have to conceive of the policy process as trial-and-error process; there is a strong case for policy experimentation.

It is important to guarantee feedback from those experiments to allow for policy-makers and other participants in the policy networks to accumulate experiences. Consequently we can characterize innovation policy as policy learning (Lundvall and Johnson 1994: 18). "The learning approach", as Lundvall and Borrás argue, " provides a fluid perspective of a policy process in continuous transformation and evolution where no clear stages can be discerned" (1997: 64). Policy learning must be understood as aself-reflexive process. This means more that

anticipating new developments and considering them in the development of new policy strategies; self-reflexivity includes the monitoring of the environment, critically dissociating oneself from traditional functioning of reality and developing alternative ways of acting. This needs to include the aspect of negative feedback.

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ROMAN GALAR

ON THE "BLACK SWAN" INSPIRED ATTITUDES TOWARD FUTURE

Introduction

Attempts to discuss future seriously used to be burdened by the necessity to challenge a number of the commonly accepted clichés of doubtful value. These clichés, concerned mostly with the degree in which future might be predicted, analyzed, influenced and programmed, are rooted mostly in the proud illusions of the Enlightenment. This "men controlling their destiny" and "computing the future of universe knowing position and momentum of all particles" stuff got discredited by the progress of science quite a while ago. Yet, in the meantime, the illusory logic of these clichés has turned to be irresistible for general public.

This is especially so with social scientists and politicians, as the self-imposed task of programming future inflates their importance. In response to repetitive failures of grand projects, based on the delusion of predictability, vast and complex explanations are being produced. These are either plot theories, implying the vicious involvement of hidden enemies, or inadequacy theories, pointing to the need of models still more complicated and fed with still more data.

Without explicit dissociation from these illusions, the ideas of the adaptive approach toward future developments in general and progress in particular are hardly graspable. Attempts to dissociate had to be lengthy (while, not sufficiently long), secondary to the main topic, negative, and detrimental to the author's credibility. It is so much easier to debate from inside of an acknowledged paradigm than to argument, while challenging the paradigm itself. After publication of the "Black Swan"[1], the situation should become more comfortable. Recognized by Amazon as the best not fiction book of the year 2007, it has spent 17 weeks on the New York Times Bestseller list and was translated into 27 languages. With such an impact it might be expected that the "Black Swan" will provide a well recognized point of reference in the matters concerning practical approach to future challenges.

In this short contribution I try to give my personal view on the content of the book, relate some of its principal concepts, share my understanding of its messages and remark on its importance for the ongoing discussion about the future of regions.

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[1] N.N. Taleb, The Black Swan. The Impact of the Highly Improbable, Random House, 2007.

The "Black Swan" content

The author of the book is a rare bird. After making enough money as a Wall Street risk analyzer at the end of 1980s, he has got disgusted with the profession. He left and used thus gained affluent independence in a private quest for the honest understanding of the corporate mindset. I find the effect very rewarding. Good reading, plenty of anecdotes, well placed sarcasm, vivid popularization of Western intellectual heritage—all this dedicated to the cause of reason and common sense.

The book is focused on the out of proportion effects that the extremely rare and hardly predictable events, called "Black Swans", might have. Taleb insistently points out that while most attention concentrates on the everyday's details, the total outcome is largely formed by unexpected occurrences. This might seem kind of obvious. Is not human life defined by the singular moments when the genetic lottery produces one's genotype, the partner for life is first encountered or a false step makes one a cripple, etc? Yet, it doesn't seem trivial when Taleb notices that: *In the last fifty years, the ten, most extreme days in the financial markets represented half the returns.* This observation relates to the sphere that is assumed to be well controlled by the professional competence.

The book aims to explain why the existence of Black Swans is so commonly ignored. Even admitting that they might have happen in the past, people tend to believe that there were eliminated from the modernity of our times. Taleb explores this phenomenon involving in his arguments ideas of ancient and modern philosophers and referring to the recent research in mathematics and psychology. In this process he is very discriminating with regard to authorities. Some, especially Mandelbrot and Popper get idolized, while a number of idols of market and academia get denigrated. "Black Swan" is certainly a book bent on propagating the ideas of falsification and self-similarity into the mainstream.

The book demonstrates convincingly how poorly our minds are equipped to understand complexity and randomness that pervade the modern environment. There are compelling examples on:

- How even the fully predictable future dissolves due to accumulation of errors (to predict the effect of the ninth rebound of a billiard ball, the gravitational pull of the people standing around the table would have to be taken into account).
- How specialization restricts thinking to the interior of the model (a statistician informed about a "honest coin" that has shown tails 99 times in row, will argue that the probability of tails coming next is 50%; while a men of the street will opt for 100%—assuming disinformation and guessing that the coin must be faked).
- How even in the well defined risk areas the expert knowledge is unreliable (estimates of risk by professionals engaged at stock exchanges provide at average as good results, as assumption that prices will stay the same). This is nicely corroborated by the recent events on the financial markets.

Main concepts

Debilitating fallacies

A large part of the book is devoted to the discussion of some common fallacies that distort perception of reality and hide from view the impact of the highly improbable events.

- Silent evidence fallacy—consists on the selective assessment of history. Attention focuses on *the rosier part of the process*. This forms a base for unjustified optimism.
- Lucid fallacy—exposed when studying uncertainty with an apparatus build on the games of chance. This ignores the real life ambiguity concerning adherence to the rules of the game.
- Narrative fallacy—due to the natural urge of human minds to make sense of what has happened, by wrapping it in a consistent story. This masks the impact of chance.
- Round trip fallacy—visible when the absence of evidence is mistaken with the evidence of absence. This is responsible for a range of serious blunders like the formula feeding frenzy in 1970s.

"Mediocristan" and "Extremistan"

The central construct is the distinction between "Mediocristan" and "Extremistan" . Mediocristan might be interpreted as a kind of traditional, limited environment that our atavistic brains are able to grasp. Extremistan denotes the modern, all-inclusive environment, with complexities beyond human comprehension. The important difference is the scalability of human achievements, leading to the effect that "the winner takes all" (be it personal income, books sold or scientific citations). Taleb points out that a dentist—a representative of a Mediocristan person—might become affluent after 30 years of drilling teeth. This is in sharp contrast to Extremistan careers, where a market player, actor, writer or innovator might achieve colossal and practically instantaneous success. The upside is that, in difference to being a dentist, the chances of total failure among the adepts of Extremistan professions are close to certainty. This explains rat races and gives Taleb an occasion to a nice venture into intricacies of fractal randomness.

Skeptical Empiricism

Taleb is an outspoken critic of "platonicity", i.e. of tendency to concentrate on the well defined objects and models, while ignoring their interface with the inherently messy real problems. There are many lucid observations that will not endear him to the influential group of what he calls the "Bildungsphilister" type researchers. As an antidote to the Platonic approach Taleb advices skeptical empiricism, which, among others:

- prefers minimal (and falsifiable) theories against grand, general socioeconomic models;
- advocates the virtue of being rather broadly right than precisely wrong;
- recommends suspicion toward data, especially if they pretend to be computed probabilities (all kind of forecasts, especially financial);
- urges to move from observations to books, not from books to practice.

Suspicion of the Gaussian

Taleb is not really eager to discuss where from the Black Swans are coming. He is engaged in angry rhetoric based on supposedly fundamental opposition between the mediocre Gaussian events and the splendid and terrible Black Swans. This seems to me a most disputable part of his reasoning. One might point on a number of truly catastrophic effects that arise suddenly from the usual Gaussian noise, if its effects are selectively accumulated (notch effect, quantitative evolution). Some Black Swans might appear because we were stubbornly not looking in the direction where they are hatching. Both procedural approach and political correctness are very adamant in declaring what should not be taken into account. These parts of the book are better at thought provoking than explaining.

The message

The main message it to be aware of the Black Swan possibility. The arrival of Black Swans is by definition unexpected, but some of them might be already sensed breeding behind horizons of the usual. Especially so, if they emerge from tensions that the system is unable to unload systematically. It might be impossible to predict when and how the discharge will happen, but the ultimate effect is more or less certain, and one might only hope that there will be enough time to react. Taleb calls such events "Mandelbrotian Grey Swans".

Elements of critique of the modern society

Taleb admits that he is most often irritated by these who exercise their skepticism against religion but not against economists, social scientists and phony statisticians. He points sarcastically on academic philosophers, who are professionally employed in the business of questioning what people used to take for granted. They exercise skepticism toward existence of gods, definition of truth, redness of red, meaning of meaning, etc. Yet they believe blindly in stock market and abilities of their pension plan managers to multiply their income. This observation extends easily to less elevated layers of society. Contempt for old superstitions is more than matched by adulation of the new ones. Supposedly rational economy and politics are hanging on irrational beliefs of consumers and electorate that everything is going well.

Elements of personal advice to the fellow humans

The book is saturated with personal advice that I find both intelligent and amusing. Taleb is practical about necessity to earn enough money to gain the freedom of action. Then he advocates the attitude of the 19^{th} century gentlemen; i.e. doing what one finds worthy of doing. He writes that: *not matching the idea of success others are expecting from you is only painful if that's what you are seeking.* His existential position is: *I don't run for trains* implying elegance and control of one's own life that is most refreshing. It brings to my mind an ironic comment by Professor Tadeusz Zipser: *we do everything to jump on the tram that is just driving to the depot.* (It was given in a somewhat different context of public discussion on some modernization by imitation venture.)

The future of regions input

Taleb notes that Black Swans might be of the disastrous and of the hopeful kind. One might denote a market meltdown, the other some crucial technological innovation. He admits that *half of the time I hate Black Swans, the other half I love them. I love the randomness that produces the texture of life, the positive accidents.* It might be argued that the properly run regions provide a good ground for breeding the second and avoiding the first type of Swans.

We live in the period of globalization. In this perspective regions are very secondary beings. Yet, it might be noted that attempts to globalize—i.e. to encompass the whole available sphere of interactions with one order—abound in history. Globalization has all appearances of a perfect business arrangement. Its benefits are obvious: it provides the greatest markets and simplest rules. The reasons, why globalization has not yet finally succeeded, are more ambiguous.

One of the reasons is that global solutions leave no options. The global system itself, as well as its principal corporations and organizations, have no real competitors. This lack of diversity

makes learning on errors practically impossible, as there are no viable competitive alternatives to compare the effects. All policies are by necessity the "only possible" policies, with the painfully well know implications.

Taleb expounds a lot on the Frederic Bastiat's remark: *We can see what governments are doing and therefore sing their praises—but we don't see the alternative. But there is an alternative; it is less obvious and remains unseen.* This might be a crucial realization, when the sense of the division of power between regions and states is considered. It is obvious that some decisions have to be taken at the higher level of governance. It is evident that some decisions can be taken both at the central and at the local level. Arguments against devolution of power point at lower cost, increased order, superior competence, enhanced control etc. Argument for devolution use to point at possibilities of local optimization and pay homage to democratic principles. The ultimate reason for implementing subsidiarity principle is rarely mentioned. And the reason is that devolution of power will make alternatives and their effects visible. Once they are visible the learning by doing might start, thus opening the way for the system evolution.

Another deficiency of globalization is that global actors tend to escape local limits to growth by moving growth to the wider arena (e.g., the real estate amok and Harry Potter frenzy). This brings successes and failures on the unprecedented scale and their consequences tend to be cumulative and crushing.

Still another deficiency is a strong tendency to shift local problems elsewhere, instead of solving them on the spot (e.g. European CAP effect on the global food market). In this way the tensions become global and have to relax globally. The global system operates as an "Extremistan" *par excellence*.

This three reason might be helpful in understanding why the episodes of globalization in human history were so short-lived their obvious advantages notwithstanding. Each success prolongs the game, but one irreparable failure might close it. And the global system tends to accumulate little failures into failures big enough to crash down the whole; while providing little forewarning and no reliable alternatives. The necessity to deal with such cumulative crashes might reveal a new, unasked for, face of globalization—an authoritarian global crisis management. In the Autumn of 2008 we might be just witnessing its emergence.

If the global systems were more decomposed and scaled down, the effects of the *winner takes all* rule would be softened and the learning abilities restored. In terms of the Black Swan, regions belong to the realm of Mediocristan. Successes are on the lesser scale and so are disasters. The common cultural platform makes them easier to predict and to contain. The experiences of the neighboring regions might offer useful advice on how to develop successes and avoid troubles. In addition, in the world where the sought for careers would have regional rather than global dimension, the total amount of the available human satisfaction should greatly increase. In such conditions the regional cultures might flourish, greatly augmenting the cultural deposits of humanity.

Conclusions

The main "Black Swan" input to the discussion on predicting future is—forget it. Future is based on uncertainty, unless it is a stagnating future, i.e. the prolonged present. Future might and should be controlled, but awareness is more important than planning. Control of the future is a matter of strategic initiative. It demands good maneuvering abilities of vivid intelligence rather than procedural fortifications of fake certainty. Taleb is adamant in his message: *Avoiding being a sucker. The antidote to Black Swans is to be non-commoditized in ones thinking.*

It should be stressed again that "Black Swan" was written by a financial markets insider. An insider that succeeded in Extremistan and become deeply critical of its working. Critics go very deep, and many potent ideas from classical philosophy to modern mathematics are invoked in argumentation. Despite of the Author's academic credentials, "Black Swan" is not an academic book — it is a book of passion and it is only broadly right. This is advantageous, as it gives Taleb a chance to influence culture not just specialization.

It is impossible not to remark on timing. This highly speculative work has hit the market just a moment before its speculations started to turn real. Now the world wobbles on the brink of an precipitous crisis resulting from the wrong assessment of chances. Taleb asks: *How these whose job is to make us aware of uncertainty fail us and divert us into bogus certainties through the back door?* There is hardly a more timely subject to consider.[2]

[2] This contribution is published at the same time in "The Future of Regions in the Perspective of Global Change"—edited by P. Jakubowska, A. Kukliński, P. Żuber, Ministry of Regional Development, Warsaw 2008.

CHRISTIAN BERG

GLOBAL NETWORKS—NOTES ON THEIR HISTORY AND THEIR EFFECTS

Networking is one of the most important trends today, it can be seen almost anywhere. Apart from the biological networks, which have been around for long (e.g. the neural network of the brain), there are technological networks (cf. railways, telephone lines, Internet), social networks, networks of corporations, of terrorists, of security or intelligence service, of all sorts of peer-groups and so on. In order to cover these various facets, we will use the following broad definition: networking is understood as the process of building a system of elements (often a large number), the nodes, which exchange either energy, or matter, or information or a combination of these three. Networks have thus a *structural* aspect (they build a system of nodes, an infrastructure) and a *functional* one: they exchange something.[1]

The thesis of this paper will then be threefold:

1. Ever since the industrial revolution transportation technologies as well as information and communication technologies (ICTs) have driven technological, economic and social progress and development. This process advanced in the second half of the 20^{th} century, particularly in its last decade, leading to a complex interdependency of several global networks.
2. Many networks exhibit typical features. Studying these features will allow a better assessment of the implications of the current networking processes.
3. Global networking has considerable implications for the distribution of power among the actors on the global scene. Those entities which have network structures themselves gain influence, others loose. In the context of this volume global networking can thus be seen as an enabler of several "turning points". Moreover, such networking is taking place at an incredible speed and might well be considered as a turning point, or turning period itself.

1. Historical notes on technological networks

1.1. The 19^{th} century and the dawn of globalization

Networking phenomena have always taken place, already in nature and independent of human activity. The neural networks of animals and humans, for instance, are among the most complex

[1] This definition is explained in more detail in a previous book of mine: Vernetzung als Syndrom. Risiken und Chancen von Vernetzungsprozessen für eine nachhaltige Entwicklung, Campus: Frankfurt/ New York 2005. Also other parts of this paper draw on reflections within that book.

phenomena we know. In modern times human-made networks have become increasingly important. Diverse kinds of networks in technology, society, business, or elsewhere have made networking one of the most influential phenomena today.

For a long time social relationships and social networks were confined to a relatively small area and a rather small circle of relationships, to families, clans, and tribes as well as to merchants and salespeople. However, the industrial revolution gave a boost to technologies of transportation and ICT, thereby also boosting networking processes in the societal domain. In the nineteenth century the railway was developed and railway networks were built. They shortened travel times considerably. Distances which had required more than a week of travel, could suddenly be bridged within just one day. Steamships shortened long and dangerous journeys, travel times between the Old and the New World were reduced from more than a month to about a week.[2] Transportation became much faster, easier, and cheaper, providing ample opportunities and incentives for trade. Adam Smith described the principles of specialization and division of labour as drivers of the free market. Not surprisingly, the new ways of transportation created bigger markets with more potential of specialization and further division of labour. International trade fostered standardization of measures, weights, gauges of rail tracks etc. Once they were established, however, international standards, in turn, facilitated trade and the distribution of production processes. Although foreign trade had been around for thousands of years, only now a single world market emerged.

However, such unified market did not only require transportation of goods, it also required communication. Due to a happenstance, two other technologies were developed around the same time: telegraphy and telephone. The first networks of telegraphs were built in the middle of the 19th century, followed by the first telephone networks only few decades later. Both enabled fast and long-distance bi-directional information exchange. This was a necessary condition for building a global market, since a global market requires a global system in which demand and supply can be communicated and negotiated. It requires quick communication on products and prices.

Those technological networks soon triggered societal networking as well. The first cultural events of global character took place. In 1851 the series of World exhibitions started, celebrating human ingenuity and latest technologies. The modern series of the Olympic Games, starting in 1896, expressed a new spirit of international competition and an awareness of international relationships beyond politics. Gradually, a global society evolved. Globalization, which is such a dominant phenomenon today, clearly started as a consequence of these first important networks of the 19th century, although the word itself is quite new. This is indicated by the development of the global foreign trade in the 19th century. Between 1830 and 1880 the global foreign trade grew by a factor of 8, which corresponds to 6% growth in each and every year of that period.[3]

1.2. Rapid growth in the late 20th century

The process of technologically driven networking even accelerated in the second half of the 20th century. The exhaustive diffusion of individual mobility, the construction of fast and long-distance connections for both road and rail traffic as well as the significant growth of air traffic contributed to an increased pace of global networking. While there had already been connections of roads and railways, the transportation networks were expanded especially with fast connections for long distances. For instance, the total length of the German Autobahn network was about 2.500 km in

[2] Wolfgang König / Wolfhard Weber, Netzwerke Stahl und Strom (1840–1914), Propyläen Technikgeschichte Band 4, ed. by Wolfgang König, Berlin 1997, p. 158.

[3] Gurland, A.R.L., Wirtschaft und Gesellschaft im Übergang zum Zeitalter der Industrie, in: Propyläen Weltgeschichte Band 8, Das neunzehnte Jahrhundert, ed. by Golo Mann, Berlin/ Frankfurt 1960, 316.

1960, compared to more than 9.000 km in 1990.[4] Moreover, air traffic increased more than any other way of transportation. The number of passengers of air traffic in the EU increased from 5 million in 1960 to 120 million in 2000.[5]

We just mentioned that the foreign trade grew by a factor of 8 between 1830 and 1880, indicating the coming-to-be of a world market for goods. One century later, however, the same indicator had increased by more than an order of magnitude more than that. Between 1950 and 2000 global foreign trade grew by a factor of 103! It grew 17 times faster than the world's gross domestic product, which only grew by a factor of 6 in that period![6]

ICTs developed similarly, and accelerated networking turned quantity into quality. It took 38 years until 50 million Americans had a radio, 13 years till the same number had a TV—but only 5 years till they were online.[7] Radio was already a quantum leap. News could now spread instantaneously and reach out to a much larger community than newspapers. Television could transfer vivid and moving pictures as well as audio formats. This made a difference. One can well argue that the Vietnam War was not decided on the battlefield but in the living rooms of the American people—since that war was the first one which people could watch on TV—almost live. While millions of people watched the same battles at the same time, many people reacted in the same way and protested against that war.

The most important invention since the telephone (some even say since Gutenberg's letterpress) was the Internet, including email and World Wide Web. Although the Internet had been used for scientific purposes for several years, only around 1990, when the World Wide Web was created, the Internet "took off". As we just said, it then spread at an amazing speed, much faster than telephone, radio, TV or any other technology of similar impact. Why could the Internet spread at this amazing speed? There are two main reasons: Firstly, the infrastructure which consumers normally use for the Internet is the fixed-line telephone network—at least for the last mile. In other words, one network could perfectly utilize another one, which had been built up over decades. Secondly, already 25 percent of the American population had a Personal Computer in their homes by the time the World Wide Web was developed.[8] The more users the Internet has, however, the more useful is it to every single user. In order to hook up to the Internet one only needed a modem and a browser. In other words, the entrance barrier to this new technology was remarkably low. Other technologies, which work on top of the existing infrastructure, could similarly benefit. Fax machines saw an increase of 700% in the 1990s.[9] Within one decade, the Internet spread at such a speed that in some societies they almost reached saturation within only one decade.

Therefore, it is important to note that in most cases new networks do not substitute the old ones but complement them. Cars did not substitute trains, telephones did not substitute telegraphy—at least for a long time –, mobile phones did not substitute fixed-line networks. In an increasingly networked world there are several kinds of interdependent networks which constitute the technological basis of our civilization.

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[4] Federal Office of Statistics of Germany (Statistisches Bundesamt) (ed.), Datenreport 1994. Zahlen und Fakten über die Bundesrepublik Deutschland, Bonn 1994, p. 347.

[5] Cf. Federal Office of Statistics of Germany (Statistisches Bundesamt) (ed.), Datenreport 2002, 360.

[6] World Trade Organization, International Trade Statistics 2002, Geneva 2002, 33.

[7] Jürgen Wilke, Entwicklungsstufen und Determinanten der Kommunikationsgeschichte, in: Kommunikation in Geschichte und Gegenwart, Vorträge der Jahrestagung der Georg-Agricola-Gesellschaft 2001 in München, ed. by Kai Handel, Freiberg 2002, 42.

[8] Barry Hughes, International Futures, 3. ed. Boulder, CO/ Oxford (U.K.) 1999 (Hg.), Database for "International Futures"

[9] Federal Office of Statistics of Germany (Statistisches Bundesamt) (ed.), Datenreport 1994, 348 and Federal Office of Statistics of Germany (Statistisches Bundesamt) (ed.), Datenreport 2002, Bonn 2002, 131.

2. Typical features of networks

Many real networks show typical features, of which we can briefly list only some.

— Most networks do not have a central regulation. Rather, they operate bottom-up, building on self-organizing processes. This implies that they can operate very flexibly. Networks can often adjust themselves to changing environment very quickly.

— Networks build on mutual relationships, on reciprocity of exchange and mutual benefits. In principle, networks therefore foster an atmosphere of trust.[10]

— This implies that networks are rather insensitive to perturbations or failures. For instance, considerable parts of the human brain can be damaged (or even taken out under certain circumstances) leading only to a comparably little loss of memories or abilities.

— Many networks are "small worlds". In a small world, you can cross an entire network with only a few steps, even if the number of nodes is considerable. Take, for instance, the networks of relationships between all people on earth. How many steps are needed to build a connection between you and, lets say, Bill Clinton or Franz Beckenbauer? How many people do you reach by the acquaintances of the acquaintances of your acquaintances etc.? One can easily show that a chain of 5 or 6 successive acquaintances would on average be enough to establish a connection between any two people on this planet.[11] A great deal of communities and networks are small worlds, the business world, the academic world, the World Wide Web, the Internet routers etc.

— Small worlds are scale free, which means that there is no characteristic scale which defines the network. In scale free networks, the vast majority of nodes have only few connections to other nodes, a small number has an order of magnitude more connections, while very few nodes have again one or even several order of magnitudes more nodes.[12] Take the World Wide Web: while for the vast majority of websites (more than 90%) there exist less than 10 links referring to them, there are a few very important nodes, the "hubs", to which more than one million links refer (like google.com, amazon.com, cnn.com).[13]

— The "hubs" are of crucial importance for the entire network. Although networks are in general relatively resistant to perturbations, this does not hold if you attack the hubs. The hubs hold the network together, since they have so many more connections than most of the other nodes. However, if you damage or take away the hubs, you can harm the network significantly with little effort. Take the attacks of Sept. 11, 2001: they hit symbols of capitalism and the Western world. The world trade center was a major hub in the network of the business world, and their consequences go far beyond the limited scope of the attacks themselves.

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[10] We will see below that there are, of course, some restrictions to this.

[11] As a "back-of-an-envelope-calculation" you could assume that each person has 100 acquaintances. The people you reach with just one step in between are already 100 x $100=100^2$, i.e. 10.000. After five steps you would reach already $100^6 = 10^{12}$ = 1 trillion people. This is, of course, only a first approximation, since it does not consider cluster-building (which reduces the numbers you reach) and assumes only 100 acquaintances per person (which is, in turn, far less than real).

[12] Scale free networks follow a power law distribution—not a Gaussian distribution. In a Gaussian distribution you would expect that there is an average number of, let us say, relationships someone has, for instance 150. You would expect that the same percentage of people have 200 as 100. But that's not the case in scale free networks. Some people might only have 10 relationships, while others might have 1000 or even more.

[13] Barabási, Albert-László, Linked. The New Science of Networks, Cambridge, Mass. 2002, 58.

3. Some effects of global networks

This volume is dedicated to crucial developments of global impact within the last few decades. Such developments, which are correlated with both structural changes and new driving forces, might be called "turning points", as Antoni Kukliński suggests. According to Kukliński, a "turning point" is considered as a "deep and relatively rapid structural change in a given domain with clear consequences for the global scene. The turning point means also a rapid emergence of a set of new driving forces shaping the nature of the processes which determine the global performance of the given domain." Kukliński suggests, for instance, to consider "the emergence of new power of oil producing countries", the "shift of power from the nation-state to the transnational corporations", the "shift of power from the national to the global scene", and "the emergence of the European Union as an important actor of the global scene" as turning points.

It is the main thesis of this contribution that global networking gave rise to several of these developments, of these turning points. Moreover, compared to other turning points, global networking might be considered as a rather long time development, since we could see that even its fastest (and most recent) period took approximately a decade. However, seen in a historical perspective and considering the severe implications this has, such networking is taking place at an incredible speed and might well be considered as a turning point, or turning period itself.

3.1. Oil as the fuel of the globally networked economy

The intensive international trade mentioned above derives from booming industrial economies which need a lot of energy. Energy is needed both for production and transportation of goods. That's why the global economy has become increasingly dependent on energy as the motor of the industrial societies. Among all primary energy sources oil is particularly important, since by far the most of all traffic depends upon it.[14] Moreover, oil is the most important raw material for the chemical industry. Since the 1960s, oil has been the most important primary energy source globally. It accounts for about 35% of all energy consumed, followed by coal (23%) and gas (21%).[15] Oil is literally the fuel which makes the global economy running.

Shortages of energy have therefore dramatic effects, as became evident during the first global oil crisis starting in 1973.[16] The OPEC then decided to impose an oil embargo on the industrialized Western states as a reaction to the Yom-Kippur-War. While the OPEC, founded in 1960, had not been very influential until 1973, it became an important player in the global economy over night. Following this embargo, oil prices rose by a factor of four within one year, with far-reaching consequences. Many countries experienced inflation, unemployment, rising national debts and rising costs for social security etc. Energy consumption was reduced, as the U.S. industry's energy consumption indicates. The two years with the greatest industrial energy consumption in the U.S. between 1960 and 2000 were the years of the two oil crises 1973 and 1979.[17] In other words, as a consequence of the high prices, consumption was reduced—but it took some months till this became effective. Therefore, the years when the crises started showed the highest consumption.

Shortages often push innovation. In this case high energy prices helped the industrialized economies to decouple their economic growth from resource consumption. In the following, the

[14] Road traffic, air traffic and sea traffic use almost exclusively oil-based energy sources, while only some railways can use electricity (while a great proportion of railways use oil, i.e. diesel as well).

[15] German Advisory Council on Global Change (WBGU 2003), World in Transition— Towards Sustainable Energy Systems, Earthscan, London.

[16] In an interesting historical coincidence the awareness of "limits to growth" spread right before that oil embargo.

[17] Barry Hughes, International Futures, Database for "International Futures"

industrial sector lost and the service sector gained weight in the major industrial economies. Between 1970 and 2000 the contribution of the industrial sector to the gross domestic product decreased by 10% to the benefit of the service sector.[18] However, although the industrial energy consumption has developed moderately since the 1970s, the energy consumption of the traffic system, which is particularly oil dependent, has been constantly increasing. While the energy consumption of European industry (EU-15) even slightly decreased between 1985 and 1998, the consumption of the traffic sector increased by 50% in the same period.[19]

Already in the 1950s geologists calculated that there will be a peak in the global oil production.[20] Meanwhile, most of the Non-OPEC states have reached their peak oil, i.e. they passed their maximum oil production.[21] The question is when the OPEC states will reach their peak oil. Some countries might already have passed it, others can still increase their oil production. Nobody really knows when the global peak oil will occur—or whether it already has occurred. There is little doubt that we'll see exponentially rising oil prices when we pass that peak. Until present, we've always seen an *increasing demand* which could be compensated by an *increasing supply*. Once the oil production reaches its maximum, we'll see that the curves for supply and demand will run in opposite directions, leading to a final increase in price. All will depend on the time scale at which this happens. Most likely we'll see considerable resource allocation conflicts.

What does all this say? Some conclusions.

First, although the industrialized countries could decouple their economic growth from their industrial energy consumption, today's globally networked economy depends on oil at least as much as it did a couple of decades ago. Truly globalized production processes and business operations require that.

Second, traffic is not only using up a lot of oil, it is also a considerable burden for the environment. Even more so, since those means of transport grew most, which affect the environment more than others, i.e. road and air traffic.[22]

Thirdly, at least for the next few decades, oil will continue to be important, since there is no real alternative to oil as energy for transportation or as a resource of several industries.

3.2. Business networks and the increasing power of multi-nationals

Already in 1990 Walter Powell argued that there are three different ways of organization: markets, hierarchies, and networks.[23] Powell's view implies that today's businesses build networks instead of hierarchical organizations. He argues along the following lines. Markets operate via the price. The price is their only means of communication. Markets show a high degree of flexibility, since everything is reduced to a price as the only variable. The actor preferences are independent of one another, and the climate of such systems is suspicion. "Markets offer choice, flexibility, and opportunity. They are a remarkable device for fast, simple communication." (302) However, since the price is a simplifying mechanism, it is, according to Powell, unsuccessful at capturing the intricacies of complex, dynamic exchange. "Organizations, or hierarchy, arise when the boundary

[18] Barry Hughes, International Futures, Database for "International Futures"

[19] Commission of European Communities (ed.), Panorama of transport (1970–2001), Theme 7, Luxembourg 2003, 6.

[20] In 1956 M. King Hubbert predicted the peak oil for the U.S. to happen between 1965 and 1970, and for the global oil production around year 2000 (cf. M. King Hubbert, Nuclear Energy and Fossil Fuels in: Drilling and Production Practice, Washington, American Petroleum Institute p. 7—25). The peak oil in the U.S. actually occurred in 1971, while we have probably not yet reached the global peak oil. Some experts say this is due to the oil crises in the 1970s which reduced consumption.

[21] Cf. http://omrpublic.iea.org/ , access March 2006.

[22] Cf. Commission of European Communities (ed.), Panorama of transport, 6.

[23] Walter Powell, Neither market nor hierarchy: Network forms of organization, in: Research in Organizational Behaviour, Vol. 12 (1990), 295–336. The following numbers in brackets refer to the same paper.

of a firm expands to internalize transactions and resource flows that were previously conducted in the marketplace. The visible hand of management supplants the invisible hand of the market in coordinating supply and demand." (303) According to Powell, a hierarchical structure is particularly well-suited for mass production and distribution, since the requirements of high volume, high speed operations demand the constant attention of a managerial team. "The strength of hierarchical organization, then, is its reliability ... and its accountability..." (303) However, organizations are rather static and cannot be adjusted to changing environments as easy as networks can. Powell points out, what we already mentioned above, that networks rely on self-organizing processes and are very flexible. This implies that network forms of organizations have a competitive advantage against hierarchical organizations particularly in rapidly changing environments—like we've seen during the past two decades.

While organizations operate by a hierarchical structure and top-down information flow, networks require mutual relations, they require reciprocity. Networks favour win-win situations, they promote an atmosphere of openness and trust.[24]

Furthermore, Powell argues that networks are particularly suited for circumstances in which there is need for efficient, reliable information. Information that can be trusted is hardly that which runs top-down an organizational structure. The most reliable information comes from someone whom you have dealt with and whom you have trusted in the past. (304) Networks are "particularly useful for the exchange of commodities whose value is not easily measured. Such qualitative matters as know-how, technological capability, ... a spirit of innovation or experimentation ... are very hard to place a price tag on... The open-ended, relational features of networks... greatly enhance the ability to transmit new knowledge and skills." (304)

Knowledge as the "ultimate resource" of the information age is shared best in network structures. In other words, entities with network structure have a strong advantage in the information age, since information is well processed and distributed in networks. It should be noted that this argument is not related to the technological networks, which form the basis of the information age. Rather, it means that those attributes which are needed in the information age (like knowledge and innovation) find their best culture medium in network structures. The actors of the information age (which want to distribute and process information) should also have network structure, since networks are well suited to distributing and processing information. Therefore, there are two distinct reasons why the information age is a network society and why networks have become so important today.

Manuell Castells also argues that the business world conceptualized the "network enterprise" already in the 1980s. This business model, which emerged in the 1980s was a precondition for the rapid spread of the Internet, says Castells. Through the Internet, businesses interact with their "suppliers, customers, subcontractors, and employees, in a multi-directional system of information and decision-making that bypasses the vertical channels of communication without losing track of the transaction. The result is better-quality information, and better adjustment between partners in the business process."[25]

In sum, the business world was already organized in networks to a considerable extent when the Internet took off. Network forms of organizations have a competitive advantage in

[24] Kevin Kelly therefore states, in his book NetEconomy: "The network economy is based on technology, but it can only be built on relationships. It starts with chips but ends with trust." (quoted from the German version: Kevin Kelly, NetEconomy, Zehn radikale Strategien für die Wirtschaft der Zukunft, (engl. 1998) Munich/ Düsseldorf 1999, 190. Of course, one might object that there are networks which do not seem to favour openness and trust. The Internet, for instance, is a medium which does not per se promote trust. However, in this case it is the sheer number as well as the virtual character of the of nodes which counters the open atmosphere. In principle, however, networks are more kin to teamwork, mutual benefits and openness compared to hierarchical organizations.

[25] Manuell Castells, The Internet Galaxy. Reflections on the Internet, Business, and Society, Oxford 2001, 76.

a networked world. It is no wonder that multinational enterprises which are both constituted by and interdependent with several kinds of networks are well adjusted to the networked character of today's world. Globally operating businesses can therefore truly capitalize on global networking by splitting and spreading their operations all over the globe. Therefore, one reason why businesses have won so much influence recently is that they have increasingly assumed network forms of organization.

3.3. What NGOs and terrorists have in common

The universality of networking phenomena in today's world becomes evident by the fact that the winners of the globally networked society can be as different as Non-Governmental Organizations (NGOs) on the one hand, and international terrorism on the other. Both NGOs' and terrorist networks have become much more influential in the last few years. Little needs to be said about the influence of terrorists, particularly since September 2001. Terrorist attacks spread fear and insecurity to almost every part of the world, they provoke wars, have an impact on legislation in several countries, often restricting civil liberties and privacy, they bring about a new understanding of concepts of security (e.g. of nuclear power plants)—they influence virtually all aspects of life. However, NGOs have also become much more influential in recent years. The number of NGOs has considerably increased with the usage of the Internet. Within OECD countries the number of NGOs increased by 55%, in the non-OECD countries even by 95% within the 1990s.[26] Several international NGOs, like Greenpeace, amnesty international, Medicines sans frontieres, Tranparancy International and many others have become influential partners in the global society. Being only small in numbers and financial background, their campaigns reach out to the masses and change people's conception. During the conflict between Greenpeace and Shell on the Brant Spar in the middle of the 1990s, about 75% of the German car drivers said they would be willing to boycott Shell.[27] Several NGOs do meanwhile even have a consultative status with United Nations agencies relevant to their area of work, get access to the World Economic Forum or influence other institutionalized events of such kind.[28]

From a purely organizational point of view, NOGs and international terrorists share important organizational features.[29]

- They are building on decentralized and informal structures. By becoming a member of the respective entity you could almost immediately put into practice what you're committed to. Since these networks depend on the activity of their individuals, the individuals, in turn, are empowered. In the fragmented and individualistic environments of (post-)modern societies, such networks provide a framework of meaning which goes beyond individual well-being and prosperity.
- Both NGOs and terrorists operate on an international level.
- Both NGOs and terrorist networks require a well-informed global public as the audience of their action. Both kinds of groups stage their actions to get media coverage. To get more media attention, ...
- ... both choose symbolic actions. A symbol is partially representing and realizing the reality it stands for. The David-against-Goliath image of a small rubber boat teasing the large oil tanker

[26] Barry Hughes, International Futures, Database for "International Futures".

[27] Cf. http://archiv.greenpeace.de/GP_SYSTEM/GPFRAM10.HTM, access March 2006.

[28] Cf. http://en.wikipedia.org/wiki/NGO, access March 2006.

[29] This does *only refer to the organizational, structural aspects*. On a deeper level, one could, of course, argue, that terrorism itself is an expression of the some of the losers of globalization. Furthermore, the following particularly applies to NGOs of activists, for which their *main action is a political message* (like Greenpeace or amnesty international). To others, which are actually doing something, does this apply to a lesser degree.

carries symbolism. Often terrorist attacks are symbolic as well. The World Trade Center symbolized the power, prosperity and pride of the global business community. Since trade is responsible for the globally networked world to a considerable extent, as we said above, there can hardly be a more symbolic action than annihilating the global center for trade.[30]

- Both NGOs and terrorists were underestimated by classical institutions in the beginning. Shell did by far not consider Greenpeace's influence as important as it turned out to be in the 1990s, when Greenpeace demanded that Shell should not drown the oil platform Brent Spar in the ocean. In a three years argument Shell eventually gave in and lost a lot of reputation. Meanwhile, several enterprises have learned this lesson and are pro-actively engaging in dialogues with NGOs. Quite often, former employees of NGOs are even hired by large MNEs to work for their corporate citizenship departments. Accordingly, terrorist networks were underestimated as well. The military attack against Afghanistan was supposed to come to terms with international terrorism—but it only partially succeeded. On the other hand, the attacks of September 2001 could have been prevented if FBI and CIA would have linked their information. There had been indications of terrorist attacks impending—but they were not considered relevant or the governmental institutions were not linked respectively.
- Both terrorist networks and NGOs rely on self-organizing processes and on donations of committed individuals. We do not know whether Usama bin Laden is still alive or not—but that does not really matter. As long as the nutrient solution which gives rise to fundamentalist activities is fostered, the respective networks will grow, regardless of any particular leader. Similarly, as long as governmental organizations are not able to address and resolve urging social or environmental issues, as long as multi-nationals and investment funds can accumulate capital and neglect the rights and needs of whole peoples and nations of today and tomorrow, NGOs will stay influential and express civilians' concerns.
- Neither NGOs nor terrorists are legitimized democratically. Of course, there are huge differences in the moral legitimization of these kinds of groups. However, it is important to see that there are important players in the globally networked society which have no democratic legitimization.
- The more important information flows are and the less important material flows, the more effective can those networks be. For instance, amnesty international can use the Internet to announce human rights' violations in totalitarian regimes, environmentalists can video-tape illegal clearings of tropical rain forests using GPS and uploading the information to the Internet. Similarly, terrorist groups can plan their activities in the anonymity of Internet cafes.

By comparing their structure, pointing to similarities in their organizational form and their mode of operation, the underlying regularity shall be demonstrated. By no means, of course, does this neglect the fundamental difference in their mission, which can hardly be more extreme.

3.4 The fading influence of nation states and the demand for a global governance

Most nation states have lost influence during the process of globalization. Unlike businesses, nation states are bound to a territory and cannot take advantage of the mobility and flexibility the global network offers other actors. Unlike NGOs they have rigid hierarchies and bureaucracies. They cannot acquire wealthy tax payers as companies might acquire cheap workforce. They cannot start from self-organizing processes, putting aside their constitutions. Only to some extent they

[30] The symbolism goes much further, of course. For instance, the suicide bombers symbolize the discontent with the purely immanent goals of capitalism by sacrificing this life to get a reward in the afterlife.

can decentralize their structures. Therefore, in order to sustain their influence on the global scene, many nation states are involved in processes of forming larger trans-national entities.

The European Union is a good example. It started as the European Coal and Steel Community in 1951, followed by the European Economic Union in 1957 (Treaty of Rome), the European Communities until it became the European Union in 1992 (Treaty of Maastricht). Although the original intention was better economic cooperation in a sector of military importance, in order to hinder any future conflicts among the member states, it gradually became clear that the European integration is also an important means for each member state to leverage its impact on the global scene. The European integration, although planned for a different purpose, is Europe's answer to survive in the global world. In an amazing development the member states limit their own sovereignty voluntarily in order to build something greater.

However, although transnational alliances can help nation states articulating their concerns and coping with global competition, a governing entity for the globally networked society is still lacking. Some kind of common framework is necessary which governs the actions of the global players. Currently, it seems that the only organization which could enforce such framework in principle, the U.N., is challenged by its large organizational bureaucracy and by its constitution which reflects the situation of the post-war period. The few initiatives of international cooperation on urging issues, like the Kyoto protocol or the International Criminal Court, have been struggling with the fact that some countries are opposing the respective plans and hindering their effective and efficient operation. However, there will hardly be an alternative to establish some kind of globally enforceable framework, which sets the rules for all relevant global players.

3.5. Global networking as turning period

In recent years, we have seen several developments on a global scale which could only affect the lives of most people on this globe because the world is so densely networked. There is a long list of challenges and threats which affect us exactly to the degree as we are networked. Take, for instance, the several diseases of both animals and humans, which can spread throughout the world at an increasing speed. Foot-and-mouth disease, BSE, Avian flu, AIDS, SARS, and—most threatening at the moment—the fear of a global pandemic flu of a new kind have caught our attention in several waves throughout the past few years. Take terrorism, which can only spread fear globally, because both the terrorists and their targets can be found all over the world. Take technology: a slight change in oil prices can have considerable influence on the industries of tourism, airlines, automotive, etc. Take software: Monocultures of software increase the risks of network failures, viruses, and other malicious attacks.

In closing, the global networking processes we've experienced during the past few decades do not only promote social and economic development, they also challenge our cultures, our life-styles and our attitude towards nature in an unprecedented way. Broadening the concept of turning points one might thus say that the period in which the global society could evolve, which is basically within the last one and a half decades, is a turning time. Looking back to the fifteen years between 1990 and 2005, our children and grandchildren might consider this period as an enabler of a truly global society. Moreover, they might conceive us as naïve in providing the technological basis for the proximity of the world's societies but not reflecting on the social, cultural and environmental implications such merging and melting will have.

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Part III:

The Enigma of The XXI Century

WOLFGANG MICHALSKI

RESPONDING TO THE CHALLENGES OF 21ST CENTURY TRANSITIONS: IN SEARCH OF A HOLISTIC, COHERENT AND POLICY-ORIENTED APPROACH

There are many indications that the beginning of the 21st century holds in store once again a fundamental transformation of our economies and societies,—an evolution which manifests itself in many dimensions and at all levels: local, regional, domestic and international. There are quite a few observers who compare the present process of deep and rapid change with the transition from the agricultural to the industrial society.

Both, theory and history suggest that the progression towards a new economic and social paradigm is always marked by a broad pallet of unprecedented opportunities and chances, but also by many new uncertainties and risks. Yet, past experience also indicates that it

appears important in such a context, *first* to accept the challenge of change, *second* to shape the circumstances of the future wherever possible and desirable, and *third*, where the latter cannot be achieved, to adapt flexibly to the new economic, social and technological environment.

For individuals this implies the need to develop and cultivate their adaptive capacity, to engage in life-long learning, to expand their experience and horizon, and in particular to prepare themselves, and especially their children, for a world where a (if not the) major continuity is permanent rapid change of their working and living environment. Those who are able to adjust to the new circumstances and grasp the new opportunities will be the winners; those who either refuse to adjust or are not able to do so, will end up as the losers.

The challenge for companies is to subject their traditional business model to close scrutiny as the successful strategy of the past may not be anymore a promising avenue for the future. Companies have to permanently evaluate their strengths and weaknesses in face of increasingly global markets with global supply chains, global delivery channels and global competition. They have continually to initiate new ventures and re-structure those existing,—both with the aim of maintaining their competitive edge and moving up the value chain.

Labour unions, too, have a particular hard time to determine their role in the new economic and social environment. Many of them (perhaps with the notable exception of those in Sweden) have still not understood that under present-day circumstances one cannot have dynamic economic growth, high employment and rising incomes and at the same time be opposed to structural change both at sector and company level. If unions really wanted to support all workers and not

only those who are still in a job, they would heavily engage in education and training and help people more generally to remain employable and find a new post.

Most complex are the demands on governments. Apart from balancing the short-term and the longer-term requirements, they have to follow two basic, but sometimes difficult to reconcile orientations: on the one hand, the active pursuit of economic and social policies, at domestic and international level, which positively spur the mutual interaction of technological, economic and social change; on the other, a design of policies which ensures that the benefits of the future technological, economic and social dynamism are fully reaped and shared and the associated costs and risks are controlled and contained.

A necessary prerequisite to respond positively to the challenges of 21st century transitions is appropriate analysis both of the present and of the future. In a period of a fundamental transformation of our economies and societies, already the analysis of the present poses major problems. Not only that available statistics and their underlying classifications and concepts may be out-dated, even the notions on which our thinking, analysis and judgements are based, may be old-world.

With respect to the future, the depth and speed of change, the increasing interdependence and complexity, the inapplicability of traditional, frequently linear approaches and, as a consequence, a growing range of seemingly intractable problems,—all contribute to increasing uncertainty and to the feeling that the future is essentially threatening. As a result, many individuals see no bridge across the void; many companies, in particular in traditional businesses, try to seek shelter behind protectionist measures; many unions fight the war of yesterday; and many governments, especially in advanced countries, content themselves with muddling through instead of facing the challenges and making every effort to cope with them.

No doubt, it was always impossible to forecast the future. But in the light of 21st century transformations there is not uncertainty all over. One can still seek to identify certain fundamental trends in economic and social developments, analyse the driving forces behind them and speculate about trend-breaks and new trends. Also this—and even if integrated in a thorough scenario approach—will never fully protect against the unexpected, but it may help to uncover developments which are not sustainable as well as potential new opportunities and risks. And in particular, if governments would act accordingly, they may in fact contribute to generate the enabling conditions necessary for most of the private actors—individuals, companies and even labour unions—to capitalise on change.

Major Driving Forces Shaping 21st Century Transitions

In a global perspective, key determinants of the economic and social evolution of the foreseeable future would include: Demographic developments; continuous urbanisation; increasing competition for raw materials, in particular energy; the evolution towards a multi-polar world economy; the on-going globalisation of production and distribution structures; the transitions to a knowledge-intensive economy and society; an accelerated trend to globally interconnected networks; an increasing awareness of the need for sustainable development; and a continued and recently much intensified uncertainty about the future political and economic world order with persistent tensions between multilateralism and unilateralism, between liberalism and protectionism, and between political, cultural and religious pluralism and dogmatic intolerance.

It took about 10,000 years for the world's population to grow from 5 million to 1 billion by the year 1800, another 100 years to double to 2 billion and less than century since then to triple to 6 billion. Even if decelerating somewhat since the early 1970's, world population is still growing at

a rate of 1.2% and, according to the medium variant of the most recent UN projection, expected to reach nearly 9 billion in 2050. Regional differences continue to be considerable. The annual growth rate in the developing countries is still about 1.5%, compared to only 0.25% in the more developed countries. This difference, although slightly diminishing, will by and large persist for the foreseeable future.

As a result, the prospect is for accelerating ageing of populations in nearly all OECD countries. Should birth rates and/or immigration not increase dramatically, the financial viability of traditional healthcare and pension systems in industrialised countries will be seriously threatened. With the exception of China, there will befast growing young populations in most of the developing world,—resulting in more than 85% of the world population living there by 2050. Unless economic growth and job creation, and more generally living standards, rise significantly in the developing countries, substantial migration pressures will built up,—both from the South to the North and within the South. The consequences of such a development could be dramatic, not only in an economic and social perspective, but also in human terms.

Closely related to demographic developments is the trend towards urbanisation. After reaching 2.9 billion or 47% of the world population in 2000, the world's urban population is expected to rise to 5 billion or 60% of world population in 2030. Bearing in mind that urban dwellers count already today for more than 75% of the population of the more developed countries and that this rate will still further increase to above 80%, one could conclude that this evolution does not pose any problems. It is important to note, however, that this means that almost all the increase in the population in the developing countries will be absorbed by urban localities.

According to a recent UN report, there is all prospect therefore that the locus of poverty is moving from the country side to the cities,—with an increase of the number of urban slum dwellers from nearly one billion people today to about two billion in 2030. There can hardly be any doubt that such an evolution, if not accompanied and cushioned by major housing and infrastructure investments, could result in a dangerous hotbed for the development and spread of infectious diseases as well as for crime and terrorism.

The long-term availability of natural resources is another issue area which has attracted widespread attention over the past few decades. It is important to note, however, that apart from the problem of climate change, all prophesy of gloom was unjustified so far. Even if the exploration of specific raw materials came up against certain limits at local or regional level, it was always possible either to find new sources elsewhere or to overcome any specific scarcity through economic or technological substitution processes. The question is therefore whether this will also hold for the future. The longer-term availability of fossil fuels is a particular worry in this context.

Despite all efforts to promote alternative energies, it is expected that coal, oil and gas will remain the main energy source for another 25 years and that fossil fuels will have to provide for more than 80% of the increase in energy demand over this period. But still the pressing issue is at all probability not physical scarcity in terms of available resources and reserves. The real problems are related to political instabilities in main oil producing countries, to potential terror attacks and strikes, to insufficient investment and lacking capacity reserves on the supply side as well as to increasing bottlenecks in coal, oil and gas transport. That there is an urgent need to reduce CO2-emmissions is a different question.

Despite the emergence of a number of highly successful, newly industrialising countries—Korea, Taiwan, Singapore, Malaysia and Thailand in Asia and Mexico and Chile in Latin America—the United States, the European Union and Japan are still the world's leading economic centres. Combined, they still represent nearly 75% of world GDP. Nevertheless, several new economic powers can already be clearly discerned at the horizon. In terms of purchasing power parities,

China's and also India's national product already exceed that of France, the United Kingdom and Italy.

Regarding the size of Gross National Product, the United States, too, are expected to be overtaken by China within the next few decades,—first on the basis of purchasing power parities, and subsequently in terms of US$ as well. As regards longer-term prospects of India, some experts predict that it might be the fourth largest national economy by the mid-2020. Issues of world governance could be of increasing relevance in this context. Not only that China may not give in to American hegemony on the world political scene, together with India, Brazil and some others it may seriously question Western leadership, in particular with regard to rule-making and rule-enforcement, in the international economic system.

The internationalisation of economic activities through trade, investment and technology transfers has a long history. What is new in the evolution since the Second World War is the way the globalisation process has accelerated, widened and deepened. There is no doubt that growing international economic exchanges are overwhelmingly beneficial; however, the resulting growing international economic interdependence increases the risks for the world economy, too. Shock waves of regional or even local origin can rapidly ramble around the globe; the potential for volatility in financial markets is amplified; national authorities are increasingly unable to deal with major macro-economic problems,—and all this at a time when international governance, in particular on the basis of international co-operation, is weakening.

It is also obvious that the globalisation of production and distribution structures results in keener competition and accelerated structural change. This applies not only to the markets for goods and services, but also for those of capital and labour. As a result labour costs (including non-wage costs) that are out of line with overall productivity levels can undermine the competitiveness of a location (or even a country) as much as bad infrastructure or too high overall tax and regulatory burdens. Governments (and labour unions) who do not recognise this, who do not heavily invest in education and enable the people to upgrade their skills, who do not encourage structural change and innovation, will be faced with the risk of either growing inequality and fragmentation of society or of general economic and social decline or in the longer-term even the risk of both.

The relationship between discovery and technology, and economy and society is not unilateral, but inherently two-way and complex. Not only does the application of new knowledge and related technological progress result in the continuous change of economic and social structures, but changes in these very structures, including the evolution of attitudes and values, have at the same time a major impact on the direction and speed of technology development and innovation. Looking at technology developments at the turn of the 21st century, a broad range of new technical break-throughs seems once again in reach.

However, only a few of these technologies appear to be so pervasive and potent to provide mankind with new basic enabling capacities that they may have a major impact on the paradigm of economy and society: information technologies in the short-term and bio-technology and perhaps new energy technologies in the longer-term are the main candidates. Although the general evolution is by no means a surprise, the exposure to the full potential of these radically innovative technologies could still put enormous strain to people's ability to tolerate the new and the unknown and pose unusual strong challenges to the existing cultural and ethical standards. Notwithstanding all the benefits expected from these new technologies, societal polarisation is a real prospect also in this context.

The transition to a knowledge-intensive economy and society also implies a major dematerialisation of value-added activity and the replacement of the uniformity of mass production, mass consumption and mass government with creative diversity and decentralisation of responsibility.

Many of the traditional vertical command and control structures will be substituted for by new horizontal relationships. To the extent that knowledge is becoming the predominant input, output and structuring feature of the economy and society, many of these new relationships will be geared to the provision and the exchange of information and intangible high value-added services. The nerve centre of this evolution are digital networks and in particular "the network of the networks".

Although the development of the Internet is anticipated to continue at rapid pace, this does not mean that it is ensured that the vast majority of the world population will participate in this evolution. Access to the world telecommunication infrastructure is extremely uneven,—both between countries and between urban and rural areas. There are nearly 500 main telephone lines per 1000 people in the advanced countries and less than 100 in the developing world. Moreover, a significant proportion of the population in particular in developing countries is still illiterate. A major problem is therefore the prospect of a persistent digital divide, both at domestic and at international level.

The most disquieting issue in the global context is climate change. Not only has the global mean temperature risen significantly over the last hundred years; its rise was faster and lasted longer than at any period over the past ten thousand years. Apart from temperature measurements, there are many other indicators which confirm the trend, including a rise in the sea level, increased precipitation as well as decreased sea ice and snow cover. Although projections vary significantly by regions, overall weather conditions are expected to become more unstable with extreme rain and flooding in certain areas and severe droughts in others. Major impacts are foreseen in agriculture, in water supply and quality, with regard to human settlements and human health, and with respect to biodiversity. Overall studies indicate that some of the most adverse effects are bound to occur in a number of developing countries which are the most vulnerable and least able to adapt to climate change.

There is no doubt that throughout history mankind has adapted to climate variability, weather instability and the depletion of certain natural resources. Compared to earlier times the present situation is nevertheless in several respects different. Today science is providing a basic understanding of climatic and environmental processes and based on this, on high incomes in major parts of the world and on present-day technological capabilities, mankind would be able to take counterbalancing action,—at least for the man-made part of the process. Yet, again here as in other areas where important global issues need to be addressed, existing world governance structures, primarily based on national governments pursuing domestic interests, are basically inadequate and therefore inefficient.

There are four points which need to be emphasised at this point: *First*, the list of fundamental long-term trends presented so far, is by no way exhaustive. There are quite a number of other important evolutions on the horizon, in particular if one includes the geopolitical and military realms. *Second*, it is important to note that all the mega-trends discussed in this paper do not only bring about risks and threats, but also a whole range of new opportunities and chances. *Third*, the analysis shows clearly that the real issues of the future are not any physical scarcities or natural threats, but primarily problems of an economic, social or political nature. Above all, it seems that it is not generally insufficient awareness of the challenges associated with 21st century transitions, but inadequate governance structures, both at domestic and international level, which are at the root of present major difficulties and problems.

Fourth and finally, the mega-trends having been dealt with above are not at all independent of each other. Population growth, economic development, the distribution of income and wealth, the international system for trade and investment, and the environment interact in many complex ways. The same is true of the globalisation of economic activities, the evolution of modern

technologies, the transformation from the industrial to the knowledge-intensive economy and society, and a global economy driven by globally networked dynamic clusters representing the hotspots of innovation and economic and technological progress in the world of tomorrow. As these complex interactions have the potential of amplifying or neutralising the impact of any of the specific developments, it is obvious that only broad-based holistic approaches which combine quantitative and qualitative analysis can provide a basis for coherent and effective policies.

21st Century Transitions: Policy Challenges for Advanced Countries

Taking into account the global picture regarding economic and social developments of tomorrow is a first requirement governments have to meet when they attempt to assess the appropriateness of their policies in the light of 21*st* century transitions. The second is to consider relevant domestic trends and their interaction with the outside world. Looking at advanced industrial countries, 21*st* century transitions point to several sets of specific, interrelated issue areas and associated policy challenges: *first*, the economic and social implications of population ageing; *second*, the educationalrequirements of the knowledge-intensive society; *third*, a significant potential for innovative applications of new technologies;*fourth*, the consequences of increasinglydeeper economic integration and growing international interdependence; *fifth*, a trendtowards greater diversity; and *sixth*, the on-going dispersion of power and responsibility.

Increased life expectancy due to improvements in living standards, healthcare and nutrition and low fertility rates will result *ceteris paribus* in a stagnant or even shrinking workforce and extremely high dependency ratios. Maintaining the present retirement age and the status quo with regard to healthcare and pension entitlements would in many advanced OECD countries lead to such pressures on taxpayers and/or government expenditure that there is a real risk of compromising future growth prospects and the material living standards of future generations. Although they would certainly not be sufficient to solve the problem, increased immigration and in particular high macro-economic productivity gains through creative investment and innovation could make a major contribution to alleviate the burden. For the rest the option is a combination between higher premiums, a later retirement age and a reduction of benefits.

Economic activity was always based on four production factors: land, capital, knowledge and people. In the agricultural society, the emphasis was on land and people. In the industrial society of the 20*th* century, the most essential inputs were capital and people. In tomorrow's economy and society, the critical factors for wealth creation will be knowledge and people,—knowledge embodied in investment goods and processes as well as in the educational level of the workforce. At the same time it appears that not only product life cycles, but also the half-life time of educational achievements, in particular of professional know-how, are increasingly shortening. The importance of the adaptation of the educational system to effectively underpin the application and diffusion of new technologies can therefore hardly be underestimated. Curricula modernisation and life-long learning are central elements of any effective policy response.

A wide range of new technological break-throughs appears again in reach. Further rapid progress is expected in information technology, new materials, genetics technology, nanotechnology, environment protection and energy technologies to name just a few,—and of course in many combinations of them. However, whether the potential will be translated into reality and to what extent individual countries will participate and benefit from this development, will largely depend on people's acceptance of the challenges of change and on the active pursuit of policies that foster

the mutually re-enforcing interaction of technological, economic and social change. This is clearly underpinned by the economic performance patterns of the 1990's where a few industrialised countries, due to successful innovation and associated increasing rates of return, were able to maintain higher rates of economic growth than even most of the developing world.

Greater openness with respect to trade, investment and technology transfers leads to intensified competition on domestic and international markets and results in growing pressure for structural change. Defensive policies which favour established old enterprises and industries at the expense of innovative new ventures are a questionable policy response. Delayed adjustment is generally the most expensive option. Apart from the direct costs, it rigidifies economy and society, and frequently undermines the enabling conditions for innovation and creative investment elsewhere. Even if jobs not created have no voting power, in the longer run governments have only the choice between a virtuous circle of structural flexibility and dynamic macro-economic stability or a vicious circle of rigidity and macro-economic instability or at best under-performance in terms of lasting slow economic growth and high unemployment.

The industrial society has been in many respects a complex incarnation of the technologies of the 20th century. It was not only characterised by mass production and mass consumption, but also by mass government. Even if it is impossible to describe the society of tomorrow in any detail, there are many indications that the underlying patterns of production and consumption are undergoing a process of profound change. Market openness, shorter product cycles and increased possibilities for customisation provide consumers today with a multitude of choices of products and services (including leisure and culture) that would have been unimaginable even only some thirty years ago. There is no reason to believe that this process of increasing diversification will not continue in the longer-term future. In the contrary, growing heterogeneity of social structures associated with demographic developments, changing income distribution, migration and the erosion of traditional cultural reference points, could further support this evolution.

Important changes are underway in governance structures, both in the private and public sectors. The old forms of governance inherited from the industrial society and characterised by permanent and fixed allocation of power and hierarchical command and control structures, are becoming increasingly inefficient. Many observers are convinced that economy and society are moving towards new forms of governance which can be found already today in highly supple organisations that are capable of regularly redistributing responsibility according to the nature of the task. The emphasis is shifting towards horizontal networks and co-operative teams, providing ample room for creativity, innovation and participation in decision making. It is important to note, however, that a successful transition to such organisational and creative liberty has a number of critical preconditions. One is to ensure that the people have the capacity needed to cope with their new responsibilities. Another is that there are frameworks in place that render active participation in making and implementing the decisions possible.

Responding positively to the challenges of 21st century transitions is not an easy task. Key for reaping the benefits are the continuous adjustment of economy and society to a rapidly changing economic, social and technological environment as well as creative investment and technological, organisational and institutional innovation. Yet, 21st century transitions do not only provide new opportunities, they are also associated with risks and costs.

Both structural change and innovation does not only make old investment obsolete, it also induces workforce adjustment, and in particular the social costs involved in the latter may be very high. Another concern frequently expressed, is that radically new products and tools represent too great a threat to cherished norms and traditions. Furthermore, there are wide-spread fears that the introduction of new technologies will exacerbate the schisms between the haves and the have-nots, the well-educated and the others, the risk-takers and the risk-avoiders. At least in

some of these cases governments may have to choose between either to delay structural change and innovation or to compensate losers. There is little doubt that the latter solution is in many instances both less harmful and less costly in the longer run.

Finally, there is also the—in a sense—the opposite concern that the benefits of 21st century transitions, in particular those of the possible technological advances, will not materialise because the economic and social changes that diffuse new technological developments and innovation do not occur. This latter worry highlights the fact that the relationship between technological progress on the one hand and economy and society on the other is not unilateral, but highly interactive. Technological break-throughs and profound organisational innovations will hardly occur on a broad front if there is no match between the prevailing political and social patterns and the respective institutional and other requirements for the full exploitation of the vantage points of new innovative approaches.

All this proves the interconnectedness of the issues facing policy makers when they struggle with the responses to the challenges of 21st century transitions. Yet, just the assertion of an increasing interdependence and complexity of the problems, even if this prospect is real, does not help them when they have to take decisions on concrete policy design. What is needed, apart from a better understanding of future trends, is an issue-oriented approach across all relevant major policy areas.

Policy Assessment in the Light of 21st Century Transitions

The transition from the agricultural to the industrial society provides the most pertinent illustration of the profound implications which the full diffusion of new technologies can have not only on the patterns of economic activity and work relations, but also on economic and political power configurations, settlement patterns, family structures, and even social behaviour patterns and value systems. 21st century transitions will again pose unusual strong challenges to people's ability to grasp the new opportunities, to adapt to a rapidly changing economic and social environment and to tolerate the foreign and the unknown. Nonetheless, there is hardly any possibility to opt out of this process, and if there were, in the light of the promises of the future, it would perhaps not even be desirable.

The real issue is therefore to design policies, which would ensure that the benefits of the future technological, economic and social dynamism are fully reaped and shared and the associated costs and potential risks are controlled and contained. At the most general level, the challenge is that individuals, businesses, labour unions and governments will need to embrace a culture of creativity and experimentation. At the micro-level, this requires efforts to encourage individual and organisational capacity to introduce innovation and change. At the macro-level, there is a need for an overall societal climate that nurtures the values and customs which can sustain continuous discovery and structural adaptation. Clearly, policy has to be designed to support the forces of change and not those, which tend to preserve the past at the expense of the future.

What this signifies in concrete terms can be illustrated by distinguishing: *first* those policy areas and measures where the traditional and present thrust should be maintained or even strengthened; *second*, those areas of policy where in the light of 21st century transitions significant and partly fundamental reforms are needed; and *third*, those where the basic frameworks are not yet in place so that the requirement is imaginative policy innovation. As 21st century transitions are a phenomenon that encompasses nearly all aspects of economic and social life, this procedure would need to be adopted in a fairly systematic way to almost all areas of policy. What follows, may serve as a selective illustration.

To begin with, it appears that the traditional orientation of macro-economic policies is to be sustained and that the familiar thrust of structural adjustment policies must even be strengthened in many countries. A stable macro-economic framework, based on government policies that aim at low inflation and solid public sector finances, play a key role for reducing volatility and providing a general economic climate which is conducive to creative investment, innovation, experimentation, risk-taking and entrepreneurship. Competitive goods and service markets, open and transparent capital markets and more flexible labour markets are all essential for the smooth adaptation of economic structures to changing patterns of demand and supply and for the effective and as much as possible frictionless re-allocation of resources to new economic activities with increasingly higher value-added. Also a continuation of the shift in the government's role from a direct provider of often uniform products and services towards a regulator of a more diversified, decentralised and market-driven provision will enhance general economic flexibility and open up many new opportunities for innovative activities.

Major reform efforts are needed in most OECD countries in the fields of education, R&D support and social policies. In order to further adapt the learning capacity of society, support change and prevent social exclusion, the basic objectives of education policies remain by and large the same; but marginal improvements, based on traditional mass era approaches will hardly be sufficient to cope with the exigencies of 21st century transitions. Continuous advances in technology, the spread of new innovative models of work organisation together with the shortening of the half-life time of educational achievements and the necessary leap to life-long learning will demand imaginative new ways of organising education and validating people's knowledge. This is a reality for all OECD countries and makes new approaches to education a high priority issue everywhere.

The old ways of government R&D support, in particular with their bias towards large technology-intensive systems, are becoming increasingly ineffective in enhancing the competitiveness of the domestic business sector. Not only that 21st century transitions are very much associated with the development and application of new horizontal technologies; in a world with growing differentiation and sophistication in consumer and business demand, including in knowledge-intensive services, government support for innovation must be fairly broad-based. As the range of new knowledge and innovative technologies has enormously expanded and grown in complexity, companies and even countries, perhaps with the exception of the United States, cannot anymore cover all relevant disciplines and techniques. It is important therefore that governments in the context of their R&D support do not impede domestic companies to seek co-operation with foreign firms and research establishments. In the contrary, they should encourage this, even if this means that some of the results of national R&D support leak out.

Major and imaginative reforms are needed to make sure that unemployment insurance, healthcare and pension systems are adapted in ways that correspond to the needs of tomorrow's rapidly changing and more diverse society. Many of the old ways of risk sharing and social solidarity which were largely adequate for the industrial society tend to stifle the much higher levels of adaptability, creativity and diversity that are essential to fuel the knowledge-intensive economy and society. Policy reform is underway in many countries, but the scope is frequently narrow, progress is slow and most importantly, they are driven primarily by financial considerations in the light of ageing populations and other pressing problems of today. What is equally important, are innovative approaches which adjust the social support systems to the new requirements of the economy and society of the 21st century.

Finally there are several domains where even fundamental reform would not solve the problem, but where genuinely new ground will have to be broken. One such area is development policy, including all aspects of the political, economic and social relationships between industrialised

and developing countries. Protectionist agricultural policies of OECD countries represent just one element in this context. Another important issue is the development of global policy frameworks for the Internet and for electronic commerce. The latter demand includes global solutions to such issues as consumer protection, safeguarding privacy, verifying identity, and ensuring competitive market conditions.

New international rules will also have to be designed in relation to biotechnology developments. International agreements on certification procedures for and trade in genetically modified organisms as well as standards for food safety may turn out to be particularly difficult to negotiate and implement. There is no doubt, however, that innovation, economic growth and global wealth creation will suffer if the spread and the world-wide application of the most promising areas of new technologies such as biotechnology are impeded by extremely high protectionist barriers due to the lack of appropriate international frameworks.

Last, but not the least, major breakthroughs will be needed in managing genuinely global issues such as the well-functioning of international capital markets or dealing with the potential implications of climatic change. In particular in the latter case, recent experiences at international negotiations, such as in Rio de Janeiro and Kyoto, have clearly shown that the rigorous pursuit narrow and short-term national interests will hardly result in satisfactory solutions and agreements. Indeed, global governance has become an increasingly complex matter and involves, among other things, the bridging of frequently deep divides in terms of the initial evaluation of the issues at stake, the interpretation of objectives and, most importantly, the acceptable degree of limitations to the exercise of national sovereignty. Even more important than at national level are differences in the stage of economic development, differences in culture and attitudes of people, and differences in ethical and moral values.

Concluding Remarks

The world of the 21st century will have to be founded on concepts, approaches and institutions which insure sustainable development in its political, economic, social and environmental dimensions while at the same time allowing for and building on increasing diversity of the planet Earth, and there is indeed no doubt that this implies a daunting agenda. However, it needs to be emphasised that, as presented, the propositions in this paper are just intended to provide signposts. They are in no way comprehensive, complete in the areas referred to or sufficiently detailed. Yet, the issues of comprehensiveness and further concretisation of the programmes or problems may, in fact, not represent the greatest challenge for economic and social policies at the beginning of the 3rd millennium.

European governments have been alerted since twenty years that in the light of ageing populations they had to reform their healthcare and pension systems. But they did not act until catastrophic deficits made the situation definitely unsustainable. The Japanese government has been warned since very long, too, that structural adjustment and a more flexible economy and society were the requirements for sustained economic growth at the turn of the century. Nothing happened before their economy suffered the most severe stagnation since the Second World War. The United States should have learnt from the first oil crisis in the early 1970's that their energy policy renders them increasingly import-dependent and, as a consequence, vulnerable to external economic and political developments impacting on the world oil market. Still they have not introduced vigorous measures, such as European level fuel taxes, which provide incentives to reduce oil consumption.

Apart from controversy about details, it seems that in all these cases certain asymmetries of benefits and costs, both actual and perceived, significantly contribute to generate and reinforce political opposition against and major delays in necessary reform initiatives. Three reasons play a major role in this context: First, in many instances, the political, economic and social costs of structural adjustment programmes show up immediately, whereas the benefits come later. Second, the costs of many reform projects are frequently clearly identifiable and visible, whereas the benefits may be thinly spread all over the economy and society or in the public not even be associated with the policy implemented. Last but not the least, the potential losers of the process of change are normally strongly motivated and capable to organise resistance, whereas the winners are more than often not.

Consequently, what is needed under such circumstances to effectively implement policies towards dynamic and sustainable economic growth and wealth creation is a broad-based alliance for change: A movement, going across party lines and including civil society at large; a movement that gives voice to the opportunities of tomorrow; a movement that advocates the longer-term benefits and not primarily the short-term costs; a movement which embraces a culture of creativity, experimentation and continuous discovery; a movement which supports economic and social policies which positively spur the mutual interaction between political, economic, social and technological change.

As was the case at the time of the transition from the by-and-large local or regional agricultural society to a national industrial one, so is the early phase of the transformation process towards a global knowledge-intensive economy and society characterised by a number of fundamentally new developments, which call into question many of the traditionally social, cultural and even ethical norms. To respond to this challenge, to create a climate of tolerance allowing experimentation with new ideas and lifestyles, to provide the necessary scope for the forces of change and at the same time to balance the new and the old values, and through this insuring broadly shared wealth creation and sustainable development in all its dimension- this is the real challenge for policy and society at the dawn of the 21st century.

PAWEŁ OPALA
KRZYSZTOF RYBIŃSKI

GORDIAN KNOTS OF THE 21ST CENTURY

Paper presented on the occasion of the 20th anniversary
of the Polish Association of the Club of Rome*.
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Abstract

In this paper we identify four Gordian knots of the global economy in the 21st century, that is 1) limits to growth: scarce energy and natural disasters, 2) aging of the developed world and the 21st century as the age of migration, 3) the rise of China and the failure of democracy, and 4) rising significance of global financial markets and emergence of new global players.

We describe what policies are adopted at international and European level to deal with these Gordian knots and assess, when it can be done, what are the strengths and flaws of these polices. Finally we suggest "outside-the-box" Alexandrian solutions to some of these problems.

We argue that while the natural resources constitute limits to growth in the medium run, the humanity's ability to develop disruptive innovations will challenge those limits in the long run. We therefore call on the Club of Rome to broaden its discussion as what appeared as the main Gordian knot of the 21st century some 30 years ago should now be seen in a broader context. Europe has immense challenges and opportunities lying ahead. It is high time that the Club of Rome warns politicians which so diligently take Europe towards the dead end called global marginalization. Lack of strategic vision, national patriotism, protectionism, inability to see developing countries as legitimate global players. All these strategic weaknesses will strike back and will lead to weak Europe, unable to play an important global role in the 21st century. It is not to late to avoid this gloomy scenario.

1. What we mean by Gordian knots?

A Gordian knot is a metaphor for an intractable problem, that can be solved by a bold stroke. It is associated with the following legend:

"According to a Phrygian tradition, an oracle at Telmissus, the ancient capital of Phrygia, decreed to the Phrygians, who found themselves temporarily without a legitimate king, that the next man to enter the city driving an ox-cart should become their king. Midas, a poor peasant, happened to drive into town with his father Gordias and his mother, riding on his father's ox-cart. Before Midas' birth, an eagle had once landed on that ox-cart, and this was explained

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as a sign from the gods. Midas was declared a king by the priests. In gratitude, he dedicated his father's ox-cart to the Phrygian god Sabazios, whom the Greeks identified with Zeus, and either tied it to a post or tied its shaft with an intricate knot of cornel (Cornus mas) bark. It was further prophesied by an oracle that the one to untie the knot would become the king of Asia (today's Asia Minor).

The ox-cart, often depicted as a chariot, was an emblem of power and constant military readiness. It still stood in the palace of the former kings of Phrygia at Gordium in the fourth century BC when Alexander arrived, at which point Phrygia had been reduced to a satrapy, or province, of the Persian Empire.

In 333 BC, wintering at Gordium, Alexander attempted to untie the knot. When he could find no end to the knot, to unbind it, he sliced it in half with a stroke of his sword, producing the required ends (the so-called "Alexandrian solution", taken by the Hellenic Army IV Army Corps as their motto). Plutarch disputes this, relating that according to Aristobulus, Alexander pulled the knot out of its pole pin rather than cutting it. Either way, Alexander did go on to conquer Asia, fulfilling the prophecy".

(Source: Wikipedia http://en.wikipedia.org/wiki/Gordian_Knot).

The goal of this paper is closely associated with the legend. We will make an attempt to identify Gordian knots of the global economy in the 21st century, wearing economist glasses. Then we will describe what policies are adopted at international and European level to deal with these Gordian knots and we will assess, when it can be done, what are the strengths and flaws of these polices. Finally we will suggest "outside-the-box" Alexandrian solutions to some of these problems.

For the purpose of this paper we adopt the following definitions:

A Gordian knot is a sequence of events that will likely take place in the future. The outcome of these events is very important for the future state of the global economy, but this outcome cannot be predicted with certainty basing on today's knowledge. Multiple outcomes are possible that might lead to very different distributions of global wealth, power and influence.

An Alexandrian solution to a Gordian knot problem is a set of actions, which may seem strange, or politically incorrect, but which significantly increase the odds of positive outcomes, i.e. future states of the global economy where Europe is a powerful global player and global innovation leader[1].

An Alexandrian solution is an outside-the-box strategic choice, which has three features as described in Kuklinski (2007):

- *primo*—it is a crucial choice opening a new path of development or at least a significant correction of the existing path of development,
- *secundo*—it is a long lasting choice establishing a new element in the process of long duration,
- *tertio*—it is a irreversible choice—or a choice which can be reversed only at very great material and sometimes also spiritual costs.

Before we proceed with Gordian knots identification problem, we note that a series of recent conferences, books and papers identified enormous challenges that Europe faces in the 21st century global knowledge economy: Kukliński (2007), Kukliński, Skuza (2003), Kukliński, Pawłowski (2005a), Kukliński, Pawłowski (2005b), Kukliński, Skuza (2006), Kukliński, Lusiński, Pawłowski (2006), Radzikowski, Rybiński (2007), Rybiński (2007b), Rybiński (2007c), Tausch (2007).

Today Europe is unable to deal with these challenges. Politicians are strategically-blind and instead of creating a strategic long-term vision for Europe they engage in myopic actions aimed

[1] See Radzikowski, Rybinski (2007) for explanation why ability to generate, transform and diffuse innovation is crucial for the future prosperity of Europe.

at increasing popularity ahead of next elections. Tausch (2007) refers to these short-term action plans as "destructive creation".

It is high time to replace "destructive creation" with a strategic vision for Europe. Ability of Europe to rise to this challenge will be tested by its reaction to most important global issues identified in this papers as Gordian knots.

2. Identifying Gordian knots

As presented in Kukliński (2007), predicting far-away future requires a certain set of skills. For example, when identifying various future scenarios one needs to take into account the following dilemmas:

1) long duration versus turning points
2) path dependency versus path creation
3) virtuous versus vicious circles
4) catching up versus lagging behind

For example the first dilemma calls for outside-the-box thinking. Most researches rely on trend extrapolation or mean-reversion techniques, while in many cases long-term trends have been abruptly changed by disruptive innovations (steam, steel, light-bulb, internal combustion engine, Wal-Mart business model, cell phone, the Internet, China WTO membership). This obviously indicates that the Gordian knots identification is researcher-specific, different researchers, coming from different backgrounds, would find different Gordian knots. However in what follows we define the big ticket items, that would show up on radar screens of most people pondering what might shape the future.

Basing on the knowledge pool available to us in the Fall of 2007 we postulate that the following sequences of events should be labeled Gordian knots. Below we justify our choice:

1. Limits to growth: scarce energy and natural disasters

Will scarce energy resources halt global growth? Will rising human ecological footprint associated with emerging markets industrialization and lack of improvement in developed world lead to accelerated global warming, and to even larger number of disasters? Will new disruptive innovations be born (19^{th} century of steam and coal, 20^{th} century of oil, and 21^{st} century of what)?

2. Aging of the developed world and the 21^{st} century as the age of migration

Huge threat to public finances, what policies are needed? Can European social model be kept, are we ready for massive immigration from Asia and Africa in Europe in the coming decades?

3. The rise of China, the failure of democracy

Will Chinafrica become the new axis of world power in the 21^{st} century? Why non-democratic countries such as Singapore, Hong Kong, Korea or Taiwan managed to achieve great economic prosperity while maintaining environmental and social integrity? Will the same success path (but on a much larger scale) be repeated by China, or will China follow the Japanese footsteps and fail?

4. Rising significance of global financial markets and emergence of new global players

The new global financial architecture will be developed in the 21^{st} century. The end of New York and London dominance in world financial markets, the rise of Shanghai/Shenzhen/Hong Kong as the world financial centre. Return of protectionism, triggered by rising assets of Sovereign Wealth Funds in non-democratic societies (China, Russia, Gulf oil exporters). Two scenarios

seem likely: "national patriotism and Europe financial marginalization" and "balanced East-West distribution of power". The coming years will determine which scenario will materialize. The Alexandrian solution is called for to increase the likelihood of the good outcome.

In what follows we describe the four Gordian Knots and their implications for the future. We also make an attempt to identify the possible Alexandrian solutions to deal with the four Gordian Knots.

2.1. Limits to growth: scarce energy and natural disasters

Since the groundbreaking book published by the Club of Rome in 1972 (Meadows et al., 1972) the perspective of a coming collapse of the global economy caused by excessive development has been at the heart of public debate. Many of the gloomy forecasts have not materialized so far, but they have rather moved away than disappeared. Two issues will be discussed in this chapter. First, what is the risk of energy resources depletion—is it really plausible taking into account estimates of available resources, but also alternative energy sources? What could be the economic consequences of shrinking common-used energy resources? And what should be done to take advantage of incoming changes? Second, what would be the environmental consequences of unsustainable growth—where are the limits to growth according to environmental measures and what should be done to lower human ecological footprint?

Depletion of common-used energy resources

What is the probability that common-used energy resources will be depleted during the 21st century? According to the World Energy Council, at the end of 2005 recoverable resources of coal reached 847.4 billion tonnes, of crude oil 159.6 billion tonnes and of natural gas 176.5 trillion cubic meters. In the same year, the world's consumption of coal amounted to 5.8 billion tonnes, 3.7 billion tonnes of crude oil and 2.8 trillion cubic meters of natural gas (World Energy Council, 2007). According to EIA estimates, world market energy consumption will increase by 57 percent from 2004 to 2030 (Energy Information Administration, 2007). With the simplifying assumption that this increase will be equally distributed into greater use of all kinds of resources it means that by 2030 we will have used up 23 percent of coal, 77 percent of oil and 52 percent of natural gas of recoverable resources known-today. Of course, those assessments should be adjusted if predictions about available amounts of recoverable resources are revised.

Table 1.

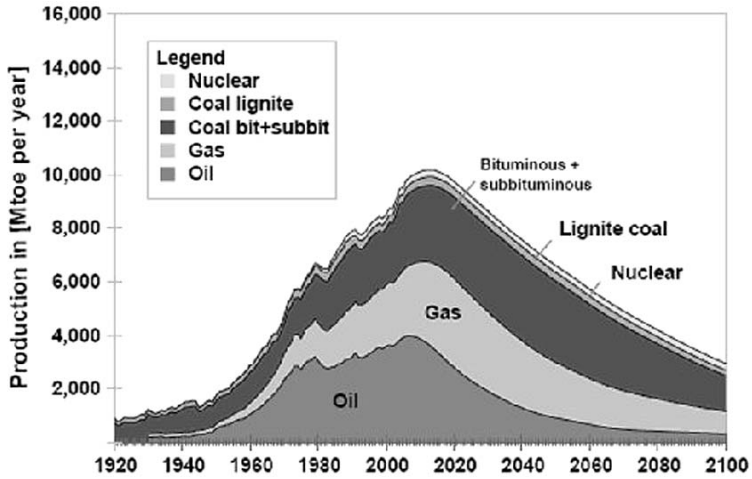
Amount of common energy resources and their consumption

	Recoverable Resources in 2005	World's Consumption in 2005	World's Consumption in 2005–2030*	Percent of recoverable resources use in 2005–2030**
Coal (billion tonnes)	847,4	5,8	193,6	23%
Crude oil (billion tonnes)	159,6	3,7	123,3	77%
Natural gas (trillion cubic meters)	176,5	2,8	92,2	52%

* with the assumption of equal distribution of rise in the usage of resources by the year 2030.
** recoverable resources as known in the 2005.

Source: World Energy Council, 2007, own calculations.

Zerta, Schmidt, Stiller and Landinger (2007) claim that the production of energy from oil will peak before 2010, nuclear energy before 2020, gas energy before 2025 and coal energy in the years 2030–2040. In cumulative terms, the peak of energy production from fossil fuels and nuclear power plants is forecasted for the years 2015–2020.



Source: Zerta, Schmidt, Stiller, Landinger (2007).

Fig. 1. Forecasts of fossil fuels production

A comparison of the foregoing estimations with those presented by the Club of Rome in 1972 reveals many differences. In fact, according to the 1972 estimations, all resources of coal and natural gas will already have been exhausted by 2030 (Meadows et al, 1972). In the report there are many other examples of forecasts that today seem to be incorrect. For example, in one of the scenarios it was claimed that until the year 2000 the world's society would have to deal with huge shortages of arable land. The revised version of the book published twenty years later postponed this moment by about 50 years (Meadows et al, 1992). According to the 1972 estimations, resources of gold should already be depleted at the moment of writing this article (which obviously is not the case), and resources of mercury and silver will be exhausted within the next seven years (which is unlikely) (Meadows et al, 1972).

The foregoing shows that the precision of available predictions is rather low. All forecasts' methodologies have some drawbacks. For instance, assumptions about exponential growth of variables may equally well lead to exponential overshoots. Nevertheless, the Club of Rome's report contains many important messages and implications which cannot be denied or ignored. Drawing conclusions from the report and own assessments allows to state that:

1. the quantities of common used fossil fuels are limited and sooner or later will be exhausted;
2. shrinking quantities of traditional energy resources will be reflected in their pricing;
3. rising price of energy will lead to growth of incentives to move to alternative energy sources;
4. new energy resources equilibrium will lead to a change in the distribution of global political power.

One can be sure that sooner or later stocks of energy resources used today will be depleted. And as the reserves shrink, the price of the unit of energy will rise. Higher prices of energy will have at least two consequences. First, after a certain level is reached, it will be profitable

to exploit these resources which are today considered as not recoverable. Second, the expected profitability of research and development in the field of alternative energy sources will rise, maybe even resulting in a huge technological leap (as it was in the case of coal-steam and oil eras in the 19^{th} and 20^{th} century).

Today we already know many possibilities of replacing traditional technologies of energy production. The most advanced works are done in the fields of:

- **Nuclear power** and development of fast breeder reactors, powered by the uranium-238, resources of which are estimated to be available for at least thousands of years;
- **Hydroelectricity** as an imporant local source of energy;
- **Solar power**—as MacDonald (2007) states, *"if outfitted with solar collectors, one percent of the land currently used for crops and pasture could supply the world's total energy consumption"*;
- **Wind power** which is already being developed in many places of the world due to the relatively low cost of wind powerplant construction and low cost of its maintainance;
- **Bioenergy** recieved from waste, at the same time reducing the problem of garbage storage;
- **Other,** less developed energy sources like fusion, geothermal, tidal or wave power, ocean thermal energy conversion, etc. (MacDonald, 2007).

There are many more technologies beside those mentioned above waiting to be discovered. And one should not exclude the possibility that it will happen within next 50 years. Just a quick reminder (following Wikipedia)—during the last fifty years we put a satellite (1957) and a man (1961) into space, landed on the moon (1969), constructed a laser (1960), invented a video tape recorder (1965), carried out the first heart transplantation operation (1967), introduced portable mobile phones (1983), personal computers (1980s), the Internet (1990s) and many more.

The last issue to be considered in the field of transition of energy sources is the problem of the best choice of new energy technologies from the social point of view. For example, all alternative energy sources presented above differ in terms of their influence on the environment. Nuclear power plants produce waste which must be stored, dams used in hydroelectricity have negative influence on water species and wind turbines produce noise and are dangerous to birds. So maybe an international agreement is needed to promote these ideas, which are the most sustainable rather than the most profitable. The world's leaders will have to create a vision of future energy supply guaranteeing sustainable development, that is development which balance the fulfillment of human needs all over the globe with the protection of natural environment so that these needs could be met not only in the present, but also in the indefinite future (Radzikowski, Rybiński, 2007, p. 3). Today's Europe does not have such a vision. As an example: on the one side, it tries to fulfill the Millennium Development Goals, one of which is to halve the world's poverty in 2015 as compared to the 1990 level (United Nations, 2006a p. 5). On the other hand, it promotes biofuels as an alternative source of energy. This has, however, added to the already high demand-supply imbalance for foodstuffs which can be used to produce biofuels and make at the same time an important part of the Third World's food supply. Consequently, we may end up in a scenario in which people in rich countries will pay less to drive, at the price of millions of lives lost amid rapidly rising food prices, as many families in the third world will not have enough resources to feed their members, children in particular. But this is not the end of the story. Spiegel online describes latest research led by the Nobel-price winning chemist Paul Crutzen which finds that biofuels emit even 70 percent more greenhouse gases than fossil fuels (Spiegel online, 2007). These examples are a very clear cases of "destructive creation"[2]. This term

[2] The term destructive creation was borrowed from Tausch (2007) who used this term with respect to the Lisbon agenda.

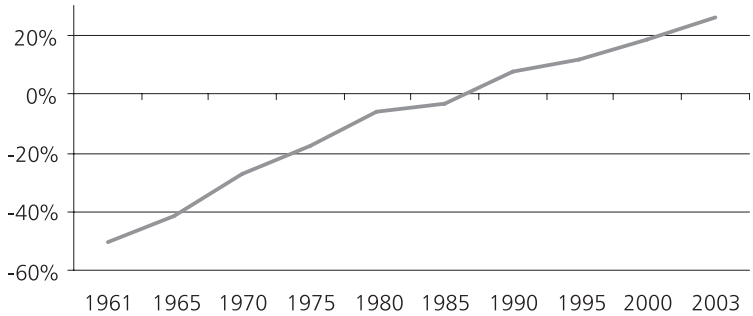
describes intense activity in formulating partial goals and policies, while at the same time there is no clear long-term vision, which would allow to formulate coherent goals and policies.

To conclude, changes are coming. And one of the most important issues is whether Europe will be able to take advantage of them. As the importance of fossil fuels falls, the distribution of political power in the world will change. The transition to the new sources of energy will benefit those prepared. Europe cannot afford to be unprepared.

Environmental effects of growth

As it was stated earlier, sustainable development may be defined as balancing the fulfillment of human needs with the protection of natural environment so that these needs can be met not only in the present, but also in the indefinite future. Most researchers agree that today the conditions of global sustainable development are not fulfilled. In this section environmental aspects of development will be discussed.

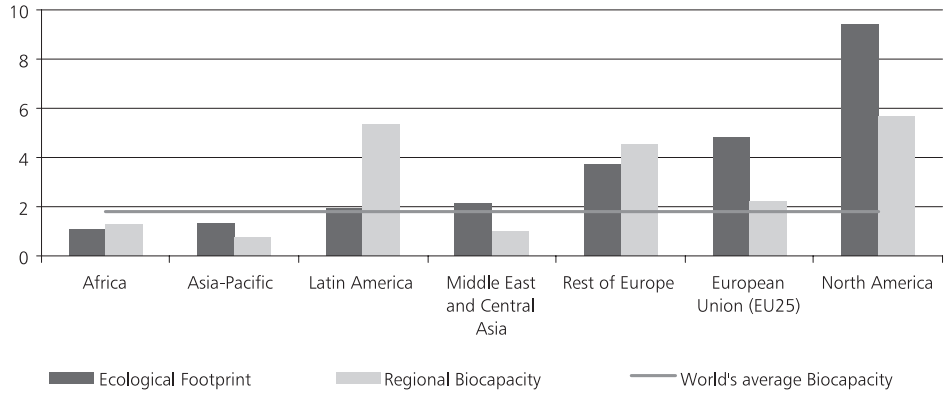
Human development affects the natural environment to such a great extent that it may prove unsustainable in the long-term. As research on the scale of human ecological footprint shows, we are already exceeding the Earth's biocapacity by about 26 percent, see figure 2 (Hails et al, 2006). And this excess is constantly increasing. Human ecological footprint measures how many hectares of a land and sea are required to satisfy needs and to absorb the waste produced by one person in a given country or region in a given year. It is expressed in units of "global hectares" per person, where global hectare *"is a hectare that is normalized to have the world average productivity of all biologically productive land and water in a given year"* (Kitzes et al. (2007)). It varies between countries and regions as the needs of people and the waste they produce differentiate. For example in 2003, 1.1 global hectares per person were required to satisfy needs of people living in Africa, 2.0 ha per person in Latin America, 4.8 ha per person in EU25 and 9.4 ha per person in the United States, see figure 3. Foregoing demand on land and water of every country or region can be set together with the area that is actually available for use and for waste absorption. This second measure is called biocapacity and is defined as a *"capacity of ecosystems to produce useful biological materials and to absorb waste materials generated by humans using current management schemes and extraction technologies"* (Kitzes et al. (2007)). It is expressed in units of "global hectares" too and varies between countries and regions as different quantities of land and water per person are available (areas which are considered as non-productive or productive but not used by humans are excluded from the biocapacity measure).



* Ecological Footprint Deficit is the difference between Human Ecological Footprint and Earth's biocapacity.
Source: 2006 National Footprint Accounts dataset.

Fig. 2. World's Ecological footprint deficit* in the years 1961–2003 (in %)

As it was explained, human ecological footprint is distributed differently between countries—while Africa and Asia-Pacific regions are today below the world's average biocapacity, the rest of the world exceeds it, North America being the leader. But because the Earth's biocapacity differentiate between regions too, in fact different levels of ecological footprint can be sustained in different regions. For example, although Asian footprint (1.3 ha per person) does not exceed the world's average biocapacity (1.8 ha per person), Asia still runs an ecological footprint deficit, as the biocapacity in Asia (0.7 ha per person) is lower than its footprint. The opposite situation can be observed in non-EU25 European countries, where relatively high level of ecological footprint (3.8 ha per person) is sustainable as regional biocapacity in this region is even larger (4.6 ha per person).



Source: 2006 National Footprint Accounts dataset.

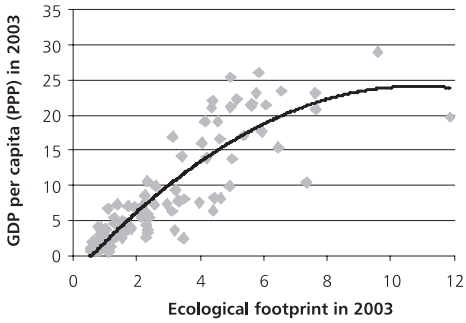
Fig. 3. Ecological footprint and biocapacity in 2003 (in ha per person)

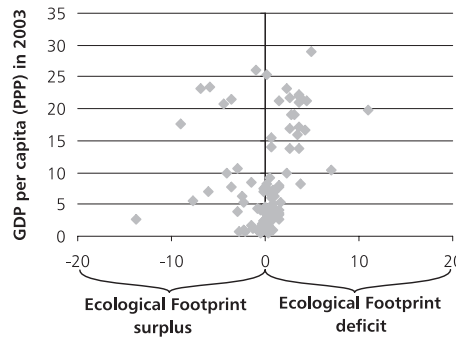
There is a general observation that countries with higher GDP per capita contribute to the world's human ecological footprint on a larger scale. But with higher GDP per capita the diversity of ecological footprint rises (for example, ecological footprint of the United Arab Emirates is 11.9 ha per person, while that of Austria, a country with similar GDP per capita in PPP, it accounts for 4.9 ha per person) suggesting that there is potential for its reduction in many countries. Another interesting observation is that there is no strong relation between GDP per capita and the ecological footprint balance, that is the difference between the country's footprint and biocapacity. But it seems that the probability of running an ecological deficit rises with increasing GDP per capita.

In 2003 the United Arab Emirates was the country with the highest human ecological footprint deficit (measured as a nominal difference between the ecological footprint and biocapacity). Kuwait took the second place and the United States the third. It is interesting to notice that four among ten countries with the highest ecological footprint deficits are members of the European Union (see table 2).

Another interesting measure of sustainable development is the Living Planet Index published by the WWF. It reflects trends in population of 695 terrestrial species, 274 marine species, and 344 freshwater species (Hails et al, 2006, p. 4). The index has fallen by about 30 percent since 1970, showing the scale of decreasing world biodiversity.

The foregoing measures show that we are already exceeding the Earth's capacity and contribute to environment degradation. Ozone depletion, global warming, the greenhouse effect, melting of ice caps and rising sea levels can already be observed and are already affecting our





Ecological footprint surplus: Situation when the country's biocapacity is higher than that country's footprint;
Ecological footprint deficit: Situation when the country's biocapacity is lower than that country's footprint.

Source: 2006 National Footprint Accounts dataset.

Fig. 4. Ecological footprint, ecological footprint balance (in ha per person) and GDP per capita (PPP) in 2003

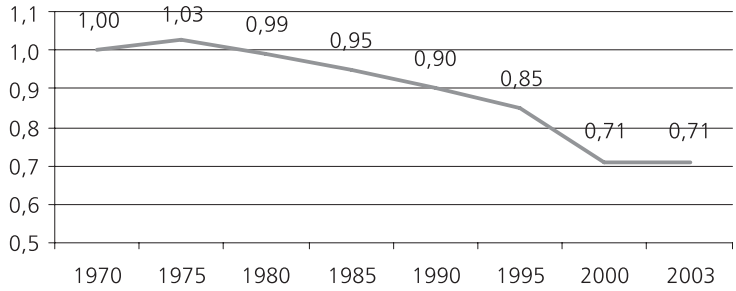
Table 2.

Top ten regional ecological footprint deficits in 2003 (in % and ha per person)

Rank	Country	Regional ecological footprint deficit	
		Percentage difference between footprint and biocapacity	Nominal difference between footprint and biocapacity
1.	United Arab Emirates	1 313%	11,0
2.	Kuwait	2 177%	7,0
3.	United States	102%	4,8
4.	Belgium	365%	4,4
5.	Israel	1 111%	4,2
6.	United Kingdom	245%	4,0
7.	Saudi Arabia	388%	3,7
8.	Spain	209%	3,6
9.	Japan	494%	3,6
10.	Netherlands	466%	3,6

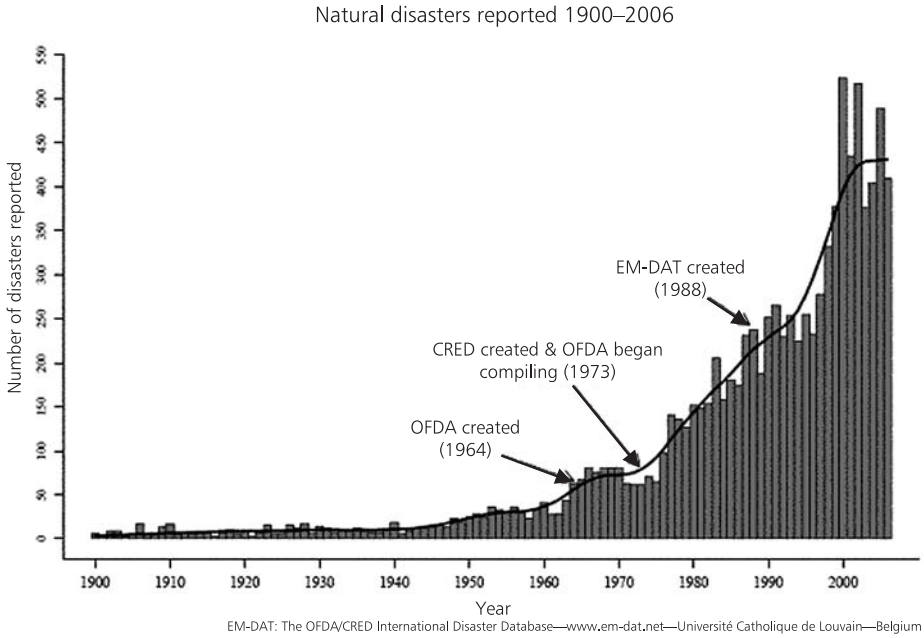
Source: 2006 National Footprint Accounts dataset.

lives. The number of natural disasters rises at an increasing pace. Although available disaster datasets are burdened by the fact of rising quality and universality of measurement, at least part of the increase in the number of disasters reported can be assigned to the changes in natural environment. Table 3 presents "top ten" countries most severely affected by natural disasters such as extreme temperatures, floods and wind storms from the beginning of 20*th* century. What is striking, in the case of each kind of disaster half of disasters have been recorded within the last ten years. According to Emergency Disasters Database, in the last two years alone 0.8 million people were affected by extreme temperatures in Argentina (May 2007), 105 million people by the



Source: Hails et al (2006).

Fig. 5. Living planet index in the years 1970–2003



* due to changes in the methodology, numbers after 2003 are not comparable with those before.
Source: EM-DAT (2007).

Fig. 6. Number of natural disasters reported 1990–2006*

flood in China (June 2007) and almost 30 million people by the wind storm in China (July 2006) (EM-DAT, 2007).

The consequences of further ecological unsustainability may be catastrophic, so corrective and preventive actions are needed. First, incoming changes in the field of energy production provide opportunity to significantly reduce pollution. It is necessary however to promote those technologies and ideas which guarantee achieving sustainable development, i.e. satisfy human needs under the condition of environmental protection. Second, more restrictive international agreements on pollution reduction must be adopted and implemented. One of "Alexandrian" ideas of achieving sustainability may be to trade human ecological footprint deficits and surpluses between countries, regions and enterprises. It could bring the market pricing mechanism to the environmental aspect

Table 3.

Top 10 Countries affected by natural disasters*

Country	Date	Total Affected**
Extreme Temperatures		
Australia	Feb-1993	3,000,500
Peru	**Jun-2004**	**2,137,467**
Peru	**7-Jul-2003**	**1,839,888**
Australia	Dec-1994	1,000,034
Liberia	1990	1,000,000
Argentina	**May-2007**	**884,572**
Russia	**Jan-1999**	**725,000**
Kazakhstan	**Nov-1997**	**600,000**
Australia	Nov-1995	500,100
Australia	Jan-1994	100,150
Floods		
China	**1-Jul-1998**	**238,973,000**
China	1-Jun-1991	210,232,227
China	30-Jun-1996	154,634,000
China	**23-Jun-2003**	**150,146,000**
India	8-Jul-1993	128,000,000
China	15-May-1995	114,470,249
China	**15-Jun-2007**	**105,000,000**
China	**23-Jun-1999**	**101,024,000**
China	14-Jul-1989	100,010,000
China	**8-Jun-2002**	**80,035,257**
Wind Storms		
China	**14-Mar-2002**	**100,000,000**
China	20-Apr-1989	30,007,500
China	**16-Jul-2006**	**29,622,000**
China	**1-Sep-2005**	**19,624,000**
Bangladesh	11-May-1965	15,600,000
Bangladesh	29-Apr-1991	15,438,849
China	8-Sep-1996	15,005,000
China	**1-Jul-2001**	**14,998,298**
India	12-Nov-1977	14,469,800
India	**28-Oct-1999**	**12,628,312**

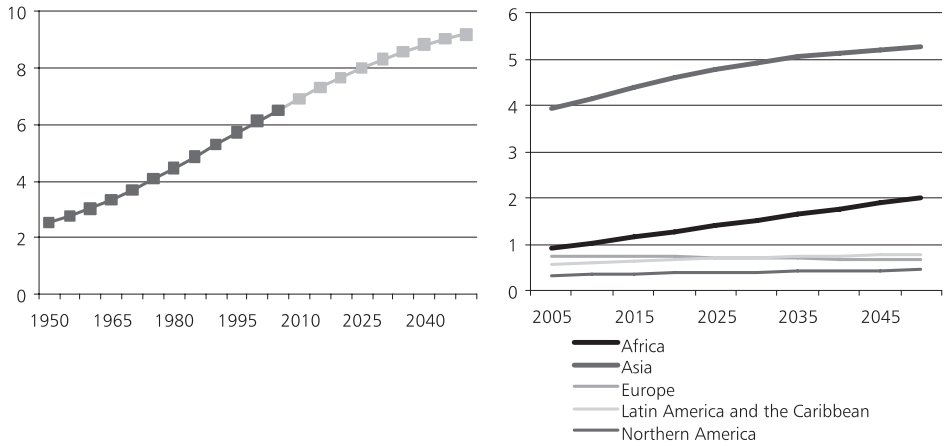
* Disasters which occurred within last 10 years are bolded.
** People requiring immediate assistance during a period of emergency.
Source: EM-DAT (2007).

of production and thus eliminate the problem of market failure in this area. In effect it would contribute to an increase in ecological efficiency of production.

2.2. Ageing of the developed world and the 21st century as the age of migration

We are living in a world of demographic changes. The improvement in living conditions and the build-up of knowledge in developed world led to increased life expectancy and significant reduction of fertility rates. This kind of transition is these days observed in some catching-up countries such as China and India while some other regions are still waiting for their turn. This chapter will consider how the world's demographic structure will be shaped in the 21*st* century, what the economic consequences of ageing will be, and what kind of policy can contribute to long term sustainability.

Today the world's population accounts for 6.5 billion people. According to United Nations (2006b) forecasts, it will reach 9.2 billion in 2050. Population in Europe will fall from 731 million in 2005 to 664 million in 2050. Population in Africa will increase from 922 million to about 2 billion, and in Asia from 3.9 to 5.3 billion in the same period.



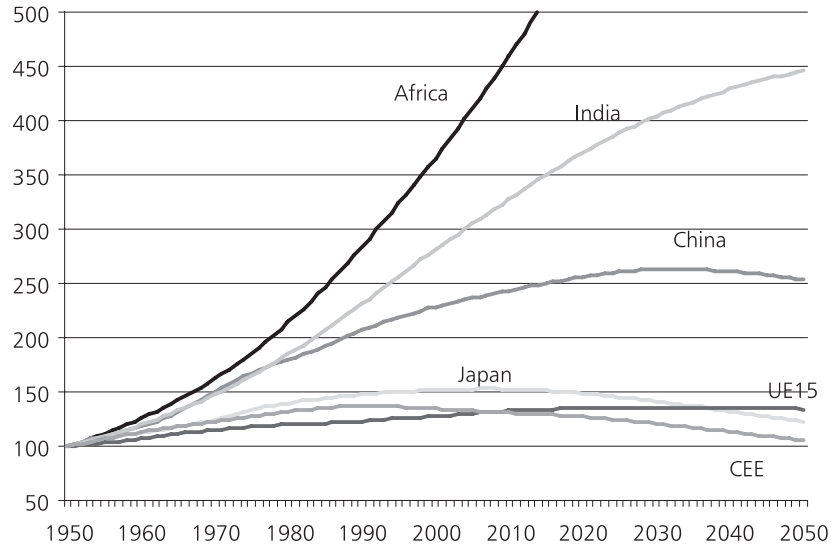
Source: United Nations (2006b).

Fig. 7. UN world population forecasts (in billions)

Analyzing population datasets for the years 1950–2050 (see figure 8), one can observe:

- a trend of rising population in Africa and India during the whole period;
- the number of persons in Central and Eastern Europe (CEE) peaking in 1992, and forecasts of such peaks in Japan in 2008 and in China and EU-15 in the 2030s;
- a growth of population by 790 percent in Africa, by 350 percent in India and by 150 percent in China in the years 1950–2050;
- a moderate growth of population in EU-15 and Japan (by about 35 percent) in the years 1950–2050 and almost the same population in 2050 as it was in 1950 in case of the CEE region (but only as an effect of increases noted before the 1990s—in the years 2005–2050, population in CEE is forecasted to fall by 20 percent).

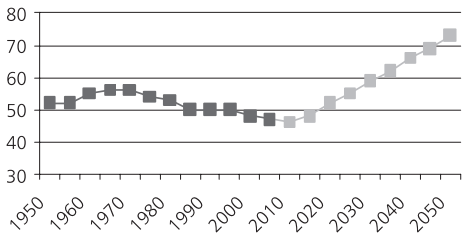
The decrease in Europe's population in forthcoming decades is not as great a concern as the one lying behind it—that is low fertility rates in European countries. Low fertility rates together with increasing life expectancy contribute to gradual ageing of society. In 1950 the number of people in the age of 0–14 years in Europe was three times higher than of those in the age of 65 years and more. In 2005 population in those groups was almost equal and it is forecasted that in 2050 the number of people in the age of 65 years and more will be 80 percent higher than of the people in the age 0–14 years. The share of people of the working-age (15–64 years) in the



Source: United Nations (2006b).

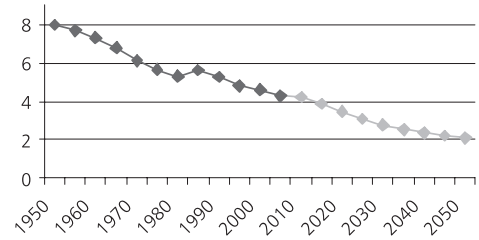
Fig. 8. Population development since 1950 (1950=100)

population will fall, which will lead to a dramatic rise of the dependency ratio in Europe. In 2005 there were 47 persons of non-working-age per 100 persons of working-age and it is forecasted that this number will increase to 73 persons in 2050. The potential support ratio, that is the ratio of the size of population in working-age to the size of population above working-age, or in other words the number of people in working-age per one person above working age will fall in Europe from 4.3 in 2005 to 2.1 in 2050.



* Total dependency ratio is the ratio of the sum of the persons of working-age (15–64).
Source: United Nations (2006b).

Fig. 9. Total dependency ratio* in Europe in the years 1950–2050



* Potential support ratio is the ratio of the size of population in the working-age to the size of population above working-age
Source: United Nations (2006b).

Fig. 10. Potential support ratio* in Europe in the years 1950–2050

Without any doubt, ageing will have a strong impact on the European economy in the 21st century. A thorough analysis of the interdependencies between ageing and economic variables are beyond the scope of this paper, thus only some remarks will be made.

First, GDP per capita can be decomposed into the following economic components: labour productivity (1), and employment rate (2), and demographic component, that is the share of working-age persons in population (3).

$$\frac{\text{GDP}}{\text{Population}} = \underbrace{\frac{\text{GDP}}{\text{Employment}}}_{(1)} \cdot \underbrace{\frac{\text{Employment}}{\text{Working\_Age\_Population}}}_{(2)} \cdot \underbrace{\frac{\text{Working\_Age\_Population}}{\text{Population}}}_{(3)}$$

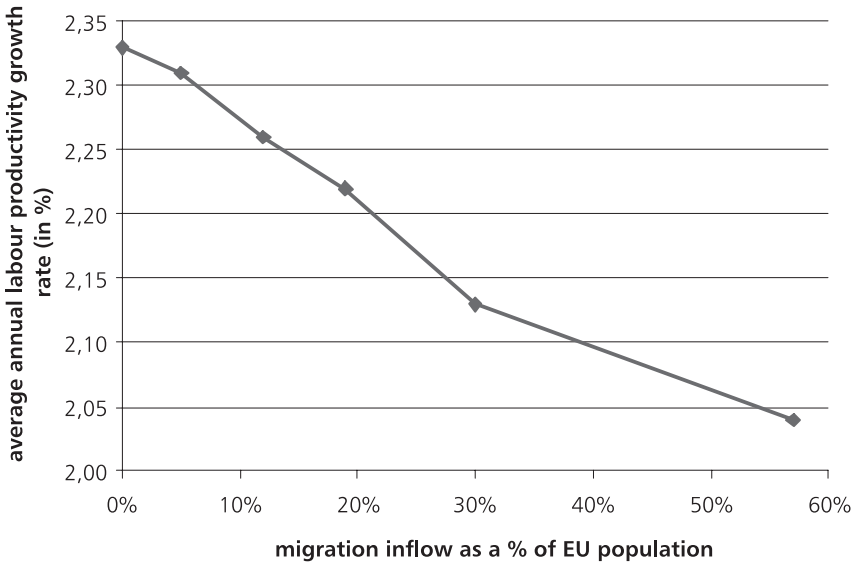
With the ageing of society, the ratio of working-age population to total population falls down, even if the retirement age is adjusted upwards. In such a situation the GDP-per-capita level can be supported only with a higher labour productivity and/or a higher employment rate. This implies that policies focused on raising productivity and the employment rate can limit direct effects of ageing on economic growth. An increase in the productivity of labour means that more output is produced by the same number of workers. It can be done by an increase in production inputs or by technological progress, that is innovations, ideas and knowledge. Increase in production inputs can be achieved by greater capital intensity of production or by increasing labour supply which in the case of a constant number of workers implies the need for working time adjustments. Technological progress is mainly a function of the country's intellectual capital, which consists of knowledge, structural and relationship capital[3] and of institutional and infrastructural conditions in which companies operate. An increase in the employment rate can be achieved by activation of the non-working part of population, for example through programs and policies focused on unemployment limiting, such as trainings, removing labour regulations, limiting social benefits for the unemployed etc.

Second, labour productivity will be affected by ageing because of its impact on GDP through various channels such as investment, level and structure of consumption, pensions, health care services, taxation etc.

Third, the level of GDP per capita can be maintained if the ageing of society does not affect the working-age population to total population ratio, which is theoretically possible when the combination of changes in retirement-age regulations and allowing for huge migration of working-age persons from third countries is applied. Unfortunately both solutions have some limitations. In the case of retirement age, there is the issue of elderly persons' limited work ability for natural or biological reasons. It is hard to asses the upper level of retirement age that is socially and physically plausible. The United Nations (2001) calculated that the retirement age in the European Union needed to maintain potential support ratio on the level noted in 1995 exceeds 71 years. Without prejudging about the reality of such outcome, it is worth to notice that in many European countries improvements in the field of retirement policy (for example men and women's retirement age equalization, early retirement policy) are still possible in spite of all. In the case of migration, the research by the United Nations (2001) suggests that it also cannot be treated as a remedy for ageing but rather as a method of weakening its effects. The maintenance of potential support ratio in the European Union on the level not lower than 3.0 (in fact still much lower than it was in 2005) would require such an inflow of migrants that in 2050 they and their descendants would account for 40 percent of total EU population. But even then the problem of ageing would not have been entirely solved—to maintain the 1995 level of potential support ratio in the European Union, the share of migrants and their descendants in population would have to rise to about 75 percent in 2050 (United Nations, 2001, p.28). Although such a flow of migrants to Europe is rather impossible we should be prepared for significant changes in this field.

[3] Following Radzikowski and Rybiński (2007), *"Knowledge capital refers to formal knowledge acquired at school or university, to experience gained at work and to tacit knowledge. Structural capital encompasses capital of processes in organization, innovation capital (such as patents), and organizational culture, for example flat corporate structure, knowledge-sharing attitude, sharing common vision and goals. Relationship capital refers to relations with clients, suppliers, it describes both the client base but also the clients potential."*

To sum up, we can draw two main scenarios for the European Union. As figure 11 shows, the maintenance of annual GDP-per-capita growth rate at 2.0 percent in the years 1995–2050 would require an annual growth rate of labour productivity of 2.33 percent with zero migration inflow, or alternatively 2.04 percent with the inflow of migrants reaching such levels, that the cumulative stock of migrants will reach almost 60 percent of EU population[4].



* assuming constant employment rate amounted to 65% of work-force population (15–64) and population developments as presented in UN(2001).
Source: own calculations based on UN(2001).

Fig. 11. Labour productivity growth and migration inflow needed to maintain annual GDP per capita growth in the EU at 2% level in the years 1995–2050*

Although the exercise above consists of many simplifying assumptions and ignores indirect negative effects of ageing on growth (which may require even higher productivity growth rates), it clearly shows the choice which Europe will have to face. First, Europe should make an effort to improve the productivity of its economy and to raise its employment rate to new heights. It will however require adopting a long-term and comprehensive vision, with an indispensable political will and agreement on reforming of the European social model known today. Second, if the first path were not chosen, Europe would be condemned to a huge inflow of migrants from regions with younger society, mainly Africa and Asia. But is Europe mentally and politically prepared to new demographic structure where migrants and their descendants account for a half or more of the population? If not, action needed to translate first scenario into reality must be taken as soon as possible.

[4] Assuming constant employment rate at 65% of population in the age 15–64 years. Labour productivity growth calculations are based on projections of total population, population in the working-age and migration flows from six scenarios presented in UN(2001). One must be aware, that some of scenarios in the UN(2001) are considered to be unrealistic. Moreover, measures of labour productivity presented here are calculated as GDP per person employed, so possible effects of changes in the working time etc. are not included. Changes of the retirement age are also not included, as the working-age population is assumed to be in the age 15–65 years.

Table 4.

Historical growth rates of labour productivity per person employed in the EU-15 countries

Period	Average annual labour productivity growth rate	Average annual GDP per capita growth rate
1960s	4.6	4.2
1970s	3.0	2.9
1980s	1.8	1.8
1990s	1.6	1.7
2000–2006	0.9	1.8

Source: Groningen Growth and Development Centre and the Conference Board, Total Economy Database, January 2007, http://www.ggdc.net.

And what can be the Alexandrian solution to the problem of ageing? Maybe, instead of silent accepting of fertility rate decline in the developed world, we should think of ideas how to slow this process down or maybe even reverse it. These ideas could for example consist of various methods of parenthood promotion, such as tax allowances, more effective day nursery and kindergarten policies but also of supporting technological advances that allow to do more work at home, for example easily accessible videoconference techniques or development of virtual offices. As regards the latter, development of online spaces such as Second Life seems an interesting and promising example. Second Life is a virtual world where, at the time of writing this article, almost 10 million people around the world were registered and where they met, sought information, and did businesses. Some companies run training courses and workshops in Second Life. In September 2007 alone more than 7 million USD were exchanged for the currency used in the game. The number of enterprises opening their offices in the virtual world is growing on exponential rate, private firms are created to offer services for avatars[5]. And this is just the beginning. It is difficult to predict what the limits to online spaces' development are and more generally what the impact of social networking on human productivity could be (me, my avatar and my blog can create more value added than the "physical me" alone). So who knows, maybe the web 2.0 revolution will be a great support to the classic methods of dealing with the problem of ageing by contributing to faster productivity growth.

2.3. The rise of China, the failure of democracy

China is big. A very large literature has documented the rise of China and its growing role in many markets, especially in commodities. Equally interesting is the frantic pace of these developments. As shown in table 5 below, China's share in many markets has grown significantly just over the last few years (for example in exports of telecommunications equipment). Between 2000 and 2006 China accounted for 40% of the world incremental demand for oil.

China is also moving up the production value added ladder, for example biotechnology clusters operate in Beijing, Shanghai and Shenzhen. Li&Fung Research Center (2006) identified 20 locations of clusters in China, specializing in various products, ranging from wearing apparel, household electronic appliances to biomedicine and aeronautic engineering in Nanjing, spacecraft, biomedicine and micro-electronics in Shanghai, opto-mechatronics in Dalian and biotechnology, pharmacy and medical apparatus in Zhuhai. As documented by Radzikowski, Rybinski (2007) China

[5] Graphical representation of Internet users

Table 5.

China's share in world GDP, exports, and commodities use

	2000	2005/2006
World GDP, PPP based	11	15
World exports	3.9	8.1
Export of machinery	3.1	9.1
Export of office and telecom equipment	4.5	17.7
Export of electronic data processing and office equipment	4.5	17.7
Exports of telecommunications equipment	6.8	20.4
Exports of integrated circuits and electronics components	1.7	5.9
Steel use	16.4	32
Cement use	35	45
Coal use	28.3	38.8
Oil use	6.3	8.9

Source: IMF WEO database, WTO, various professional associations internet resources.

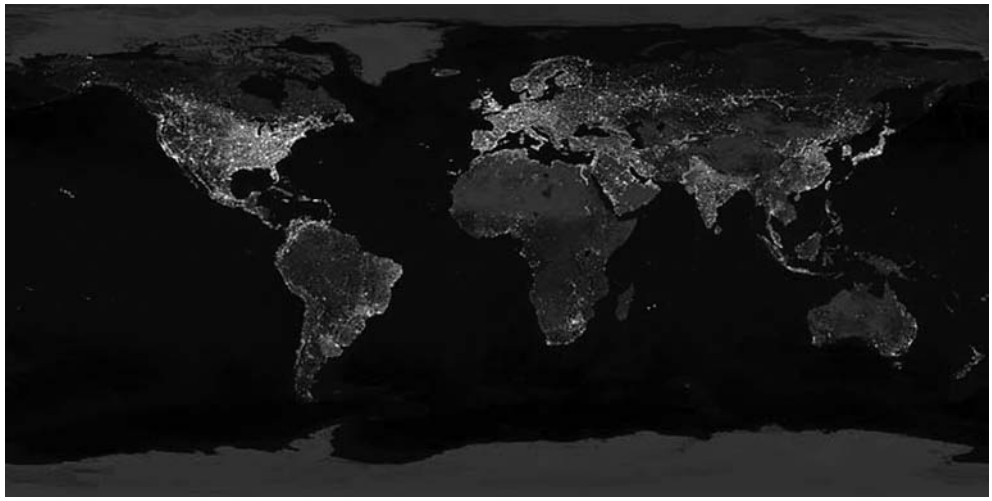
is accelerating efforts to build world class research and development, although a lot remains to be done according to recent OECD report[6]. It states that the share of high technology goods in Chinese exports rose from 14% in 2000 to 30% in 2005, but it is concentrated in two sectors that remain in large part under foreign control (especially in the ICT sector) and involve large high-tech import component. Having said that we point out that the learning curve of Chinese companies and authorities is very steep. Moreover the number of higher education students[7] reached 30 million in China, which is equal to the number of such students in the U.S. and EU taken together. Fifteen years ago China had only four million students in this category. We can safely predict that with recent war for talent in Asia raising economic return to education, the number of students will increase further and China will have increased number of people in tertiary education tenfold in just 20 years.

China has also joined the club of world "enlightened nations". As shown on the picture world at night, large part of coastal China regions were well illuminated at night already in 2000. Since then further progress has been made.

We are aware of all the problems and challenges that China is facing. Heavy pollution, infant employment, sharply rising manufacturing wages, income disparities (strongly correlated with light and dark spots on the NASA picture), necessity to create some 20 million jobs per year for people leaving rural areas and moving to cities, overheating residential estate markets, bad loans in the banking sector and possible equity bubble. It is still possible that at some stage China will make a major economic mistake and its rapid expansion path will be interrupted. Japan has made such a mistake, albeit at a much later stage of economic development as measured by GDP per capita. However a number of indicators (some of them shown in table 6 below) show that it is rather unlikely. China is a much more open economy than Japan, and international openness exposes domestic companies to international competition, and forces them to innovate and raise

[6] See OECD (2007).

[7] Higher education: Post-secondary education at colleges, universities, junior or community colleges, professional schools, technical institutes, and teacher-training schools. University: An educational institution that usually maintains one or more four-year undergraduate colleges (or schools) with programs leading to a bachelor's degree, a graduate school of arts and sciences awarding master's degrees and doctorates (Ph.D.s), and graduate professional schools.



Source: C. Mayhew, R. Simmon, NASA archive, November 2000.

Fig. 12. Earth at night

productivity. China is already filing similar number of patents that was recorded in Japan in 1980, and publishes more papers in scientific journals that Japan in 1980s. While R&D expenditure in China lags behind other indicators, and has just recently reached the level recorded by Japan in 1970s, at the same time the share of high-technology goods in manufacturing exports in China has already exceeded the present Japanese level. We should therefore assume that in the coming decades China will become the global leader in innovation, challenging high value added industries and services in the European Union and the United States. It is therefore a valid question to ask, what would be the global implications of the rise of China.

Table 6.

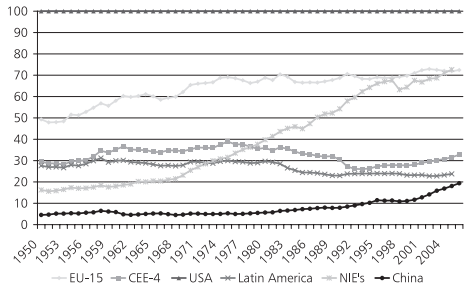
Some measures of future economic potential

	1970		1980		1990		2003/2005	
	China	Japan	China	Japan	China	Japan	China	Japan
(EX + IM) / GDP, %	5.3	20	21.8	28.2	34.8	19.9	69.3	28.4
Number of patents, 000	NA	130	NA	191	11	361	173	427
Scientific journal articles	NA	NA	1.1	25	6.3	38.6	29.2	60.1
R&D expenditures, %GDP	NA	1.5	NA	1.9	NA	2.7	1.5	3.5
High-tech exports, % of manufactured exports	NA	NA	NA	NA	6	23.9	29.8	23.7

Source: WDI, WIPO, Japanese Statistical Office.

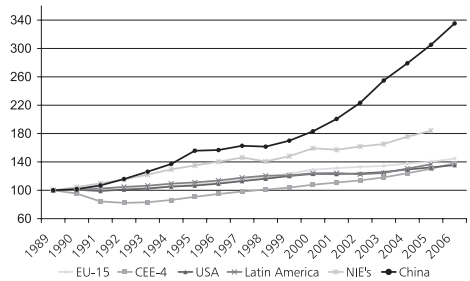
In order to answer this question it is worthwhile to look back into history of growth track record of non-democratic states. The most successful growth pattern among all world economies in the last few decades was recorded in the non-democratic Newly Industrialized Economies[8]

[8] More precisely, South Korea democraticised in the end of the 80's, Taiwan—in the middle of the 90's. Hong Kong and Singapore are still considered autocracies. The same can be said about China and India. See for instance Freedom House at: http://www.freedomhouse.org.



Source: Groningen Growth and Development Centre and theConference Board, Total Economy Database, January 2007, http://www.ggdc.net.

Fig. 13. GDP per capita in 1990 US$ (converted at Geary Khamis PPPs, US=100)



Source: Radzikowski, Rybinski (2007)

Fig. 14. GDP per capita in 1990 US$ (converted at Geary Khamis PPPs, 1989=100)

(NIEs) in Asia: Singapore, Taiwan, South Korea and Hong Kong. This undoubtedly serves as a very good example for China, which appears to pursue the same growth path on a much larger scale some twenty years later.

According to the European Commission (2005) pursuing a democratic system is one of the key elements of social development. It is of prime importance for sustainable development to make the state work for its society as a whole and not for the interest groups. This is however very difficult to do under democracy as many studies show.[9] The most evident example of this tendency is CAP under the auspices of the EU, consuming 44% of the EU's budget,[10] which shows that even pan-European bodies are prone to the pressure from the interest groups. Western multinational agreements tying these issues may be even more difficult to challenge. Another example may be a mass exodus of young Polish people (usually under 35) to the West, which may be a form of protest against the lost balance in the society[11]. Therefore in the face of rising China, European Union democracies have to look into their weaknesses anew and have to come up with Alexandrian solutions.

Of course China can meet many obstacles on its way to reach EU GDP per capita level. While NIEs were too small to have an impact on global markets China already consumes almost half of the world cement output. This has been understood very well by Chinese authorities and China has embarked on the global quest to secure raw material supplies for its soaring economy. This has been so evident in China involvement in Africa. As argued in chapter 2.1 in this paper, we may expect that rapidly growing pool of researchers will contribute to a birth of disruptive innovations that will eventually remove many of speed limits faces by large Chinese economy. But this race between growing demand for raw materials and growing demand for disruptive innovations may be uneven and we should expect bouts of volatility in global growth in the coming years. It is not

[9] For example Barro (1996) finds that the overall effect of democracy on growth is weakly negative and hipotethizes about a nonlinear relationship in which democracy enhances growth at low levels of political freedom but depresses growth when a moderate level of freedom has already been attained. A Polish philosopher and advisor to the Solidarity movement, Mirosław Dzielski, claimed that democracy can limit freedom and it is economic freedom that should be pursued first and then, slowly, democracy.

[10] One of the very few examples of democracies that do not subsidize agriculture is New Zealand.

[11] According to Community Statistics on Income and Living Conditions Poland is the only one country in Europe, in which the average income of people aged 65 and more is higher than the average income of people aged 0–64 (it is 113% in Poland and 55%–94% in other European countries).

unconceivable for the oil price to rise to 200 dollars per barrel, for example, before collapsing to nil after humanity finds new source of energy.

Another implication of China's rise would be in geo-strategic dimension. Professor Zbigniew Brzezinski, former advisor to president Carter presented his "World forecast" in a recent lecture at Gdansk Aeropag[12]. He documented that in the last 200 years the same group of countries had a dominant impact on the world: the Great Britain, the United States, Germany, Russia (Soviet Union) and to a lesser extent France. Other countries had very little or no impact on the key global decisions. In the 21st century only the United States retained its global power status, others can no longer play a global role, and those who try are boxing well above their weight.

According to professor Brzezinski the next axis of power is developing. This new set of global powers should include: the United States, China, India, Japan, Russia (assuming it becomes a responsible global stakeholder) and Indonesia (as the largest Muslim country). There is also an important role to play for the European Union if it manages to speak in more unified voice and builds its global position along ambitions voiced by the United Kingdom, Germany and France. It is worth noticing that prof. Brzezinski composition of new global powers differs from the group of countries invited to multilateral consultations by the IMF[13]: the United States, the European Union, China, Japan and Saudi Arabia, although the latter choice was influenced by the prominent role these countries play in the global imbalances[14] story.

Of course one can argue fiercely why this or that country will have a better chance to join the group of new global leaders in the 21st century. But irrespectively of the actual outcome it is worth performing the forward-looking exercise of assuming certain productivity trends and taking today's demographic forecasts. In the table 7 below we present results of such exercise performed in PWC (2006) study and show current and future weights of certain countries relative to the GDP of the United States. We compare these results with the present share of these countries in the IMF and World Bank quota.

Of course the share in the IMF voice and quota is determined by a very complicated formula (see IMF (2007a)) and European countries strongly oppose using PPP based GDP figures to compute new quota.

Having said that, we do think that a very simple table 7 yields very powerful conclusions. A number of European countries are overrepresented at Bretton Woods institutions relative to their size in comparison with the United States, this applies in particular to Germany, the United Kingdom and France, which are countries that enjoyed global importance in the 19th and early 20th century, and lost this role in the 21st century. This overweight will intensify in the coming decades unless a proper mechanism is found to scale down European share in the IMF and World Bank quota and voice, or, most preferably, to replace many national seats with one European Union seat. These forecasts imply that France and Germany will be overrepresented more than two times relative to their size. Conversely, emerging market countries are heavily underrepresented relative to their present size, and even more relative to their future size, China will have been underrepresented six times, and India nine times, Brazil, Indonesia and Turkey more than three times, Mexico two times.

Above exercise shows that two scenarios are possible. Either developed nations allow China and other developing countries to have a bigger say in international institutions, or the Bretton Woods institutions will gradually loose their global mandate. Regional development and investment

[12] See Brzezinski (2007).

[13] See IMF (2007b).

[14] See Rybiński (2006 and 2007) for an in depth discussion of global imbalances.

Table 7.

Selected countries' GDP in PPP terms in 2005 and forecast in 2050. Present share of these countries in IMF and World Bank votes. All figures relative to the United States = 100

Country	GDP in PPP terms		Share in IMF/WB quota	Vote disparity (above 100 overrepresented below 100 underrepresented	
	A	B	C		
US=100	2005	2050F	2007	C/A (%)	C/B (%)
US	100	100	100.0	100	100
Japan	32	23	35.8	112	156
Germany	20	15	35.0	175	233
China	76	143	21.8	29	15
UK	16	15	28.9	181	193
France	15	13	28.9	193	222
Italy	14	10	19.0	136	190
Spain	9	8	8.2	91	103
Canada	9	9	17.1	191	191
India	30	100	11.2	37	11
Korea	9	8	7.9	88	99
Mexico	9	17	8.5	94	50
Australia	5	6	8.7	174	145
Brazil	13	25	8.2	63	33
Russia	12	14	16.0	133	114
Turkey	5	10	3.2	64	32
Indonesia	7	19	5.6	80	29

Source: PricewaterhouseCoopers, Hawksworth (2006), own calculations.

banks have already been created, just to mention African and Asian Development Banks and the recent decision to create Banco del Sur in Latin America. China lending practices make it very difficult for the World Bank to run its lending operations based on heavy conditionality. Number of initiatives in Asia make it likely that any future financial turbulence in that region will be resolved with the help of regional institutions rather than with the IMF involvement.

Finally, with the rise of China we are probably witnessing the end of Washington consensus[15] era. As argued in Gowan (1999), Hudson (2003), Ngai-Ling Sum (2005) and many other books and papers Washington consensus setup allowed biggest financial institutions, especially those based on Wall Street, to gain enormous "scale privilege" amid free entry into less financially developed economies. In particular:

- The United States was able to run huge current account deficits with the rest of the world by issuing US treasury securities that were bought by central banks of surplus nations
- The United States was able to focus its policy actions basing on domestic market without much concern for global implications. Hence higher stability of the US economy was achieved at the expense of higher volatility in other economies, and the most recent decision by FOMC

[15] See Rodrik (2006) for an in-depth discussion of Washington consensus

might serve as the best example, when securing soft landing in the US will likely contribute to asset bubbles in many emerging market economies

- The United States as a country was able to enjoy "exorbitant privilege"[16], i.e. in the post-Bretton Woods period earn some 7% on its foreign assets while paying only 3.5% for its foreign liabilities.

It is unquestionable that Bretton Woods and Washington consensus financial order helped the United States to achieve global financial hegemony, while other factors have contributed as well.

Several contributions[17] discuss the emergence of the new transnational capitalist hegemony by building consensus across global corporate elites and influencing national authorities. Some authors argue that there was informal Wall Street—Treasury coalition that made joint efforts to ensure that Washington Consensus was the mantra of economic policies around the world, and that this "coalition" secured backing in domestic financial sectors around the globe. Indeed, for example in Mexico and Poland it was the financial sector that gave strong backing and endorsement for Washington consensus policy, which in the Mexico case was called "bankers' alliance"[18].

Grote, Marauhn (2006) describe this situation as follows:

"*Governments were under pressure not from one but two directions. Opposition to controls comes not just from the United States and IMF on the outside; but also from key elements of the private sector at home determined to preserve benefits and privileges derived from liberalized financial markets. Interacting with the "Wall-Street-Treasury" complex, in other words, is a comparably influential bank-industrial-wealth holder complex—combining in effect into a powerful transnational coalition that works in a mutually reinforcing fashion to bar any retreat from Washington consensus*".

While we do not fully subscribe to this "conspiracy theory", we indeed acknowledge that massive deepening of financial markets in the last 20 years was accompanied by falling share of wage bill in nominal GDP in many countries and by rising income inequality within countries, see Radzikowski, Rybiński (2007). It is important to stress, however, that globalization reduces inequality, as documented in Sala-i-Martin (2006), where eight indices of world income inequality declined in the period 1970–2000.

In other words globalization and the Washington consensus financial order allowed poor countries to catch up, but at the same time the owners of financial capital in developed countries benefited much more than owners of human capital. Maybe the most striking example of this widening of the income inequality is shown by the level of income of hedge fund managers in the United States. Under the 2–20 arrangement (fee amounts to 2% of managed assets and 20% of generated profits) in 2006 26 fund managers earned more than 130 mln dollars, while the founder of Renaissance Technologies, James Simons, made 1.5 billion dollars in 2006 alone.

The rise of China is unlikely to change this picture, income inequalities in China are even bigger than those in the United States. What will change however, is the Wall Street global influence. It has been said that the United States is run by Goldman Sachs, to reflect numerous senior positions held by former Goldman Sachs bankers in the United States administration. A careful reader of the recent book by Alan Greenspan will also find out how important was the Wall Street in the American, and hence global, politics. This is about to change, with Asian

[16] See Gourinchas, Rey (2005) for estimation of this effect. See Rybinski, Sowa (2007) for explanation why changing global financial landscape will lead to elimination of this privilege.

[17] See for example Carroll, Carson (2003), Agnew (2006)

[18] See Maxfield (1991)

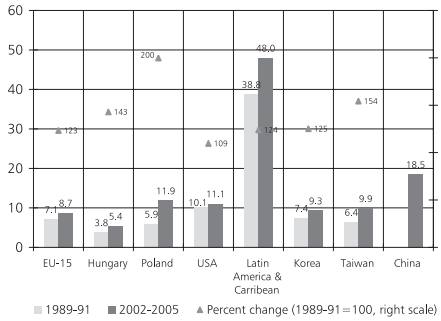


Fig. 15. Decile dispersion ratio (10th income decile/1st income decile)

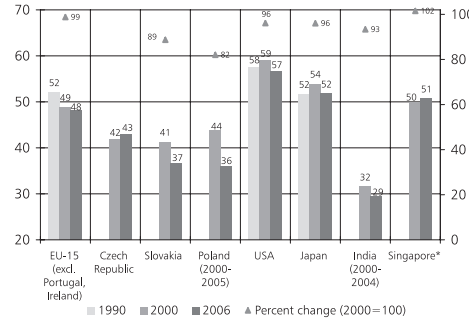


Fig. 16. Compensation of employees (in % of GDP)

Source: WIDER World Income Inequality Database; World Development Indicators 2007. U.S. Census Bureau; Koreanbutions.
Statistical Information Service: http://www.kosis.kr/eng/main.htm; Report on The Survey ofQNA.
Family Income and Expenditure in Taiwan Area, National Statistics Republic of China (Taiwan): http://eng.stat.gov.tw/ct.asp?xItem=3458&CtNode=1597.
Source: Radzikowski, Rybinski (2007)

Source: Ecowin Databases: Ecowin Economic and OECD *Refers to earnings and excludes employer social contributions.

financial and political class replacing American "bankers alliance" global influence. Say good bye to Washington consensus, say hello to Beijing challenge.

2.4. Rising significance of global financial markets and new global players

Financial markets have grown very fast in the last three decades and their role in the global economy have increased immensely. Tables 8 and 9 below documents this development.

Table 8.

Financial markets development (in $ trillion)

$ trillion	1980	1993	2000	2005
Global GDP (nominal)	10.1	24.4	31.7	44.5
Global bond market capitalization	4.0	22.3	36.0	58.0
—government debt securities	2.0	10.6	14.0	23.0
—private debt securities	2.0	11.7	22.0	35.0
Global equity market capitalization	3.0	14.3	32.0	44.0
Global bank deposits	5.0	16.4	25.0	38.0
Hedge funds assets	n.a.	0.1	0.5	1.5
Pension funds assets	n.a.	5.3	10.3	17.9
Global derivative markets (notional outstanding)	n.a.	94.2	109.5	355.5
Central bank foreign exchange reserves	0.4	0.9	1.9	4.2
Sovereign wealth funds assets	N/A	N/A	N/A	2.1–2.5

Hedge funds assets—the last presented data set for hedge funds corresponds to the year 2006. Pension funds assets—data only for OECD countries.Global derivative markets—first data publicized by BIS corresponds to the year 1998. Data for 2000 and 2005 without commodity contracts. SWFs assets estimates for 2006.
Source: BIS, OECD, McKinsey Global Institute, IMF, Morgan Stanley, own calculations.

In the last quarter of the century global bond market capitalization rose from nearly 40% of the global GDP to over 130%, with private debt securities market developing much faster that government debt securities. Global equity market cap to GDP ratio quadrupled. There was no growth in the last five years amid bursting of the internet bubble in 2000–2001. Both markets are now bigger that global bank deposits, which reflects global shift of the savings structure. There was an explosion of derivative markets, notional outstanding contracts stood at eight times global GDP in 2005, and years 2006–2007 saw further rapid growth in these markets, rapidly interrupted in August this year amid crisis in the US subprime housing loan market and subsequent collapse of asset backed commercial paper market and collateralized debt obligations market[19]. Pension funds assets to GDP ratio doubled and new types of large investors emerged: hedge funds, central banks and sovereign wealth funds.

Table 9.

Financial markets development (in % of global GDP)

% of nominal global GDP	1980	1993	2000	2005
Global bond market capitalization	39.6	91.4	113.6	130.3
—government debt securities	19.8	43.4	44.2	51.7
—private debt securities	19.8	48.0	69.4	78.7
Global equity market capitalization	29.7	58.6	100.9	98.9
Global bank deposits	49.5	67.2	78.9	85.4
Global derivative markets (notional outstanding)	n.a.	386.1	345.4	798.9

Global derivative markets—first data publicized by BIS corresponds to the year 1998. Data for 2000 and 2005 without commodity contracts. Source: BIS, OECD, McKinsey Global Institute, IMF, Morgan Stanley, own calculations

This rapid growth of financial markets is accompanied by significant growth of cross-border financial claims, which tripled in the last quarter of a century as a ratio of global GDP, see table 10. This trend was briefly interrupted by bursting of the internet bubble in 2001–2002.

Table 10.

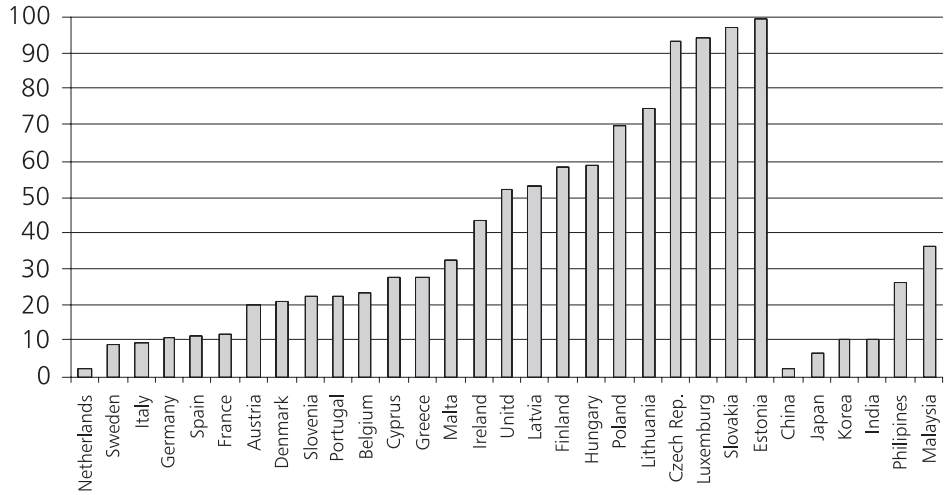
Cross-border financial claims

	1980	1992	2000	2005
Total cross-border capital flows, $ trillion	0.46	0.90	4.50	6.19
% of global GDP	5	4	14	14

Source: McKinsey Global Institute.

As argued in the previous chapter the existing Washington consensus required countries to adopt stabilize-liberalize-privatize policy, which implied removing barriers to entry for foreign, capital-rich investors, which were based in developed countries. This led to situations when for example in some Central and Eastern European countries the share of the banking sector owned by foreign investors amounts to 70–90 percent. Interestingly, many Asian countries resisted this

[19] See Mead (2007) for a comprehensive description of credit derivatives.



Source: ECB, BIS.

Fig. 17. Foreign share in banking sector assets, 2005

Washington consensus dogma, and allowed for only moderate penetration of their financial sectors by foreign capital.

However the early 21*st* century saw a rapid accumulation of financial wealth in emerging market countries which began to use Washington consensus rules in a reciprocal fashion. However they were about to find out that the traffic regulated by Washington consensus is one way only. When it comes to buying developed world companies by emerging markets investors, it is not called openness to direct foreign investment, it is obstructed by "economic patriotism". There all sorts of arguments raised. For example it is said that Asian central banks and sovereign wealth funds may introduce political consideration in their investments. This could lower the economic value added in host countries and distort market signals that allow markets function efficiently. Many politicians are voicing concerns that these government owned investors in current account surplus countries may move from passive investor style into active owner after acquiring large stakes in publicly trade companies in developed world.

In what follows we take a closer look at new types of investors that emerged in 21*st* century and paint two scenarios that seem probable, depending on actions taken by developed nations and response by new types of investors based in emerging markets.

But first we must acknowledge that the fact that capital flows from poor to rich countries—contrary to what economic theory would predict—is not knew, it has been well documented and has been labeled as "Lucas Paradox"[20]. So the new phenomenon in the 21*st* century is not the direction of flows, but the fact that these flows became larger and take a different form.

In the 20*th* century emerging markets "invested" in developed countries by placing funds in safest instruments: bank deposits, government bonds, or asset backed securities of highest quality. This allowed the United States, which had the most developed and most liquid markets[21] to enjoy

[20] See Lucas (1990).

[21] As argued by Caballero (2006) there were asset shortages in emerging markets, so asset-rich financial institutions in emerging markets (Asia and oil exporters) were forced to invest in financial-asset-rich countries. This asset shortages hypothesis was one of important factor explaining the emergence of global imbalances, i.e. huge US current account deficit financed by large capital inflows from Asian and oil exporters' central banks and sovereign wealth funds.

Table 11.

Selected World Stock Exchanges, market capitalization, USD billion

Stock exchange	1990 December	2000 December	2006 December	20007 June	2007 August	Growth 2007/1990 August, %	NYSE=100 August 2007	NYSE=100 1990
Asia total (ex. Japan)	*369*	*1189*	*4804*	*6569*	*7768*	*2 003*	*49.8*	*13.7*
Bursa Malaysia	48	113	236	307	274	472	1.8	1.8
Hong Kong Exchanges	83	623	1715	2028	2276	2 629	14.6	3.1
Jakarta SE	8	27	139	167	165	1 935	1.1	0.3
Korea Exchange*	110	148	834	1042	1102	899	7.1	4.1
Shanghai SE	NA	NA	918	1693	2382	NA	15.3	NA
Shenzhen SE	NA	NA	228	491	707	NA	4.5	NA
Taiwan SE Corp.	99	248	595	669	678	586	4.3	3.7
Thailand SE	21	29	140	173	183	780	1.2	0.8
Japan								
Tokyo SE	2929	3157	4614	4681	4518	54	29.0	108.8
United States								
NYSE	2692	11535	15421	16604	15590	479	100.0	100.0
United Kingdom								
London SE	850	2612	3794	4037	3854	353	24.7	31.6
Europe	*616*	*4815*	*7695*	*8816*	*8461*	*1 275*	*54.3*	*22.9*
BME Spanish Exchanges	111	504	1323	1520	1497	1 244	9.6	4.1
Borsa Italiana	149	768	1027	1100	1060	613	6.8	5.5
Deutsche Bø	355	1270	1638	1956	1894	433	12.1	13.2
Euronext	NA	2272	3708	4240	4010	NA	25.7	NA

Source: World Federation of Exchanges, www.world-exchanges.org.

the "exorbitant privilege". We are witnessing a rapid change in early 21*st* century with sharp increases of market capitalization in Asia as shown in table 11 below.

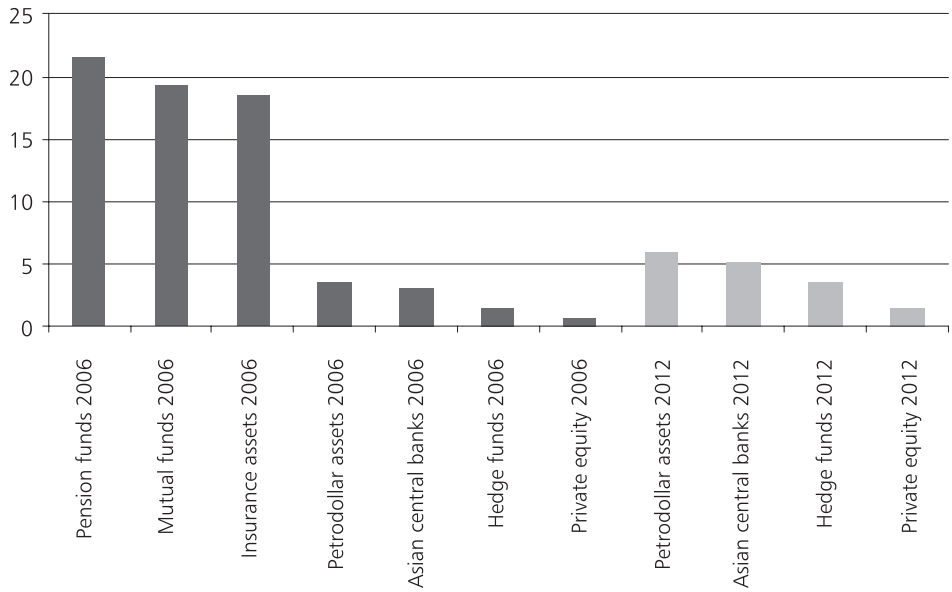
While markets in the United States remain the world's largest and most liquid, Asian exchanges are catching up fast in terms of market capitalization and liquidity and they improve transparency and regulations at the same time. For example in 1990 stock exchanges in Asia had market capitalization equal to 14% of NYSE capitalization, and stock exchanges in Shanghai and Shenzhen did not exist at all. In August 2007 Asia stock exchanges market cap stood at 50% of NYSE market cap, and exchange in Shanghai and Hong Kong were bigger than those in Western Europe. Chinese exchanges became the world's leaders in the cumulative size of IPOs.

Fast growth of Asian capital markets coincided with an emergence of the new types of global investors: Asian central banks and sovereign wealth funds located in Asia and in oil exporting countries[22]. McKinsey consultancy estimates that in 2012 Asian central banks and sovereign wealth funds based in Asia and in oil exporting countries will have amassed some 12 trillion dollars of assets.

But the size of these new global investors is not the only factor that has been changing in the last few years amid rapidly rising oil prices and interventionist exchange rate policy. World has also witnessed the change of style of investing. Capital has flown for decades from poor to rich countries, but it was in much smaller volumes and was placed in low yielding deposits collected by large western banks and into western governments' bills and bonds. This is no longer the case and we witness a gradual shift towards investments carrying credit risk (equities, corporate bonds, asset backed securities). As presented in appendix 1 these new investors are activist, taking large stakes in western world companies, with a number of large transactions completed in 2007. There is much more in the pipeline, publicly announced deals are reported in appendix 2.

As long as capital inflows to the western world were rising but were placed in government securities it was accepted and welcomed by western world governments. It allowed the United

[22] See MGI (2007) and Kern (2007) among others for a throughout analysis of sovereign wealth funds and Rybiński, Sowa (2007) for a discussion on central banks as investors.



Source: MGI (2007).

Fig. 18. Assets under management (in $ trillion)

States to enjoy "exorbitant privilege" and allowed US consumers to expand consumption and personal investment (in housing) beyond what was justified by their intertemporal budget constraint. The United States has been able to find easy financing for its booming current account deficit, which approached 7% of GDP.

But in early 21*st* century Asian central banks and oil based SWFs became world biggest investors and started to move into territory reserved so far for the private funds, managed by individuals based in the developed world. The threat that the West might loose control over assets that are considered of strategic importance[23] triggered a hostile response, and economic patriotism flourished in many countries. Appendix 3 presents the list of blocked transactions and the action taken by authorities in developed countries to prevent Asian and oil based investors to buy assets in the West.

This problem is magnified further by the fact that while in the years to come cumulative assets managed by developed countries' managers will still be larger than those in the developing countries, in the former case it is scattered among thousands of investment, pension funds and insurance companies. In the latter case it is controlled by an handful of investors as described in the table 12 below.

So it is difficult to take control over a multinational corporation by a single fund managing private assets in the West, and it is possible to engineer such takeover by large investor based in Asia or in oil exporting country. And then the next question immediately pops up, what would be intensions of such investor, who is often state-owned, and the state is a non-democratic nation. Moreover these investors lack transparency and in general do not report their holdings, unless required by stock exchanges, which also has not been observed in some cases.

[23] Typically energy is rightly defined as strategic industry, but in some cases such "classification" is hard to understand, with France Danone as best example. Loosing control over yoghurt production may hurt national pride, but has nothing to do with national security.

Table 12.

Assets under management, Asian central bank, SWFs and biggest "western world" asset managers

		Assets (USD bn)
Petrodollars	Kuwait Investment Authority	200
	Abu Dhabi Investment Authority	500–875
	Qatar Investment Authority	40
	Saudi Arabian Pension Fund	130–150
	Dubai International Capital	5
	Saudi Arabian Monetary Agency	250
Asian central banks	China	1066
	Japan	875
	Taiwan	265
	South Korea	238
	Russia	295
	India	167
	Singapore	136
	Hong Kong	133
	Malaysia	82
Hedge funds (without leverage)	JP Morgan/Highbridge (US)	33.1
	Goldman Sachs AM (US)	32.5
	Bridgewater (US)	30.2
	DE Shaw (US)	27.3
	Farallon (US)	26.2
	Renaissance Technologies (US)	26
	Och-Ziff Capital (US)	21
	Barclays Global Advisors (Europe)	19
	Man Group/AHL (Europe)	18.8
	GLG Partners (Europe)	15.8
Largest traditional funds operating in the West	PIMCO (investment fund)	693
	CalPERS (pension fund)	247

Evidence collected in this chapter allows to paint the following high likelihood scenario. The western world will put up barriers to capital flows, "economic patriotism" in Europe and in the United States will flourish, as it is easy to sell to the electorate and can contribute to politicians popularity. Politicians will become "guardians" of national strategic treasures to be protected from "eastern barbarians standing at the gate". In response, gradually, capital flows will be redirected to fund developing countries corporations, and the relative value of "guarded treasures" will gradually fall over time. This is likely to happen anyway in the coming decades, but the protectionism scenario will act as a catalyst accelerating this process. Instead of bringing in new investors as important stakeholders of the new global order, it might lead to development of new "axis of power", with acceleration of Asian and oil exporters investments in Asia and Africa. This strengthening of capital ties will be reinforced by African demographic dividend, and "Chinafrica" will emerge and the center of world power in the coming decades. It will naturally lead to marginalization of Europe and to a fall of United States role in shaping the global landscape.

This scenario can be avoided but it calls for the Alexandrian solution. We see a pressing need for a global conference that will result in an agreement that could be summarized as "transparency-openness-minority-passivity" or TOMP agreement. This international agreement, based on full reciprocity, will keep capital account in developed countries open to developing countries investors, in exchange for investors' commitment to full transparency of investments, for their commitment to be passive investors and to hold only minority stakes. Such an agreement will likely help the developing countries to adopt western values, that served the global economy well in the past centuries, to become responsible global investors and responsible global stakeholders. The West will be able to benefit from a steady flow of capital and balanced East-West distribution of power will be achieved. The scenario choice between "national patriotism and Europe financial marginalization" and "balanced East-West distribution of power" will be made in the coming years. The Alexandrian solution is called for to increase the likelihood of the good outcome.

Conclusions

We defined four Gordian knots in this paper:

1. Limits to growth: scarce energy and natural disasters
2. Aging of the developed world and the 21st century as the age of migration
3. The rise of China, the failure of democracy
4. Rising significance of global financial markets and emergence of new global players

Evidence amassed in this paper allows to draw the following conclusions:

First, while the natural resources constitute limits to growth in the medium run, the humanity ability to develop disruptive innovations will challenge those limits in the long run, while higher output volatility and possibly abrupt changes in relative prices do lie ahead. We are much more concerned about the problem of environmental effects of human's development. Although Club of Rome's report underlined possible consequences of further ecological imbalance, too little efforts have been made so far despite the fact that the first effects of irresponsible behaviour are already materializing.

Second, Europe is getting old. This undeniable fact will become a serious challenge for economic development in the 21st century as ageing means less people able to work and more people to take care of. While there were 4.3 persons in the working-age per older person in 2005 it would be a half of that in 2050. We drew two possible scenarios for Europe. First, Europe would make an effort to improve productivity of its economy and to rise employment rate to the new heights. This would however require adopting of a long term and comprehensive vision, with an indispensable political will and agreement on reforming of today's form of European social model. Second, if the first path was not chosen, Europe would be condemned to huge inflow of migrants from regions with much younger society, mainly Africa and Asia.

Third, in the last decades of the 20th century the most successful growth pattern among all world economies was recorded in the non-democratic Newly Industrialized Economies in Asia. At the beginning of the 21st century incredible civilization jump in the largest country of non-democratic group, that is China, can be observed. China will probably become the strongest and the most competitive economy in the world within next few decades. It is already setting up strong alliance with Africa and thus crowds out Europe and the United States from African economic landscape. The share of China in global resources usage is growing, as same as the share and strength of Chinese enterprises on global markets. China is the world's largest exporter of computer equipment, its intellectual capital is on the rise and the number of higher education

students is larger than in the United States and the European Union. China is the world's leader in capital exports and thus is becoming a "global store" as well as "global bank". Next centuries will bring rises and falls of countries and regions. It seems that, as Great Britain lost its power to the United States in the 20th century, in the 21st century China will be the most powerful player on the economic, political and cultural scene with Europe and perhaps the United States becoming "the Great Britain of the 21st century". The strategy of the European Union have not taken this likely scenario into account so far. It can be seen for example in the Europe's resistance for greater representation of China and other developing countries at Bretton Woods institutions, which consequently may lead to development of strong alternative regional financial institutions and thus to weakening World Bank's and IMF's global mandates. If Europe wants to keep its position as an important global player, radical change of strategy is needed with the comprehensive vision of strong and competitive Europe in 2050. But the question is whether small European democracies living in the 4-years election cycle can abandon destructive national protectionism and short-term political goals to create such a vision.

Fourth, the role and importance of financial markets soared in the last three decades. Global bond and equity market capitalization rose from nearly 70% of the global GDP in 1980 to over 230% in 2005. At the same time cross-border financial claims rose from 5% to 14% of global GDP. There was an explosion of derivative markets. Rise of China and oil exporting countries where huge amounts of assets are managed led to emergence of new types of global investors. It is estimated that in 2012 Asian central banks and sovereign wealth funds based in Asia and in oil exporting countries will have amassed some 12 trillion dollars of assets. Large part of those assets will be invested on the global financial markets with rising significance of investments carrying credit risk (equities, corporate bonds). Those developments bring much concern in Europe and in the United States. There are voices that the protectionism policy must be introduced to avoid the possibility of taking charge of multinational corporations by the capital flowing from non-democratic countries. It seems that the era of Washington consensus which assumed removing barriers to entry for foreign goods and capital is ending and the world is moving towards protectionism, especially in the field of capital transactions. In response, gradually, capital flows will be redirected to fund developing countries corporations and the relative value of "guarded treasures" in the West will gradually fall over time. It might in turn lead to development of the new "axis of power", with acceleration of Asian and oil exporters investments in Asia and Africa. This scenario of European financial markets marginalization can be avoided if global agreement on "transparency-openness-minority-passivity" (TOMP) is concluded where the capital account in developed countries remains open to developing countries investors in exchange for investors' commitment to full transparency of investments, for their commitment to be passive investors and to hold only minority stakes. TOMP should also assume full reciprocity.

To sum up, we call on the Club of Rome to broaden its discussion. What appeared as the main Gordian knot of the 21st century—limits to growth—some 30 years ago should now be seen in a broader context. Europe has immense challenges and opportunities lying ahead: aging and migration versus productivity dilemma, the rise of China, the growing global role of financial markets and the emergence of new investor class. It is high time that the Club of Rome warns politicians which so diligently take Europe towards the dead end called global marginalization. Lack of strategic vision, national patriotism, protectionism, inability to see developing countries as legitimate global players. All these strategic weaknesses will strike back and will lead to weak Europe, unable to play an important global role in the 21st century. It is not to late avoid this gloomy scenario.

We postulate that the best way to launch a wide debate on Europe's future is to continue a series of conferences launched and organized by professor Kukliński. The next international

conference should be titled "Gordian knots of the 21st century". The conference should address all four Gordian knots and work out policy recommendations. It should also identify the key assets Europe needs to become the leading world region in the 21st century. The conference should be followed by a multidisciplinary research project, which will among other issues will also address the weaknesses of economics, sociology and political science in dealing with 21st century global economy.

We are convinced that organizing a large international conference under the auspices of the Club of Rome could create a proper discussion platform. In-depth analysis, dialogue, honesty, mutual understanding combined with outside-the-box thinking could lead to a formulation of new vision for Europe. Without new vision and new strategic plans Europe's future looks bleak. While US can loose global dominance and become the Great Britain of the 21st century, Europe may risk becoming Argentina of the 21st century[24]. Let us repeat, it is not to late to avoid this gloomy scenario.

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[24] Argentina had GDP per capita close to US level in late 19th century. After a series of strategic mistakes it fell to less than a third.

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Appendix 1: Large investment projects of SWF and of other state units

	Fund / unit	Investment	Source of information
1	Lenovo Gropup, China 2004	USD 1.75 bn takeover of IBM's personal computer business by Lenovo Group	Deutche Bank Research: Sovereign Wealth Funds—State Investment on the Rise, 10-09-07
2	Qatar Investment Authority 2006	Qatar Investment Authority bought a $205 million stake in Industrial & Commercial Bank of China Ltd. before the Beijing-based lender's $22 billion public share sale	BN, Qatar State Fund Buys 20% of London Stock Exchange, Sep 20 2007
3	Kuwait 2006	Kuwait bought $720 million worth of shares in Industrial & Commercial Bank of China Ltd. before the Beijing-based lender's $22 billion public share sale	BN, Mideast to invest $300 billion in China, Merrill Says, Sep 4 2007
4	China National Offshore Corporation (CNOOC) 2006	USD 2.3 bn investment in Nigerian oil and gas exploration. (Rising engagement of China in Africa and Latin America: More than 650 Chinese state companies invested in Africa, especially in sectors such as oil, other commodities and telecommunications. USD 1.6 bn assets were hold by China in 2005).	Deutsche Bank Research: Sovereign Wealth Funds—State Investment on the Rise, 10-09-07
5	China Investment Corporation (officially operating since September 2007) May 2007	Acquisition of a 9.9% stake in The Blackstone Group L.P. The USD 3 bn investment was made in the form of non-voting common units. Taking earlier experiences into account (vide Unocal) it is probable that China had had informal agreement of the Treasure Department.	1/ Deutche Bank Research: Sovereign Wealth Funds—State Investment on the Rise, 10-09-07 2/www.globalpolitician.com —Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07)
6	Delta Two (investment vehicle owned by the Royal Family of the Kingdom of Qatar) Qatar June 2007	Increase in the existing 7.6% stake in J Sainsbury plc (the oldest chainof supermarkets in Britain) to a total of 25% by acquiring an additional USD 1.5 bn stake, making Delta Two the largest single shareholder. Delta Two considers buying rest of the stakes.	1/ Deutsche Bank Research: Sovereign Wealth Funds—State Investment on the Rise, 10-09-07 2/ www.globalpolitician.com —Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare,10-08-07
7	China Development Bank and Temasek Holding Ltd June 2007	Investment in Barclays PLC for a respectively: — 3.1% stake, USD 3 bn — 2.1% stake, USD 2 bn (with a conditional offer to increase their investment to a combined total of USD 19 bn in case the planned merger with ABN Amro succeeds).	Deutsche Bank Research: Sovereign Wealth Funds—State Investment on the Rise, 10-09-07
8	Saudi Basic Industries Corp. August 2007	Saudi Basic Industries Corp. completed the $11.6 billion purchase of General Electric Co.'s plastic division on Aug. 31.	Abu Dhabi National to buy PrimeWest for C$4 billion (Update5), Sep 24 2007
9	Mubadala United Arab Emirates September 2007	Mubadala, the arm of Abu Dhabi is paying $1.35bn for 7.5 per cent Carlyle stake. The deal was struck at a 10 per cent discount to a valuation of $20bn for all of Carlyle.	Bloomberg (BRF), Carlyle sells stake to Abu Dhabi—Financial Times, Sep 21 2007

	Fund / unit	Investment	Source of information
10	Qatar Investment Authority September 2007	QIA bought 20 percent of London Stock Exchange Group Plc in a deal worth about $1.2 billion. QIA states that it bought the LSE stake as part of a plan to "build long-term investments in high quality businesses" and doesn't plan to make a takeover bid. Still, the fund "reserves its position in the event that a third party announces a firm intention to make an offer". ..... Run for the LSE's 31% stake was submitted by Temasek as well. It is understood that Temasek put in a bid significantly lower than Nasdaq was looking for and has acknowledged it has little chance of winning the auction.	BN, Qatar State Fund Buys 20% of London Stock Exchange, Sep 20 2007 ..... Bloomberg (IND) Independent: Temasek "Off the radar" in Nasdaq LSE stake deal, Sep 13 2007
11	Borse Dubai, September 2007	Borse Dubai agreed to a deal with Nasdaq in which the emirate will get 19.99 percent of the exchange and a 28 percent LSE holding in return for allowing Nasdaq to take control of Nordic exchange operator OMX AB.	BN, Qatar State Fund Buys 20% of London Stock Exchange, Sep 20 2007
12	Temasek Singapur	Temasek is a big investor in Standard Chartered and Barclays	Bloomberg (IND) Independent: Concern Grows Over Sovereign Wealth Funds, Sep 11 2007
13	DIC, Dubai International Capital (private—equity arm of Dubai Holding)	Purchase of HSBC stock (1 bn USD)	www.globalpolitician.com—Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07)
14	Istithmar and Dubai Group	2.7 per cent of Standard Chartered's shares. It have also stakes in Greece's Marfin Financial and Bank Islam Malaysia.	www.globalpolitician.com—Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07)
15	Dubai's ruling family August 2007	France and Germany allowed Dubai's ruling family to buy its stake in EADS maker of Airbuses and Eurofighters.	www.globalpolitician.com—Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07)
16	Temasek Holdings Singapur	Temasek Holdings, established in 1974, has an $85bn portfolio that includes stakes in Singapore Airlines, India's ICICI Bank, China Construction Bank and Standard Chartered, the UK emerging markets bank.	www.globalpolitician.com—Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07)
17	Temasek Holdings Pte, September 2007	Singapore Airlines and parent Temasek Holdings Pte agreed to buy a 24 percent stake in China Eastern for $918 million, ending talks that had lasted more than a year. The Singapore deal now needs support from two-thirds of China Eastern's minority shareholders at a meeting expected to be held in November. The government has already approved it. At the same time, Cathay Pacific Airways Ltd. and Air China Ltd. withdrew from the deal.	BN, Cathay Pacific falls after dropping China Eastern bid (Update 1), Sep 25 2007
18	Abu Dhabi National Energy Co. (Taqa), August 2007 Abu Dhabi National Energy Co. (Taqa), November 2007	In August Taqa completed a $2 billion purchase of Pogo Producing Co.'s Canadian unit, Northrock Resources Ltd. Taqa is expected in November to close its acquisition of Pioneer Natural Resources Co.'s Canadian assets for $540 million.	BN, PrimeWest rises as Canada reviews takeover rules (Update 1), Oct 4 2007 BN, PrimeWest rises as Canada reviews takeover rules (Update 1), Oct 4 2007

Appendix 2: Planned investments

	Fund / unit	Investment	Source of information
1	China Investment Corporation October 2007	The fund would be seeking 5 to 10 per cent stakes in BHP and Rio Tinto—Australian resources companies that are riding China's industrial boom.	Bloomberg (MAG), China may look to buy shares in BHP, Rio Tinto, Oct 3 2007
2	Qatar Investment Authority (50 bn USD) / Borse Dubai October 2007	Qatar last month said it owns 9.98 percent of OMX and asked Swedish regulators for permission to raise its stake without saying how much more it wants to buy. It is vying for control of OMX with Borse Dubai and Nasdaq Stock Market Inc.	BN, Qatar is mulling a bid for OMX, Prime Minister tells CNBC Oct 3 2007
3	China Investment Corporation October 2007	The market is speculating about possibilities to buy shares of China's enterprises listed in the Hong Kong stock-exchange. China Mobile Ltd. and China Life Insurance Co. were in the group of companies with the most significant growth.	BN, Hong Kong stocks advance to record on China Investment Fund, Oct 2 2007
4	Abu Dhabi National Energy Co. (Taqa), September 2007	Abu Dhabi National announced Canadian energy corporation—the PrimeWest acquisition for about CAD 5 billion (CAD 4 billion excluding debt). ..... The offer was reviewed in routine procedure by Canadian Industry Minister. Transactions are checked under the Investment Canada Act whether it yield "net benefits" to the economy, such as more productivity or research and development. PrimeWest assets include properties in Montana, North Dakota and Wyoming. US reaction to the takeover by Taqa will be probably limited.	BN, PrimeWest rises as Canada reviews takeover rules (Update 1), Oct 4 2007 ..... BN, Canada says PrimeWest bid will be reviewed 'as others would', Sep 25 2007 ..... Abu Dhabi National to buy PrimeWest for C$4 billion (Update5), Sep 24 2007
5	Abu Dhabi National Energy Co. (Taqa), November 2007	Taqa agreed to buy Pioneer Natural Resources Co.'s assets in Canada for $540 million.	BN, PrimeWest rises as Canada reviews takeover rules (Update 1), Oct 4 2007

Appendix 3: Blocked transactions and actions of authorities

Controversial / incompleted investment projects of SWF and of other state units

	Fund	Investment	Source of information
1	CNOOC (China National Offshore Oil Corporation), 70% owned by the Chinese government July 2005	USD 18.5 bn bid to buy US oil major Unocal Oil Company Withdrawn due to Congressional opposition Finally, Chevron Corp., the second-largest U.S. oil company, bought Unocal with a bid $700 million less than Cnooc's offer.	1/ Deutsche Bank Research: Sovereign Wealth Funds—State Investment on the Rise, 10-09-07 2/www.globalpolitician.com —Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07) 3/ BN, PrimeWest rises as Canada reviews takeover rules (Update 1), Oct 4 2007
2	Dubai Ports Word (a company owned by the government of Dubai) 2006	Tthe attempt to acquire the Peninsular and Oriental Steam Navigation Company (P&O), domiciled in London, which was then the fourth largest ports operator in the world, running major US port facilities in New York, New Jersey, Philadelphia, Baltimore, New Orleans, and Miami. The eventually failed transaction was a catalyst for the debate on a reform of the existing CFIUS US (Committee of Foreign Investment in the United States) legislation in the US. Dubai Ports World was forced to sell five port terminals it acquired when it bought P&O in 2006.	Deutsche Bank Research: Sovereign Wealth Funds—State Investment on the Rise, 10-09-07 www.globalpolitician.com—Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07)
3	Temasek 2006	Controversial operation—Temasek Holdings purchased a stake in the company owned by the ousted prime minister of Thailand, Thaksin Shinawatra.	1/Bloomberg (IHT), IHT: US Fears overseas funds could 'buy up America' undue 2/ The Economist, The world's most expansive club—24-05-07
4	Gazprom 2006	A bid for Centrica, the UK utility—UK government was divided over this transaction.	www.globalpolitician.com —Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07)
5	Dubai Aerospace, September 2007 ..... Canada Pension Plan, September 2007	Dubai Aerospace abandoned a NZ$2.6 billion plan to buy 51 percent of Auckland International after two city councils with a combined 23 percent holding objected to the sale. Dubai's bid was endorsed by the airport company because it would help attract more airlines and passengers ..... Offer to buy a significant minority stake of Auckland International Airport Ltd. The offer has not been officially made so far.	BN, Canada Pension Offers to buy Auckland Airport Stake (Update 4), Sep 19 2007 ..... BN, Canada Pension Offers to buy Auckland Airport Stake (Update 4), Sep 19 2007
6	Norwegian Fund 'recently'	Norwegian fund pulled its investment out of Wal-Mart, citing accusations that it has violated child-labor laws and scuttled efforts by employees to unionize.	Bloomberg (IHT), IHT: US Fears overseas funds could 'buy up America' undue

Actions of authorities

	Who	Action	Source
1	G7, October 2007	Finance ministers from the G-7 countries and central bankers are to discuss during the meeting in Washington how to deal with the sovereign-wealth funds. Trichet said that the funds are becoming an issue which could hamper global prosperity if it is not solved.	BN, Trichet says state-run funds must act transparently, Sep 29 2007
2	EU	EU Monetary Affairs Commissioner Joaquin Almunia told the Financial Times that the funds could have their investments restricted in Europe unless they reveal more about their intentions and strategy.	BN, Trichet says state-run funds must act transparently, Sep 29 2007
3	US	The U.S. has urged the International Monetary Fund to help oversee governance and transparency issues with the funds.	BN, Trichet says state-run funds must act transparently, Sep 29 2007
4	OECD	Organization for Economic Cooperation and Development is working on ways governments can review the investments without hindering free trade and capital flows.	BN, Trichet says state-run funds must act transparently, Sep 29 2007
5	Great Britain	Public policy with regard to takeovers in Britain focuses almost exclusively on whether they are likely to damage competition. That's rarely the case with sovereign wealth fund investment.	Bloomberg (IND) Independent: Concern Grows Over Sovereign Wealth Funds, Sep 11 2007
6	Germany, August 2007	Angela Merker said that the legislation introducing restrictions on SWF takeover of German enterprises should be considered.	
7	European Commission	Actions directed toward the assessment whether SWFs do not endanger to the EU's free market.	
8	Canada	The takeover surge led the opposition Liberal Party to ask for a moratorium and a review of whether ownership rules are lax. Currently transactions are reviewed under the Investment Canada Act. Industry Minister can block a proposal if it wouldn't yield "net benefits" to the economy, such as more productivity or research and development. Former minister Maxime Bernier, appointed a panel to study the issue, including whether the law needs a new security clause for foreign takeover reviews.	BN, Canada says PrimeWest bid will be reviewed 'as others would', Sep 25 2007
9	EU, September 2007	The European Union executive adopted hard-fought proposals aimed at forcing big energy utilities to separate power generation from their transmission networks. The legislation will bar foreign firms from controlling European networks unless their companies play by the same rules as EU firms and if their home country has an agreement with Brussels. Russian officials said that such limits are against the free market spirit of the European Union and amount to state protectionism.	Reuters, 19-09-07—Update3—EU tackles Russia, utilities with energy shakeup

MICHAŁ PENKALA

THE ENIGMA OF CHINA

The rise of China and myriad consequences accompanying the process are largely seen as the most fundamental transformation of our times. Indeed, perceiving the Middle Kingdom as the most important contender for hegemony in a post-American world has increasingly become something of a "common wisdom". Beyond any doubt, China's economic performance over the past quarter of a century has been nothing short of breathtaking. Between 1978 and 2003 *per capita* income in China rose annually by 6.1 percent which means that during that period the income of an average Chinese citizen increased by 337 percent. In January 2006 China overtook Great Britain and France in terms of GDP size. Goldman Sachs, one of world's leading investment banks, estimates that by 2027 China will have overtaken the United States as the world's largest economy (though it should be noted that, owing to huge demographic differences, China will only need one fifth of the US productivity levels to acquire the same size of GDP). The Middle Kingdom managed to combine strong economic performance with impressive social achievements. Between 1978 and 2001 the number of people living below the poverty line fell from 250 million to 29 million. However, such numbers should be treated with caution as this type of data is considered to be highly controversial. Nevertheless, the fact that China managed to lift 200 million people out of poverty over a relatively short period of time should be recognized as a major success. After all, on numerous occasions the World Bank has praised Chinese achievements in this area. The following table[1] presents some basic macroeconomic data about China, as well as some short-term prognosis:

Key indicators	2007	2008	2009	2010	2011	2012
Real GDP growth (%)	11.9	9.6	9.0	8.9	8.8	8.5
Consumer price inflation (%; av)	4.8	5.9	3.6	3.8	3.9	3.9
Budget balance (% of GDP)	0.7	0.5	0.4	0.4	0.2	0.1
Current-account balance (% of GDP)	11.8	10.5	9.6	9.2	8.2	6.9
Commercial bank prime rate (%; year-end)	7.5	7.9	7.9	8.1	8.1	8.1
Exchange rate Rmb: US$ (av)	7.61	6.88	6.55	6.30	6.10	5.92
Exchange rate Rmb: ¥100 (av)	6.46	6.82	6.82	6.74	6.65	6.45

Still, the more one starts looking beneath the surface, the more problematic the "Chinese model" starts to appear. There are many flaws and drawback that tend to be overlooked—mainly because of the media hype surrounding the rise of China. In order to fully grasp the huge

[1] Source: http://www.economist.com/countries/China/profile.cfm?folder=Profile%2DEconomic%20Data.

changes taking place at breakneck pace in the Middle Kingdom, it might useful to look at the rise of China from a more critical angle.

"From the heights of Olympus to the plains of Thessaly"

In 1957 Calvin B. Hoover, an American economist, wrote an article warning that the impressive growth rate achieved by the Union of Soviet Socialist Republics, as well as several other countries belonging to the so-called "Eastern bloc", posed a serious threat for the United States. He noted that the growth rate in the communist economies was "twice as high as that attained by any important capitalistic country over any considerable number of years [and] three times as high as the average annual rate of increase in the United States". He concluded that "a collectivist, authoritarian state" was more likely to achieve rapid economic growth than a free-market democracy and assumed that the Soviet Union would overtake the United States in terms of GDP size by the early 1970s.[2] Such projections were not uncommon in that period. Indeed, high growth rates achieved by the communist economies prompted Wassily Leontief to declare that the Soviet economy—"directed with determined ruthless skill"[3]—was bound to surpass the United States sooner rather than later. Those economic analyses rested on two assumptions. First, it was believed that the countries of the liberal West were able to learn from the Soviet experience and copy some of the solutions being applied in the communist bloc and, by doing so, accelerate their own growth rate. Second, it was assumed that the growth of communist economies had virtually no limits and that it could go on forever. Had it been so, the countries of the Soviet bloc would have overtaken the Western world in terms of GDP size and *per capita* income. Nowadays such assumptions might seem funny and strike us as completely unrealistic. Yet, in the 1950s and 1960s it was a completely different story. In 1959, during a hearing held by the Joint Committee of the US Congress, the then CIA director, Allen Dulles, warned that: "If the Soviet industrial growth rate persists at eight or nine percent per annum over the next decade, as forecast, the gap between our two economies will be dangerously narrowed."[4]

No such thing of course occurred. Why was it so? Why did the Soviet growth stall? Paul Krugman, a leading US economist, explained it the following way: "Communist growth rates were certainly impressive, but not magical. The rapid growth in output could be fully explained by rapid growth in inputs: expansion of employment, increases in education levels, and, above all, massive investment in physical capital. Once those inputs were taken into account, the growth in output was unsurprising—or, to put it differently, the big surprise about the Soviet growth was that when closely examined it posed no mystery. Rapid Soviet economic growth was based entirely on one attribute: the willingness to save, to sacrifice current consumption for the sake of future production. The communist example offered no hint of a free lunch."[5] This of course discredited the notion that Western countries could borrow from the Soviet experience and boost their own growth rates. Furthermore, a closer look at the foundations of Soviet economic growth made at clear that simply projecting the growth rates of the communist economies into the future greatly overstated their prospects. Why so? "Economic growth that is based on expansion of inputs, rather than on growth in output per unit of input, is inevitable subject to diminishing returns. It was simply not possible for the Soviet economies to sustain the rates of growth of labor force participation, average education levels, and above all the physical capital stock that had

[2] Quoted in: P. Krugman: *The Myth of Asia's Miracle* (in:) Foreign Affairs; November/December 1994, p. 65.
[3] Ibidem, p. 66.
[4] Ibidem, p. 78.
[5] P. Krugman: *The Myth of Asia's Miracle*..., p. 63.

prevailed in previous years."[6] However, when the effort was undertaken to measure and account for the sources of Soviet economic growth, it was commonly assumed that economic expansion in the communist bloc would reflect both: huge increases in input level and rapid efficiency gains. But the researchers encountered a completely different reality: "What they actually found was that Soviet growth was based on rapid growth in inputs—end of story. The rate of efficiency growth was not only unspectacular, it was well below the rates achieved in Western economies. Indeed, by some estimates, it was virtually nonexistent."[7] So the lessons from the Soviet growth experience turned out to be completely different. First, the strength of the communist countries lay in mobilizing resources rather than using them more efficiently. Second, input-driven growth is always a limited process bound to slow down at some point. Hence, instead of overtaking the United States, the Soviet economy ended up on the "ash-heap of history".

Surprisingly, much of what has just been said (or, more precisely, reminded) about the Soviet economy and its once envied growth rates applies to the experience of the so-called "Asian tigers". Singapore can serve as a good example. Between 1966 and 1990 its economy grew by 8.5% a year whereas *per capita* income increased at an annual rate of 6.6% (which means it almost doubled every decade). Small wonder this little country has been hailed as an "economic miracle" that the Chinese authorities would like to emulate. But, as Krugman noted, "the miracle turns out to have been based on perspiration rather than inspiration: Singapore grew through a mobilization of resources that would have done Stalin proud. The employed share of population surged from 27 to 51 percent. The educational standards of that workforce were dramatically upgraded: while in 1966 more than half the workers had no formal education at all, by 1990 two thirds had completed secondary education. Above all, the country had made an awesome investment in physical capital: investment as a share of output rose from 11 to more than 40 percent."[8] If we take into account the above-mentioned facts, it will immediately become clear that Singapore's success owes much to one-time changes that simply cannot be repeated. It took a quarter of the century to double the employment rate but it is impossible to double it again. The bulk of the country's workforce used to be undereducated—now most of the workers own a high school diploma. Yet, further improvements in the educational levels of Singaporeans (eg. increasing the number of workers with a Ph. D. degree) might be difficult to achieve. Also, it is unlikely that the investment share of GDP—40%—could be yet increased to, say, 70%. What conclusions can be drawn from the experience of the "Asian tigers"? Krugman notes that: "Singapore's case is admittedly the most extreme. Other rapidly growing East Asian economies have not increased their labor force participation as much, made such dramatic improvements in educational levels, or raised investment rates quite as far. Nonetheless, the basic conclusion is the same: there is startlingly little evidence of improvements in efficiency. Kim and Lau conclude of the four 'Asian tigers' that 'the hypothesis that there has been no technical progress during the postwar period cannot be rejected for the four East Asian newly industrialized countries.' Young, more poetically, notes that once one allows for the rapid growth of inputs, the productivity performance of the 'tigers' falls 'from the heights of Olympus to the plains of Thessaly'."[9] Let us now turn to the case of China and examine whether the Middle Kingdom might be following in the footsteps of other countries that were believed to be sure contenders for economic hegemony but, in the end, failed to live up to such expectations proving that they were in fact "paper tigers" perspiring rather than inspiring.

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[6] Ibidem, p. 64.
[7] Ibidem, p. 66.
[8] P. Krugman: *The Myth of Asia's Miracle*..., p. 71.
[9] Ibidem, p. 72.

"The Myth of Asia's Economic Miracle" Revisited

This somewhat lengthy introduction is to serve as a reminder that much of the hype accompanying "the rise of China" is not entirely new. Although it would be wrong to simply claim that the Middle Kingdom is following in the footsteps of the Soviet Union, it is, however, important to remember that the "Chinese model" is not entirely unique. A combination of undemocratic (authoritarian rather than totalitarian) form of government, huge mobilization of resources, massive capital investment, expanding labor participation, "developmental state" and startling growth rates—all that is commonly associated with contemporary China—is to a large extent a repetition of the "Asian tigers" scenario. The same scenario that Paul Krugman (as well as other economists) "deconstructed" some time ago. It should be remembered that in his article the US economist dealt with the issue of China as well. He noted: "Accounting for China's boom is difficult for both practical and philosophical reasons. The practical problem is that while we know that China is growing very rapidly, the quality of the numbers is extremely poor. It was recently revealed that official Chinese statistics on foreign investment have been overstated by as much as a factor of six. The reason was that the government offers tax and regulatory incentives to foreign investors, providing an incentive for domestic entrepreneurs to invent fictitious foreign partners or to work through foreign fronts. This episode hardly inspires confidence in any other statistic that emanates from that dynamic but awesomely corrupt society. The philosophical problem is that it is unclear what year to use as a baseline. If one measures Chinese growth from the point at which it made a decisive turn toward the market, say 1978, there is little question that there has been dramatic improvement in efficiency as well as rapid growth in inputs. But it is hardly surprising that a major recovery in economic efficiency occurred as the country emerged from the chaos of Mao Zedong's later years. If one instead measures growth from before the Cultural Revolution, say 1964, the picture looks more like the East Asian 'tigers': only modest growth in efficiency, with most growth driven by inputs."[10] Paul Krugman delivered his verdict on the "East Asian miracle" in 1994. How much has changed in the Middle Kingdom ever since? "Many concerns focus on worrying shift in the nature of China's economic growth over the past decade. The OECD report, which took five years to complete, praised China's bold reforms and its impressive growth in total factor productivity. In the quarter century leading up to 2003 (the last year of the study), China's annual increase in total factor productivity averaged 3,7 percent—higher than in OECD countries and way more than American average growth of about 1 percent overt the past 10 years. But in the past decade, annual employment growth in China has dropped, meaning the economy's ability to absorb labor has weakened. Investment growth per unit of labor has skyrocketed. And total factor productivity growth has shrunk—meaning that China's economic miracle in the past decade, compared with the previous 15 years, has been built on less-rapid growth of the labor pool, lower productivity gains and much higher investment. The danger is not necessarily a debt crisis, but a sharp slowdown when investment stops pouring in."[11] (Total factor productivity [TFP] plays a crucial role in the process of development. TFP is a measure for the efficiency with which labor and capital are used. Economists think that TFP is a better measure of technological progress than labor productivity, which is largely driven by rates of capital spending. Many factors influence TFP, such as labor market flexibility, education levels, regulatory frameworks, and the general climate for innovation. But the level of expenditure and diffusion of ICT throughout the economy is crucial.) So it might happen that after a period of significant efficiency gains (and it should be remembered that China actually started its rapid growth phase from a very low level since its economy had been mainly based on rural communes)—associated mainly with liberalizing the

[10] P. Krugman: *The Myth of Asia's Miracle...*, p. 74.

[11] M. Liu: *How High?* (in:) Newsweek Special Edition: Issues 2006, December 2005—February 2006, p. 35.

Chinese manufacturing sector and opening up the economy for foreign companies that brought with them new technologies—China might be returning to the pattern of development typical of "East Asian tigers". What is perhaps most striking is that China is emulating the development model of the countries of the Far East rather unsuccessfully. Although the Chinese performance might look impressive at the first glance—337 percent increase in GDP *per capita* between 1978 and 2003 (compound rate of 6.1 percent a year)—it is actually far from record-breaking. Japan's *per capita* GDP rose by 490 percent (!) between 1950 and 1973. South Korea maintained 7.6 percent compound growth a year between 1962 and 1990. Between 1958 and 1990 annual *per capita* income growth rate in Taiwan was 6.3 percent. All the successful economies of the Far East performed better during their boom years than China is performing nowadays. Martin Wolf, "Financial Times" economic commentator, explained this fact in the following manner: "It may not seem fair to compare China to these smaller economies. That's true. China should have outperformed them all. The speed with which a country can grow is a function of how far it is lagging behind productivity levels of the world's most advanced economies. That is why each generation of catch-up economies has tended to grow faster than the previous one. When China's surge began, its *per capita* GDP was only a twentieth of that of the United States. Even now, after 25 years of growth, China's *per capita* output is only 15 percent of that of the United States. Japan's was a fifth of that of the United States in 1950, even before its record-breaking growth surge began."[12] Wolf also mentions the "successful ingredients" that seem to be necessary for a "catch-up process": hardworking, cheap labor force; the ability to transfer huge numbers of workers from low-productivity agriculture to higher-productivity manufacturing; political stability and an effective, development-oriented government. However, as Wolf notes: "China possesses something else few ever do: an extraordinary high rate of investment. At more than 40 percent of its GDP, the country's fixed investment is probably highest ever achieved in a large economy. Nor has any country ever been awash in so much capital at this stage of its development. For example, China's *per capita* GDP (at purchasing power parity, or internationally comparable prices) is roughly the same today as South Korea's was in 1982, Taiwan's in 1976, and Japan's in 1961. But, in those years, Japan's investment rate was just above 30 percent of GDP, and South Korea's and Taiwan's were both below 30 percent. None of those countries invested as much capital at comparable stages in their development as China does today"[13] The question that begs to be answered is: Why has China grown at a slower pace than other "East Asian tigers" given the huge increase in inputs: capital and labor? The answer could be taken straight from Paul Krugman's essay: inefficiency. As Wolf explains: "China's economy is still highly inefficient. The voracious maw of China's state owned enterprises accounts for much of this drag. Between 1993 and 2000, more than 60 percent of all loans went to these state owned behemoths. The county's notoriously high level of bad loans tell you how good an investment they have been: The Standard & Poor's rating agency currently estimates that China's banks have issued about $650 billion in bad loans, or about 40 percent of outstanding loans. If an economy growing at close to 10 percent a year generates bad loans on this scale, the misallocation of capital has to be gigantic. Although countries such as South Korea or Taiwan may not have had as much capital, they obtained considerably more growth for their investment buck. The same was true of Japan in its high-growth phase. The same is true of India today. (...) Given China's ample opportunities and investment, it should have raised living standards even faster than it did."[14] Extremely high levels of investment (misallocated in many cases[15]), low efficiency and heavy reliance on

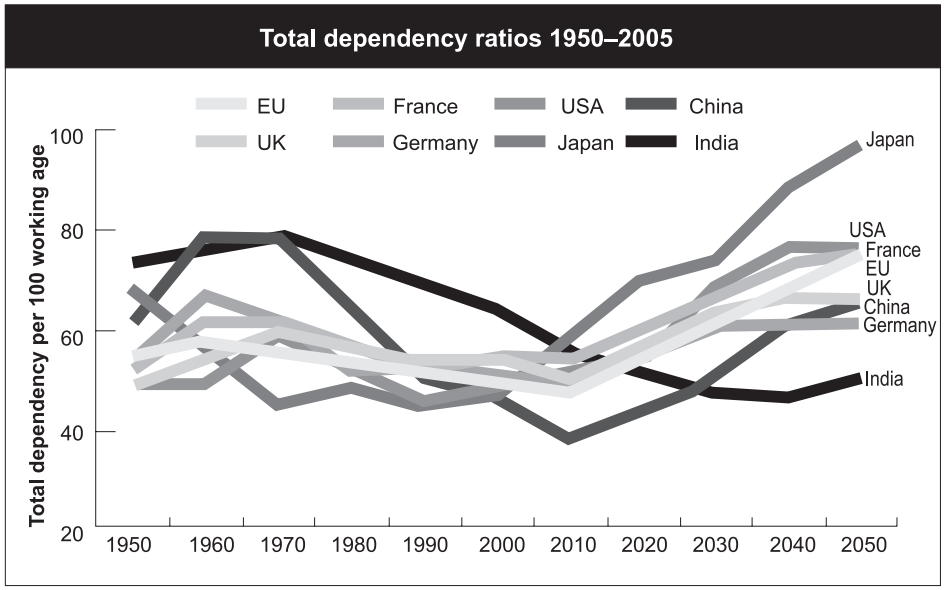
[12] M. Wolf: *Why is China Growing so Slowly?* (in:) Foreign Policy January-February 2005, p. 50–51.

[13] Ibidem, p. 51.

[14] Ibidem, p. 51.

[15] Indeed, the World Bank estimates that up to one third of all investment decisions in China between 1991 and 2000 should be considered "misguided". China's steel sector (the largest in the world) is a point in case. Its productive

cheap, hard-working labor—all this points exactly to the conclusion Paul Krugman reached when discussing the "Myth of Asia's Miracle". However, for the Chinese leadership there are other worrying signs on the horizon as well. First, it should be remembered that China is a fast ageing society. The following graphs[16] depict the ongoing demographic decline of the Middle Kingdom:



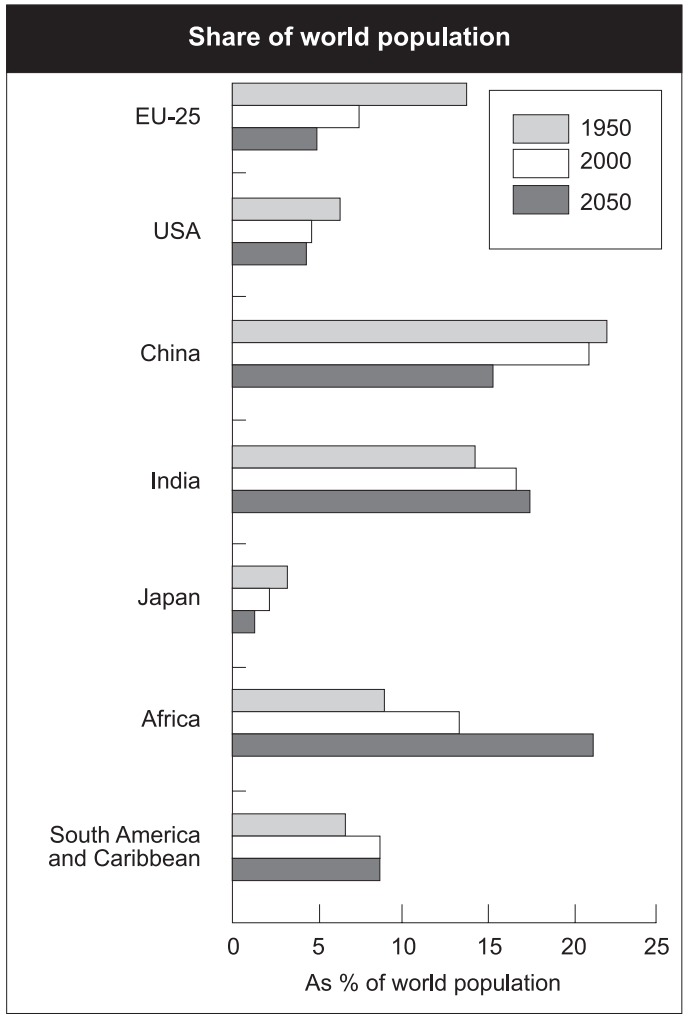
Source: UN, `World population prospects: The 2004 revision', 2005.

"Unlike the populations of developed countries, China is poised to get old before it gets rich. China's winning combination of cheap, abundant and youthful labor and massive capital investments may last for only another decade, says Prof. Yang Fan of the People's University of Politics and Law. 'By 2015 China will have entered its graying period. This will be a big crisis, and the reason why we need to focus on the knowledge economy.'"[17] Although the problem of "demographic decline" and "ageing societies" is not limited to China, the impending crisis in the Middle Kingdom will be stronger than in developed countries simply because of lower levels of wealth. Shrinking population and pensioners in need of assistance will be a problem for the economy and yet another reason to boost productivity and ensure further economic growth.

capacity is currently some 30 percent (or some 116 million tons) bigger than the real needs. Such inefficiency and waste is a common thing in the Chinese economy. Moreover, that type of overcapacity might be dangerous given the fact that China's manufacturing is geared towards export activities. It should be remembered that Chinese export is heavily reliant on exchange rates. China's current account surplus has reached the level of 12 percent of China' GDP — a fact implying that the Chinese currency—renmibi—is strongly undervalued (a practice typical of all the "East Asian tigers"). If some factors were to trigger revaluation or appreciation of the Chinese currency, export from the Middle Kingdom might become far less competitive. And China's domestic market would have difficulties absorbing all the production glut stemming from overcapacities in its manufacturing sector.

[16] Both graphs come from: A Murray: *Growing Old Gracefully: How to Ease Population Ageing in Europe*, Center for European Reform EU 2020 Essay, p. 3 and 8.

[17] M. Liu: *How High?*, p. 35.



Source: United Nations, `World population prospects: The 2004 revision', 2005

However, it should be remembered that the very fact the society is ageing might be a serious obstacle to innovation-driven growth. Andrea Boltho, a British economist, explains this fact in the following manner: "Ageing has a longer run, indirect negative effect on the growth of both output and productivity of a non-economic nature. Old people are, on the whole, opposed to change and dislike new ventures. Old people are surely less innovative and less entrepreneurial than the young. Thus, America's advance in the new technologies may also have been helped by the relative youth of its population (both native and immigrant)."[18] And that is one of the assets that the Chinese economy might soon be lacking.

[18] A. Boltho: *What's Wrong with Europe?* (in:) New Left Review 22 July/August 2003, p. 22. However, there is another point of view on the issue of ageing society: "Economies, for example, can potentially benefit from a 'demographic dividend'—a decline in the fertility rate which results in a fall in the overall dependency ratio. At the same time, the labor supply can increase as more women enter the workforce. This large working age population saves for retirement, providing resources for further investment and offering a boost to the economy. By some estimates, up to a third of the East Asian economic 'miracle' can be attributed to this phenomenon. (...) Although there is some evidence that countries with a higher median age exhibit lower growth rates, the arguments in support of declining

China and the challenge of the "knowledge-based economy"

So the threats to China's future prosperity—low productivity, heavy reliance of foreign investment and ageing population—are very real.[19] Unsurprisingly, the Chinese leadership is trying to approach those issues proactively. In January 2006 China's Science and Technology Congress approved a new "Medium to Long Term Science and Technology Development Programme". The document states baldly that within the next 15 years R&D expenditure will reach 2% (in 2010) and then 2,5% (2020). "The plan says that advances in science and technology should eventually account for 60% of economic growth and that China should aim to be among top five countries worldwide in terms of patents and scientific citations. In his keynote speech to the Congress on 9 January 2006, President Hu Jintao called on China to become an 'innovation-oriented society'".[20] Obviously, China can already boast some successes in the field of high-tech economy, though these are mainly limited to "hardware production" rather than creating and implementing new ideas. A point in case: China is currently the world's biggest producer and exporter of various consumer electronics items, such as palmtop computers, DVD players, digital music players and digital cameras. However, if we look "beneath the surface" the picture will again be completely different. China does not (yet) have a vertically integrated economy (unlike, for example, Japan) and continues to function as the final stop in a globally integrated assembly line. It imports main components from Asian economies, assembles goods and ships them to the US and EU. "In 2003, intermediate goods produced by companies in Japan, Singapore, South Korea and Taiwan accounted for 34% of all Chinese imports (...) Also, because China serves essentially as a finishing shop, barely 20% of the value of the products it exports is actually captured by the Chinese economy."[21] Hence China's growing trade imbalances: $130 billion trade deficit with East Asia and $250 billion trade surplus with the US (as of 2007). However, the more sophisticated and advanced levels of the economy are taken into account, the poorer China performs. There are currently important obstacles that can easily undermine and, in the long run, derail efforts to

productivity in an ageing society are not entirely convincing. For one, they tend to confuse the related, but not identical, concepts of innovation and productivity. Economies can be productive without being innovative—particularly if they excel at perfecting innovations from elsewhere and embedding them in working practices. For another, while there does seem to be evidence that risk-taking declines with age, as the GEM report suggests, it is unclear whether it is age per se that matters or proximity to retirement. If retirement ages steadily increase, the period during which people feel able to take risks could conceivably be extended. In short, there is no straightforward correlation between a population's age structure and its record on innovation. Studies of the impact of demographic change on productivity are by no means all pessimistic. Two recent studies, for example, have concluded that ageing per se does not have a particularly strong impact on productivity. Others have stressed that it is not age but the amount of time spent in a job that matters in terms of improving productivity." A Murray: *Growing Old Gracefully*..., p. 20 and 23–24.

[19] As perhaps yet another warning against "irrational exuberance" when talking about contemporary China, one could quote Niall Ferguson, a leading British historian, in full length: "As is common in 'Asian tiger' economies, production is running far ahead of domestic consumption—thus making the economy heavily dependent on exports — and even further ahead of domestic financial development. Indeed, no one knows the full extent of the problems in the Chinese banking sector. Those Western banks that are buying up bad debts to establish themselves in China must remember that this strategy was tried once before: a century ago, in the era of the 'Open Door' policy, when American and European firms rushed into China only to see their improvements vanish amid the turmoil of war and revolution. Then, as now, hopes for China's development ran euphorically high, especially in the United States. But those hopes were dashed, and could be disappointed again. A Chinese currency or banking crisis could have immense ramifications, especially when Western investors realize the difficulty of repatriating assets held in China. When foreigners invest directly in factories rather than through intermediaries such as bond market, there is no need for domestic capital controls. It is no easy thing to repatriate a steel mill." N. Ferguson: *Colossus. The Rise and Fall of the American Empire*, Penguin Books, 2005, p. xxiv.

[20] J. Wilsdon, J. Keeley: *China: The Next Science Superpower?*; report available at www.demos.co.uk

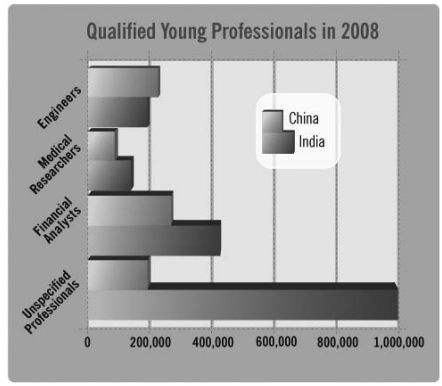
[21] D. D. Hale, L. H. Hale: *Reconsidering Revaluation. The Wrong Approach to the US-Chinese Trade Imbalances* (in:) Foreign Affairs January-February 2008, p. 62.

transform China into "innovation-oriented society". The biggest problem might turn out to be low levels of human capital and lack of "creative ecosystems" to nurture, foster and absorb domestic (as well as foreign) talent. The second issue has been best captured by Richard Florida, a leading researcher on innovation, creativity and talent. As far as China is concerned, Florida notes the following: "This is not to say that Indians and Chinese are not innovative. On the contrary, AnnaLee Saxenian, of the University of California at Berkeley, has shown that Indian and Chinese entrepreneurs founded or co-founded roughly 30 percent of all Silicon Valley startups in the late 1990s. But these fundamentally creative people had to travel to Silicon Valley and be absorbed into its innovative ecosystem before their ideas became economically viable. Such ecosystems matter, and there aren't many of them."[22] As far as the first issue—lack of creative, talented and well-educated people—is concerned, the problem has been to a great extent examined by the McKinsey Institute. In a series of reports and publications on China as a potential outsourcing hub for more advanced services, the problem of lack of sufficiently skilled workers is emphasized over and over again—even though the numbers of graduates in the most important areas (engineering, management, etc.) are extremely high. As the authors of one of those reports point out: "China currently accounts for less than 10 percent of the global market for the offshoring and outsourcing of services. Yet McKinsey research— including interviews with officials at many Chinese government agencies, executives at Chinese leading services providers, and managers at Chinese services-outsourcing parks—suggests that by implementing an aggressive strategy to develop the sector and cultivate talent, the country could capture opportunities worth $56 billion a year by 2015. China faces formidable challenges but can also draw on unique strengths. The country's two million Japanese and Korean speakers, for example, should help it increase its lead in the North Asian market for the 'near-shoring' of IT application and business-process-outsourcing (BPO) services. But a dearth of workers who can manage international projects and have strong English-language skills will make it harder for the country to become a leading provider of services to companies in Europe or the United States."[23] Some further weaknesses are also pointed out in the text. These include: lack of specific skills or low levels of such skills (eg. in mainframe), no data privacy protection (hence China's perception as a high-risk country), lack of access to end costumers (in IT services) since Chinese companies are usually subcontracted to those with direct access, as well as weak protection of intellectual property (resulting in negative global reputation). But the problem is both: qualitative and quantitative. "China's pool of university graduates is enormous. The country will produce 3.1 million college graduates this year [2005], the United States only 1.3 million. Meanwhile, China's engineering graduates will number over 600 000, those of the United States only about 70 000. These armies of new Chinese graduates reinforce an already impressive pool of labor: in 2003 China had roughly 9.6 million young professional graduates with up to seven years' work experience. Despite this apparently vast supply, however, multinational companies are finding few graduates have the necessary skills for service occupations. According to interviews with 83 human-resources professionals involved with hiring local graduates in low-wage countries, less than 10 percent of Chinese job candidates, on average, would be suitable for work in a foreign company in the nine occupations under scrutiny: engineers, finance workers, accountants, quantitative analysts, generalists, life science researchers, doctors, nurses, and support staff. Consider engineers. China had 1.6 million young professionals, more than any other country examined. Indeed, 33 percent of the university students in China study engineering, compared with 20 percent in Germany and just 4 percent in India. But the main drawback of Chinese applicants for engineering jobs, our interviewees said, is

[22] R. Florida: *The World is Spiky. Globalization has changed the economic playing field, but not leveled it* (in:) The Atlantic Monthly October 2005, p. 49; http://www.creativeclass.org/acrobat/TheWorldIsSpiky.pdf

[23] E. Benni, A. Peng: *China's opportunity in offshore services* (in:) The McKinsey Quarterly May 2008, p. 2.

the educational system's bias toward theory. Chinese students get little practical experience in projects or teamwork compared with engineering graduates in Europe or North America, who work in teams to achieve practical solutions. The result of these differences is that China's pool of young engineers considered suitable for work in multinationals is just 160 000—no larger than the United Kingdom's. Hence the paradox of shortages amid plenty."[24] The following graphs[25], comparing China and India in terms of their "talent pools", clearly demonstrate the constraints on China's future growth potential in more advanced, knowledge-intensive sectors. As Diana Ferrell, a McKinsey director, notes: "India is not only producing more young professionals, it is producing better qualified ones, too. According to a survey of local recruiters, only 10 percent of China's engineers have the skills necessary to work in a multinational corporation, compared to 25 percent of engineers in India. By 2008, India's total pool of qualified graduates will be more than twice as large as China's. If India's universities continue to churn out top-notch talent, its younger, cheaper, and larger professional workforce could help India edge out its neighbor to the east."[26]



Perhaps the above mentioned factors, as well as China's "closed" political system, explain why the Middle Kingdom is clearly lagging behind India in terms of software production. And it should be remembered that software development is the highest level in the area of high-tech production. "China launched a program of software industry development in the 1980s, almost concurrent with India. But clearly, after two decades of development, the Indian software industry has surpassed China on many accounts. In terms of Indian rupees, the compound annual growth rate (CAGR) of India over the past five years has been as high as 62.3%. In 2000–2001, the software industry in India was worth US$8.4 billion, of which domestic sales and software exports were US$2.2 billion and US$6.2 billion, respectively. As a comparison, China's software industry was worth US$6.8 billion, with only US$0.4 billion of exports in the same period."[27] The table[28] on the following page shows the quantitative differences between China and India in terms of software development.

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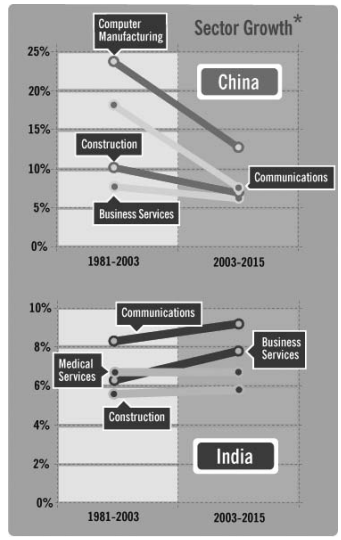
[24] D. Farrell, A. Grant: *Addressing China's Looming Talent Shortage*, McKinsey Global Institute and McKinsey & Company's China Office, p. 5–6.

[25] D. Farrell: *India Outsmarts China*; http://www.foreignpolicy.com/story/cms.php?story_id=3348&page=3

[26] D. Farrell: *India Outsmarts China*; http://www.foreignpolicy.com/story/cms.php?story_id=3348&page=4.

[27] Mingzhi L., Gao M.: *Strategies for Developing China's Software Industry* (w:) Information Technologies and International Development , no. 1 (Fall 2003), p. 64.

[28] Ibidem, p. 66.



Finally, there is the issue of intellectual property protection. It is perhaps a little known fact that—contrary to notions of China being a technological powerhouse—the Chinese system suffers form some significant shortages. "So much of China's growth and development has relied on imported technologies that only 0.03 percent of Chinese firms own the intellectual property rights of the core technologies they use. This acts as a serious constraint on profitability. Universities and research institutes are becoming more productive, but Chinese enterprises still lag behind in terms of research and development intensity and patenting, spending on average only 0.56 percent of turnover on R&D expenditure. Even in large firms that rises to just 0.71 percent."[29] In 2005 China's share of international patents filed with World Intellectual Property Organization was only 1.4 percent. The most staggering statistic is perhaps the share of Chinese enterprises that have never applied for patents: 99 percent, according to World Intellectual Property Organization. Despite the fact that intellectual property rights in China are much cheaper than in G8 countries (around 10 percent of their equivalents in Western countries), only 10 percent of Chinese IP rights are recognized as "good quality". Small wonder that, as is noted in another McKinsey Institute report on China, "support from the Chinese government and 'not being subject to stringent enforcement of patent and copyright regulations' are important competitive advantages of Chinese companies; these two issues have long troubled foreigners doing business in China and apparently remain significant worries."[30]

Table. Estimated Composition of IT Market in China and India, 1995 (%)

	Percentage of IT Expenditure		
Country	Hardware	Packaged Software	Services
Mainland China	88.1	4.6	7.3
India	62.2	5.7	32.1

Source: Organization for Economic Cooperation and Development, *Information Technology Outlook 1997*

[29] J. Wilsdon, J. Keeley: *China: The Next Science Superpower*..., p. 9.
[30] *Competition from China: Two McKinsey Surveys* (in:) McKinsey Quarterly April 2008, p. 4.

Conclusions

All the above-mentioned factors seem to be pointing to the conclusion that China is far from being and, in foreseeable future, becoming an innovative knowledge economy. Its main source of competitive strength still stems from cheap labor pool, which, due to demographic factors, is bound to shrink. So far there has been little endogenous innovation in the Chinese economy. Hence, the question that perhaps should be asked is whether China must first undergo some sort of profound political transformation before it is able to become a juggernaut for the Information and Knowledge Age. Indeed, "accelerating the pace of innovation will require Beijing to free the flow of information, particularly in cyberspace, where it has begun to crack down on dissent. Today most innovation comes out of private enterprise—especially foreign-run research by giants such as Microsoft and Motorola. The OECD says continued growth in productivity depends on restructuring state-run firms at a time when joblessness due to privatization is stirring labor unrest. Chinese leaders have slowed the pace of privatization. To keep its miracle alive, China's communist mandarins may need to embrace reforms that they have reason to fear."[31] But the alternative might turn out to be a fall "from the heights of Olympus to the plains of Thessaly".

[31] M. Liu: *How High?*, p. 35.

A DAY IN THE LIFE OF *HOMO SAPIENS GLOBALUS*

Address by Krzysztof Rybiński,

11th Teleinformatics Forum
21 September 2006, Legionowo

Ladies and Gentlemen,

Today, I would like to present a vision of the citizen of the world in the year 2026. *Homo sapiens globalus* will be found almost everywhere on the globe, and his traits will be identified by his ability to capture the benefits brought by the global financial market, global labour market, and global knowledge market. He will work, obtain information, establish and foster his professional relations as well as arrange his leisure activities primarily with the aid of the Internet. *Homo sapiens globalus* has mastered the fine art of capturing the benefits of the (continuously improved) functions available on the Internet. He is able to absorb frequent changes, and he turns them to his advantage. This makes him increasingly effective, knowledgeable, and capable of pursuing activities he finds interesting.

Let us now consider a typical example of *homo sapiens globalus*, namely John Global. I would like to introduce him to you, but in order to do so, I have to take you on a short journey. This will be time and space travel. Just imagine that by the time I will have finished the previous sentence, twenty years have passed. This means that we are now in the year 2026. In order to prepare for the meeting with John Global, I suggest that we take a closer look at his daily routine.

Let us take a sunny day of September 2026.
Time: 5 a.m. Place: somewhere in the city of Poznań.

John Global is still asleep, but the world is already getting ready to wake him up. The news aggregator is ready to provide him with a set of most recent news in line with his interests. As John Global tends to look through newspapers before 07:00 CET when he is in Poznan, and before 16:00 CET when he is in Hong Kong, the aggregator is already preparing a 'special edition'. And Global always begins his day with looking through online newspapers and drinking well-brewed coffee. Coffee is one of his indulgences, a look back to recall past events, as coffee has been his morning ritual for more than 20 years. As far as other things are concerned, our Global tries to be more flexible and not to fall into any habits.

It's 6:30 a.m.

John Global wakes up. He enjoys the view from the window—the forest and lake. It is indeed different from the one he saw two days ago in Hong Kong—skyscrapers and smog blotting out the sun. He left Warsaw for Poznan 20 years ago, in 2006, when he realized that administrative issues are too time-consuming and generate negative emotions. It was at that time— as early as in August 2006—that Poland's first fully electronic public service was launched in Poznan. This service helps make transactions via the Internet. This means that it is possible to download and fill in an electronic form, authorize it (for instance with electronic signature), make a payment (including stamp duty) and receive confirmation that a given service has been provided by the e-authority—and all this takes place via the Internet. If a physical document is necessary (extremely rarely though it happens in 2026), the relevant document is delivered to the indicated address by courier within 24 hours. When Global was moving to Poznan, he was hoping that e-government would grow fast here, and that it will be possible to set up a company via the Internet within several minutes or to file a passport application from any photographer's shop immediately after the photo has been taken, etc. He knew that things already looked like this in many places around the globe, but not yet in Poland. He analyzed strategic documents of local authorities in Poznan, took a closer look at their aims and methods to measure the results, and decided that Poznan was very likely to meet his expectations. He knew that government bodies were frequently inefficient only because they did not know or employ modern yet already proven methods of administration. Poznan, however, was different. Here, everything was well thought-out, consistent and done so as to fulfil a clear vision of e-government that was supposed to be citizen-friendly and to make their life easier. And Global was not in the wrong. He is still satisfied with his choice. It is worth mentioning that he hesitated over the decision to move. The final straw was an argument at Warsaw district office where Global had gone to in order to obtain some certificate. The certificate was ready, but Global—who had paid the stamp duty by an online transfer—had no proof of payment. Without such confirmation the officer would not issue the certificate. The argument reached its climax when the officer shouted out his anger: 'If only you had paid in cash at the counter here, there would be no problem now!'

Today, in September 2026, John Global recalls this situation with a tint of amusement. How things have changed since that day, and how much easier life is now. Today, administrative issues take him only several minutes monthly, because all these are handled via the Internet, regardless whether located in Asia or Europe. And officers are doing their utmost to provide services to John Global efficiently, as the contract for these services will only be renewed when customers are satisfied with them. Needless to say, customer satisfaction surveys take place via the Internet.

As for Global's satisfaction with his metabolism, he can measure it himself. He steps onto e-scales and it only takes him seconds to get feedback from the e-dietician. Things look good. Besides, he knows that his e-dietician has delivered relevant guidance to the restaurant where Global is going to have lunch with one of his friends.

Now it's time for his favourite coffee and online newspapers, that is a special edition of news, commentaries, lists, reports, quotes, similarities, differences etc. related to our Global's interests. News aggregator turns out to be very helpful in getting access to useful information, filtered from noise and randomness. While at home, Global looks through the newspapers using his TV-set. When he is out, he uses his communicator to do this (the name 'mobile phone' fell into disuse in 2015). Sipping his coffee, he starts reading. After a while, his wife joins in. They both use the aggregator, but they have different interests and different news search criteria. John Global's wife comes from Scotland. She is much attached to the Global Scott Network. She believes that the Scottish population is shrinking, so in order to sustain growth in Scotland it is necessary to employ the Scottish intellectual capital spread all around the world. The Global Scott Network

is so efficient, that it has been outpacing large competitive consulting companies for more than twenty years, by receiving orders related for example to biotechnological clusters. The Global Scott Network is an example of a diaspora understood as an ethnic or a religious community living in a foreign country or environment (e.g. the Chinese in the US, Jews in different countries or the Portuguese in France). A diaspora is characterized by an internal need to integrate, act together, help one another and to share one vision of the future. This internal motivation has been recognized as a fundamental factor behind the success of a community. It has been observed that talks, discussions and attempts to convince one another will never lead to the level of involvement and commitment present in diasporas, where participation and activities are voluntary. 'Death of distance' causes diasporas to be increasingly extensive. One example is the Mexican diaspora where the distance between two members was "up to two phone calls" already 20 years ago. This means that a person in need who has called up the diaspora for help had to wait only two phone calls to find somebody who would be able to help.

As a matter of fact, this very topic is already known to us, Poles. I am quite sure that you are familiar with the articles in the Polish press in the period from Poland's accession to the EU to the mid-2006. These articles lamented the fact that during this period more than a million people, mainly young Poles from the so-called PLN 1,200-gross-pay-generation, left Poland for other EU countries in search for work. It was not until 2007 that it became self-evident that this was not a tragedy but an opportunity for Poland, which got a million 'ambassadors' in Europe, who were hardworking, acquired new experience and spoke foreign languages. Similarly to the Global Scott Network, the Polish diaspora emerged in the European Union. Over time, this diaspora turned into the Global Polish Network. Therefore, we were successful in turning the brain drain into brain gain. Obviously, the Global Polish Network would not have been possible without the E-Ambassador Internet System, which was set up in 2007.

Whenever the Globals want to look together through the world news on issues they are interested in, they sit down so as to see the screen from different angles and each of them, holding their respective coffee cups and remote controls, looks through the Internet special edition produced by the aggregator. If they want to hear the sound, they just put on earphones.

7:00 a.m. After breakfast. Lucky. He can always get what he wants.

Lucky is a Bavarian Mountain Hound. He loves long walks, freedom and, above all, he adores roaming the neighbourhood. Obviously, Lucky has a microchip implanted behind his ear, and John Global's bicycle is equipped with a GPS, which keeps track of Lucky's every move. The system protects Lucky from getting into trouble, as it has been configured to send a messageto the communicators of every member of the Global family if the dog strays more than 200 metres away from the house (or the bicycle, depending on the circumstances) for more than 10 minutes.

8:00 a.m. After the walk.

John Global finds his son sitting in front of a computer, learning Mandarin Chinese. He is preparing for the Global Baccalaureate and has chosen Chinese as his foreign language because that is the most widely used language in the world.

The education system is becoming increasingly refined globally. This enables young people to have equal chances regardless of their country of origin. Every family that has a child of school age, has also a computer. The first country to put this goal into its development strategy was Singapore, which announced the iN2015 program—Intelligent Nation 2015. Singapore's success was a milestone in many countries' development. This is one of the reasons why computers are now treated by schoolchildren the way pens were some 20 years ago. Most of the classes

John Global's son attends are videoconferences, and materials can be obtained from vast online encyclopedia, which is constantly being updated by experts from all around the world and is available in any language. However, this afternoon he has got a real meeting in the Warsaw Rising Museum in Warsaw. He is going to meet with an international team working on an essay about Warsaw Rising for a global writing contest, which they are going to place online. A journey from Poznan to Warsaw takes now only 45 minutes (compared with 150 minutes 20 years ago), so he doesn't need to hurry. And a return ticket costs as much as a cinema ticket, so he can pay for it from his own pocket money that his father transfers every month to his RFID payment card in his watch. He pays for the ticket by simply placing his wrist in front of the ticket terminal.

Travelling has become so inexpensive as new cheap fuel was invented. John Global had the opportunity to work on this project ten years ago. At that time, he used to spend quite a lot of time in Hong Kong in the laboratory of a global fuel baron. Ever since, he has been frequently receiving lucrative job offers from Hong Kong (due to environmental pollution Hong Kong is becoming less attractive and Hong Kong-based companies try to compensate for this by offering higher pay). He occasionally accepts such offers, but he still spends most of his time working with experts in global networks. As a knowledge worker, he has no permanent job. He takes part in different projects on the basis of networking. These project are implemented not by specific companies (as was the case some 20 or 30 years ago), but by self-organizing networks of knowledge experts. Do you recall how innovative topical communities of practice seemed as they emerged at the turn of the 20th and 21st century? They gained momentum at the end of the first decade of our era, when it became self-evident that most innovations are developed outside organizations. For that very reason, it became necessary to develop relations between practitioners in a given field. As a consequence, self-organizing networks of knowledge experts were first formed. As a matter of fact, this was roughly how Web 3.0 was developed, a fact described in a book written by Thomas Friedman in 2005 and entitled *The World is Flat: A Brief History of the Globalised World in the 21st Century.*

One of the underlying principles operating in networks of experts is voluntary participation and the willingness to cooperate, just as is the case with diasporas. There are no geographic limitations, as they have been eliminated by the Internet. There are no language barriers, either, as Web 3.0 offers automatic translation live among several dozen world languages. There are no constraints in expert knowledge, as specialists in a given field provide inspiration for one another — ornithologists, chemists, biologists, engineers, economists and IT specialists can work on one project. This fosters creativity and innovation.

Currently, John Global is working on a number of projects, including organization of expert networks in public government bodies. These networks could operate effectively in the global market of public services. Little wonder that after his already mentioned experience with 'paying cash at the counter' Global was keen to join the team introducing innovative thinking and acting into public administration.

And how does e-government work in 2026?

There are no traditional buildings, long queues or problems with solving intricacies related to taxes or administration. Today, Global reaches the authorities through the global network from anywhere in the world by submitting documents signed with his own electronic signature. He does not have to carry a briefcase filled with documents, as was the case 20 years ago. Now, Global's unique ID allows to validate his authorization whenever necessary. An e-officer makes sure that Global is notified in advance of his civic duties by delivering him already prepared documents for approval via electronic mail.

Tax returns are a trifle, too. Global's employers transfer his remuneration to indicated bank account numbers, and details of his salary reach the relevant revenue office. Each year, he receives tax return from the revenue office, accepts it and sends it back to the office.

The current project's innovativeness consists in establishing specialized centres that would provide public services of highest quality, not only in terms of the country but also the entire world. Currently, the project of a global revenue service is being developed.

The project schedule is as important as the plan of project communication. It has long been known that projects usually end in failure not because they are bad but because somebody does not understand what his or her role in the process involves, or even why this process exists. Communication improves the level of understanding and acceptance on the part of all stakeholders. It helps create commitment observed in diasporas, and also creates room for internal motivation. It was as early as at the beginning of the 21 century that public administration in Singapore knew the art of project implementation, which institutionalised the role of communication in project planning.

1 p.m. Lunch with a friend.

Global brought him a small gift from his weekend family trip to an exotic country. It was a real bargain, and it only took a few minutes to arrange for the trip on the way home from the Friday visit to a modern art gallery. Both Global and his wife are lovers of modern art. All they had to do was to get in touch with their virtual travel agent and they could both go through the offers displayed on the screen in his car, consulting an e-expert. They decided to go for the most exotic trip, which was also quite affordable. Global competition does its job. Their only concern was not to miss the plane.

Global and his friend do not waste their time ordering meals, as an e-waiter has already sent suggested menu to their communicators (in Global's case, consulted with his e-dietician). The lunch was excellent, and the ambience was fostered by a holographic show of pictures from the trip that Global stores on a photo server accessible via the Internet. They were watching the pictures on a display fixed in the restaurant. Global is a regular here, so his bank will take care of the bill.

On his way home, Global buys flowers paying e-money by accepting the receipt in his communicator. As the weather is stunning, he takes a walk home. Passing by a sweet shop, he gives in to temptation and indulges in a big portion of ice-cream. He pays by his communicator, which includes a RFID payment card. (It is worth pointing out that the communicator is one of the most useful gadgets, as it plays many roles, e.g. that of electronic signature, ID card, driving license, passport, global tax ID, social security ID, season ticket in domestic and international transport, to name just a few. It is biometrically protected. This means that in order to activate it, Global touches a scanner which needs only a fraction of a second to read his papillary ridges).

Afternoon

At home, Global finds his son in front of the computer. He is preparing to go to Warsaw to take part in a workshop. Moving and communicating is easy, so Global has more time to spend with his son than his parents had for him. Even during his business trips, he can have eye contact with his child. This is possible thanks to the communicator he keeps wearing, which is equipped with a video camera. One of their common passions is building a wooden boat in which they hope to go to the lake. They spend most of their time working on details and learning the wood processing technology by chatting through their communicators with other amateur boat builders from England, Canada and China, among other countries.

Sailing is one of Global's favourite sports, but not the only one he does. Global takes care of his health, which is under constant surveillance of an e-doctor. Global rarely falls ill, because he takes preventive measures displayed on his communicator in accordance with his preferences twice a month. Today, he got a text message reminding him that two months had elapsed since he last took his blood pressure. He confirms his willingness to be re-examined, and his watch takes his blood pressure and sends the result to the communicator, which automatically transmits the data to his e-doctor. Everything is OK, but Global does not even notice this, because he is already engrossed in working on another issue—reducing the costs of building a city that 25 years ago was referred to as the knowledge city or intelligent city. It is simply a city that is comfortable for its citizens, a city where beauty and functionality go hand in hand, where life is easier and architecture fosters social life, a city where innovations are born and a city that attracts visitors. Obviously, Global works in an international group of experts brought together through the global network of experts. His participation in the project is highly welcome, even though he is not an urban planner or sociologist. He has been included in the project team because of his valuable experience won during his participation in numerous already completed projects. Problems they are dealing with include optimal location of a sewage treatment plant and usage of treated water in public lavatories, sending waste via pneumatic mail at 100 km/h directly from a rubbish chute to a waste incineration facility and using the heat from their incineration to generate power and produce heating for the neighbouring area, or the arrangement of car parks in central city districts in the form of a remotely controlled warehouse (no room for people means much more room for cars and no more problems with battered doors). Perhaps you recall that such solutions existed in Tokyo Teleport Town, the Japanese town of future, already in 2006.

Evening

Global takes his wife to the theatre. Two days ago, when he was in Hong Kong, during a video-conversation they decided that they would love to spend an evening together in a theatre. They both approved the idea and could simultaneously see the repertoire, and were assisted in making their choice by an e-reviewer. They chose to see Shakespeare—his plays will never grow old. Global's wife can listen to this play in English via her own mini communicator earphone.

During the interval they have an encounter with Global's friend from the time he was a student. It turns out that he recently got married and his wife used to work with Global on a project several years ago. They decide to go for a drink together. Using their communicators

they choose a cosy restaurant next to the theatre and book a table. After the performance they are all in great mood, and recall the beginning of the 21st century with amusement. The waiter discreetly charges Global's non-contact e-wallet for actually ordered dishes. John can easily accept the payments after he comes back home.

Global registers all transaction details in his financial organizer build into the communicator. Thanks to it he can track and analyze his transactions and schedule expenses. He is fully in control of his finances. His personal communicator receives financial operations on an ongoing basis, and confirms or accepts them. Once a weak it receives a financial e-analysisdrawing Global's attention to offers better tailored to his appetite for risk and lifestyle.

Small hours.
Mr. and Mrs. Global are coming back home.

Why have I told you this story? Why does a central banker tell stories about future instead of delivering a 30-minute speech of the success achieved by the National Bank of Poland and its

partners in building a safe, efficient and modern payment infrastructure in Poland? The reasonfor this is that we have to prepare for the future. And the best prepared people are those who know what they want to achieve, in other words people who have a vision of a certain state in future they are pursuing. Lack of vision poses a risk of discrepancies in understanding the goal, pursuit of inconsistent goals and in consequence leads to wavering and wasting time and money. Lack of vision almost certainly leads to failure, as today everything happens very fast. And sharing one vision does make a difference. First of all, we are all moving in the samedirection. And we are likely to accelerate the pace. A clearly defined vision allows—afterreviewing what we have now—choose suitable methods and means to achieve a desired state, that is to set indirect goals.

The vision of John Global may seem a distant future, but in fact it can come true faster than it is currently believed. The majority of examples from John Global's life in 2026 are already a reality, not a figment of my imagination. That is how life is in Asia now, and withincreasing frequency in Europe too.

I do not know your morning routine, but in my case it is not significantly different from John Global's. True, while driving to work I still scan papers (I completed a course in speed-reading). When I am at work, though, I start my day with reading an e-newspaper I designed myself by using the features offered by Web 2.0. Thanks to specialized software, every morning I receive information from the web that has tags I am interested in (for instance in the Technorati service), along with information about the blogs I am interested in (for example from bloglines) and search results on .gov and .edu domains for the entries I am interested in. I get RSS messages from the selected newspapers from several continents containing information I am interested in. Moreover, I have a number of favourite websites with articles by outstanding economists or columnists. Specialized software informs me once a day when there have been any changes to these websites, that is when these people publish something new. As you can see, my problem today—and simultaneously John Global's problem in 20 years' time—is not lack of information but its abundance, and the ability to smartly select important and useful information. Today, I use a program that summarizes texts in English. I use 25% compression. It is sufficient and allows to make reading 4 times more efficient. What is more, I occasionally visit the website of the People's Bank of China translated live into English by specialized software. Soon, I will start my own blog on economics, which will allow me to use the emerging global networks of experts to solve problematic issues, exchange views and create knowledge along with other experts.

That was about our Global and a bit about me, too. And what can be said about e-government in today's Poland? Not much.

In a Capgemini's survey covering e-government in the European Union[1] and published in June 2006, Poland ranks third from the bottom in the EU, in terms of advancement of online public services. We only managed to outpace Slovakia and Lithuania. Even though we made large progress measuring in per cent in 2005, we are still below EU(10) and EU(28) average. When set against the world findings, Poland ranks somewhere before the fortieth place, outpaced by Estonia, Hungary, the Czech Republic and Mexico.

When compared against other EU countries, we rank very poorly[2] in such categories as the ability to file tax returns online (submit tax forms and make payments), obtaining a driving license

[1] Capgemini *Online Availability of Public Services: How Is Europe Progressing? Web Based Survey on Electronic Public Services. Report of the 6th Measurement*, June 2006

[2] Methods employed in European Commission's survey to assess the services provided involve defining a five-stage framework to determine the level of services provided. STAGE 0—Total absence of any publicly accessible website or lack of possibility to qualify the existing website to any of levels 1 to 4 (0%—24% in the figure). STAGE 1—INFORMATION—The information necessary to start the procedure to obtain this public service is available on-line (25%—49% in the figure). STAGE 2—ONE-WAY INTERACTION—The publicly accessible website offers the possibility to obtain in a non-electronic way (by downloading forms) the paper form to start the procedure to obtain this service (50%—74% in the figure). STAGE 3—TWO-WAY INTERACTION The publicly accessible website offers the possibility

Table 1.

UN Index of E-Government Readiness, 2005

Pos.	Country	Index
1	USA	0.9062
2	Denmark	0.9058
3	Sweden	0.8983
4	United Kingdom	0.8777
5	South Korea	0.8727
6	Australia	0.8679
7	Singapore	0.8503
8	Canada	0.8425
9	Finland	0.8231
10	Norway	0.8228
11	Germany	0.8050
12	Netherlands	0.8021
13	New Zealand	0.7987
14	Japan	0.7801
15	Island	0.7794
19	Estonia	0.7347
27	Hungary	0.6536
29	Czech Republic	0.6396
31	Mexico	0.6061
36	Slovakia	0.5887
37	Cyprus	0.5872
38	Poland	0.5872
39	Spain	0.5847

Source: *Global E-Government Readiness Report 2005. From E-Government to E-Inclusion*, United Nations, 2005

online or registering a car. We ranked last in the EU for the lack of online company registration, as it is not possible to download forms to fill in, whereas in as much as 7 EU countries it is possible to register a company online without the necessity of filling in any paper forms. The only area where Poland meets all requirements to join the group of leaders is online submission of customs declarations. It is a rare example of an area whose development proceeded in line with a daring and clearly defined vision.

WE NEED TO HAVE A VISION, SHARE A VISION, a well-defined vision that will help us take advantage of emerging opportunities and will allow us to prepare for possible dangers associated with *homo sapiens globalus* society.

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of an electronic intake with an official electronic form to start the procedure to obtain this service. This implies that there must be a form of authentication of the person requesting the services (75%—99% in the figure). STAGE 4—FULL ELECTRONIC CASE HANDLING: The publicly accessible website offers the possibility to completely treat the public service via the website, including decision and delivery. No other formal procedure is necessary for the applicant via "paperwork" (100% in the figure). More information available in *Online Availability of Public Services: How is Europe Progressing? Web Based Survey on Electronic Public Services. Report of the Fifth Measurement, Capgemini for European Commission*, October 2004

Please, take a look around you... I can assure you that there is more than one John Global in this room... I suggest that after leaving the room each one of us should take a moment to think what you yourself, as an individual, can do to start preparing today for a meeting with John Global in 20 years. And what can each of us individually do to make us share a vision so that we can become citizens of the world and master the fine art of capturing the benefits brought by the *homo sapiens globalus* society.

Thank you very much for your kind attention and I announce the topic open for discussion.

Part IV:

Europe The Past versus The Future

WITOLD M. ORŁOWSKI

THE PUZZLES OF CONVERGENCE: EUROPE'S ECONOMIC HISTORY IN 20TH CENTURY

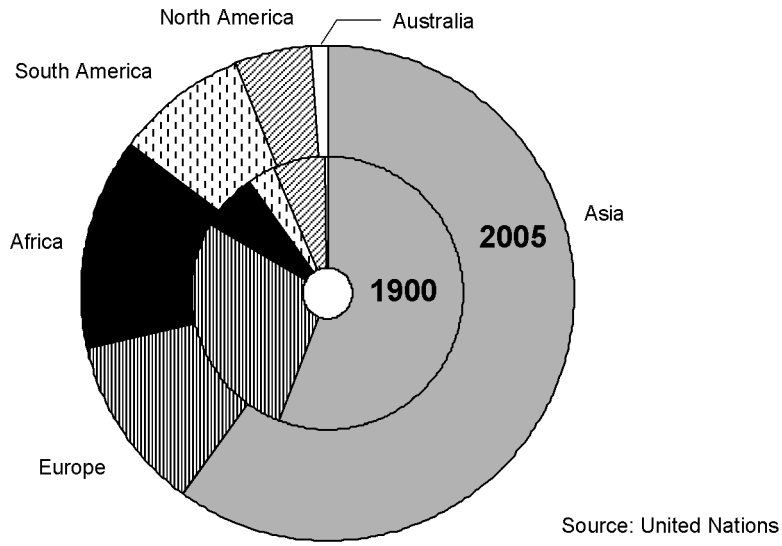
Europe, as a continent, went through the most complicated and unique path of the economic development over the 20*th* century. The driving force behind this development was politics. The continent started the previous century as a global powerhouse. In the year 1900 Europe was inhabited by 27% of the world's population. However, it produced almost half of the global GDP and two-third of the industrial output, dominated the international financial markets, investment (over 90% of the total) and trade. The political domination of Europe was even greater, as the colonial empires of the European countries were stretching over 40% of the world's area and 27% of the world's population. The continent dominated also in the area of the technology and science. European researchers gained 29 out of 30 Nobel Prizes in science (chemistry, physics, medicine) granted in the period 1901–1910. Europe dominated the world both economically and politically, although the challenging rise of the US economy from the last decades of the 19*th* century started to change the global balance of power (see Kennedy, [1987]).

By the middle of the century, however, the situation totally changed. Europe was devastated by two world wars, ruined financially, facing the problem of starvation, in some areas depopulated due to human losses and almost totally destroyed. In 1945 the share of the continent in the global GDP, including the whole Soviet Union, has fallen to the estimated level of 32% of the total. In the same year the GDP of USA and Canada was almost 20% higher, in spite of the population of both countries being equal to one-third of Europe, leading to the GDP per capita four times bigger (estimates based on the Maddison data, see Maddisson [2001]). Although the process of the fast post-war reconstruction raised the Europe's share in the global GDP to 38% by the year 1950, the economic and political situation of the continent divided by the Iron Curtain was extremely difficult.

The second half of the 20*th* century was, once again, a period of dramatic shifts in the Europe's development. On the one hand, the successful process of the economic integration and modernization of Western Europe led, particularly in the period 1950–1973, to the acceleration of growth, enhancing the technological development, and reducing the gap in productivity and income vis-à-vis the United States (by the year 2005 the GDP per capita of Western Europe was equal to 95% of the US level). On the other hand, however, the Eastern part of Europe was suffering relatively slow growth due to the inefficient economic system installed by the Communist regimes. Despite the statistical illusion created by officially published data, inflated by the propaganda, the relation between the GDP per capita in Western and Eastern Europe (including the Soviet Union) actually decreased from almost 50% in 1950 to below 40% in 1989, that implied the real implicit

rate of the GDP growth lower than in more developed West European countries. Further fall of this relation was envisaged during the first half of 1990s, mainly due to the catastrophic collapse of the economic activity in the former Soviet Union and in the Balkan countries (the fall of output in Central Europe, albeit painful, was more shallow and lasted for a shorter period of time; see World Bank [1996]). Finally, the development of both parts of Europe was much slower than the growth observed in Asia, particularly in the last decades of the 20th century. This phenomenon constituted the major force behind the fall of the share of Europe in the global GDP to 26% by the year 2005.

The change of the economic position of Europe in the world's economy during the 20th century can be best presented by two graphs below.

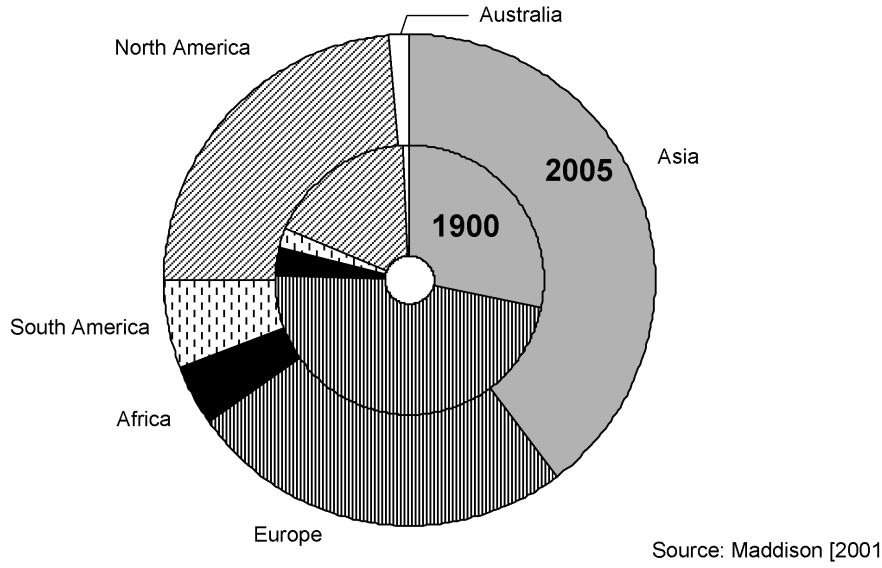


Graph 1. Population of continents, 1990–2005

As the Graph 1 shows, the share of Europe in the global population diminished seriously during the 20th century (fall from 27% to 11% of the total), the share of North America remained stable, and the share of all the other continents increased. Therefore, from the demographic point of view Europe was the main loser of the century, particularly taking into account the fact that the fall of the population was accompanied by the unwelcome trends of the population ageing, particularly strong in the second half of the century (resulting from the cultural trends of falling natality combined with the increasing life expectancy, due to the better living conditions). At the same time, the limited ability to integrate well immigrants into West European societies led to serious social tensions in many countries.

Changes in the GDP distribution among continents, presented on the Graph 2, were equally unfavourable for Europe. The share of all the continents but Europe in the global GDP increased (a relatively small increase was observed only in Africa). After the initial fall from 47% in 1900 to 32% in 1945, mainly due to two world wars that devastated the continent, and the post-war reconstruction and the successful beginning of the West European integration, that led to the increase of this share to 41% by the year 1960, the share of Europe in the global GDP was continuously falling to 36% in 1980 and 26% in 2000.

However, as the fall of the Europe's share in the world's GDP was accompanied by even faster reduction of the weight in the population, the average productivity, income and living



Graph 2. Total GDP of continents, 1990–2005

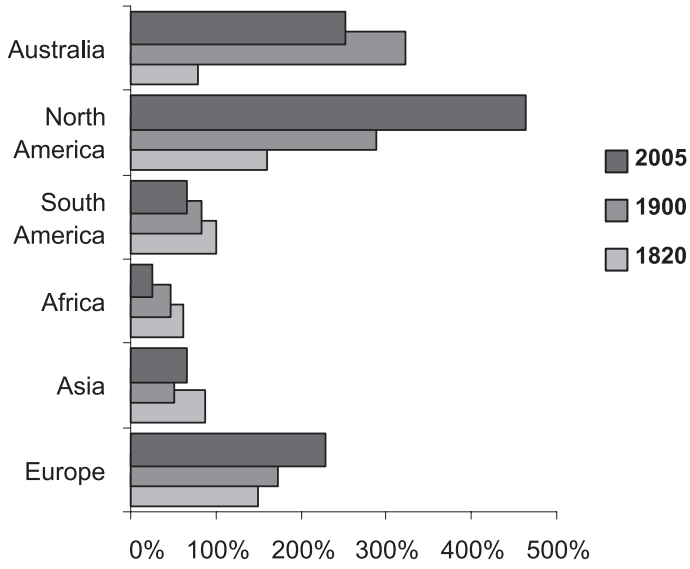
standards of the continent improved compared to the world's average. As the Graph 3 shows, the GDP per capita in Europe was continuously increasing in relation to the world's average, and the improvement recorded during the 20*th* century was, actually, not very much different from the improvement recorded during the 19*th* century—generally regarded as the period of the biggest economic success of Europe (see Kennedy, [1987]). Although the improvement recorded in North America was even greater, the results observed in other continents were generally worse than in Europe, as the relative increase in the population was faster than the relative increase in the GDP.

In a nutshell, despite all the economic problems and a falling share in the world's economy, from the point of view of the productivity and living standards the performance of Europe during the 20*th* century was not bad (obviously, that result was obtained mainly due to the development of Western Europe, while being shifted downwards by the poorer results obtained in Eastern Europe).

The general path of the economic performance of Europe during the 20*th* century, albeit quite dramatic, does not represent the most puzzling element of the story. Much more interesting phenomena were observed within the continent, with the serious shift in the balance of economic power and the role played by various countries in the Europe's economy.

Today's economic picture of Europe is best presented by the Graph 4. The huge majority of the total economic potential of Europe—over 80% of the total GDP—is located in the Western part of the continent while the Eastern part (populated by, roughly speaking, half of the continent's inhabitants, if the whole Russia is taken into account) accounts for less than 20% of the total GDP (the calculation based on the purchasing power parity; if current exchange rates are taken into account, the share of the Eastern part of Europe falls to 12% of the total GDP due to the strongly undervaluated currencies, see Orłowski [1998]). In a nutshell, the former Iron Curtain no longer exists, but still divides Europe into the richer part to the West, and a much poorer part to the East.

A common belief, that the economic map of Europe looked similar throughout the whole or, at least, the majority of the modern history is an error. It is true that after the pre-industrial division



Source: Madison [2001]

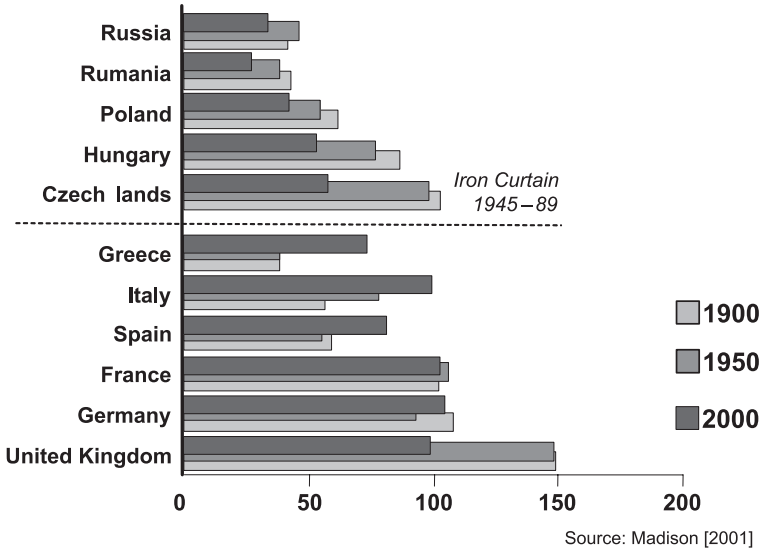
Graph 3. Changes in GDP per capita of continents, 1820–2005 (world level=100)

Source: UN, Eurostat

Graph 4. The economic map of Europe, 2005 (size of the total GDP in European countries, measured at purchasing power parity)

of labour in Europe, that emerged during the 16th century, countries located to the West of Elbe river started to enjoy faster productivity growth and a more rapid technological development than countries located in the Eastern part of the continent (see Wallerstein, [1974]). However, the "late

industrialization" of the second half of the 19th century and beginning of the 20th century in many cases started to change this general pattern. In particular, the Czech lands, Austria, Eastern part of Germany, several regions of Hungary, Russia, as well as Poland (non-existing at that time as an independent state) entered the path of the accelerated industrial change.

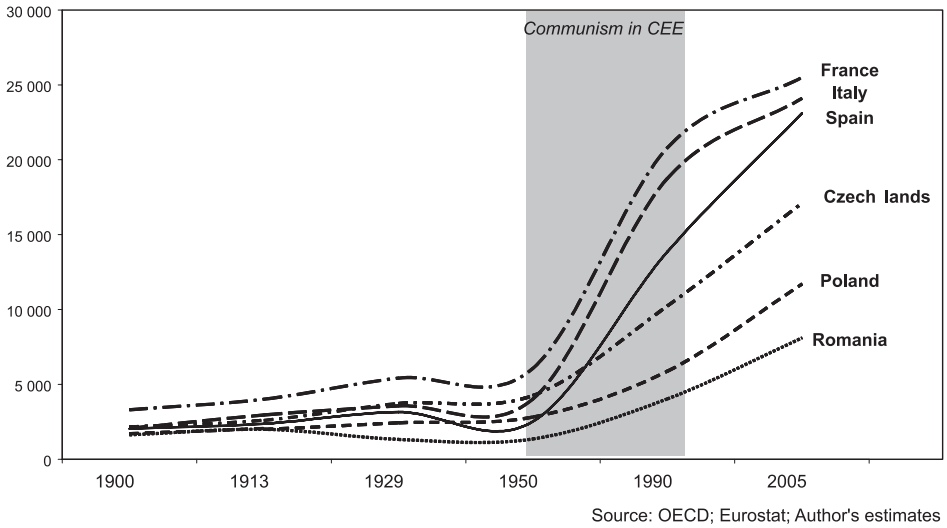


Graph 5. GDP per capita in selected countries, measured at purchasing power parity Western Europe=100

As the Graph 5 demonstrates, the division of the continent by the "Iron Curtain line" into the "rich Europe" and "poor Europe" did not held neither at the beginning of the 20th century, nor at the middle of the 20th century. Until 1950 the Czech lands (either as a part of the Austro-Hungarian empire, or Czechoslovakia) belonged to Europe's most developed nations, with the GDP per capita matching this one of Germany and France. In the same way, the level of development of Hungary in 1950 was similar to Italy, of Poland—similar to Spain, of Romania—similar to Greece. If there was any clear line dividing the "rich Europe" and the "poor Europe" at that time, it was rather a line dividing the richer North from the poorer South (and not West from East).

The big change of the pattern took place during the second half of the century, once the Communist regimes installed by the Soviets in Central and East European states (with the exemption of Greece) implemented the Stalinist system of central planning. The effects were generally unfavourable for the economic development. Firstly, countries of the Eastern part of the continent were forced into an absurd economic system, that was leading to the general inefficiency, wrong incentives for producers and consumers, and the widespread misuse of resources. Secondly, they were artificially cut from their natural trading partners in Western Europe. Thirdly, they were forbidden by the Soviet Union to participate in the economic reconstruction of Europe, partly financed by the Marshall Plan funds, and in the successful process of the economic integration realized in the framework of the European Economic Community and the European Union (see European Integration... [2003]). Finally, they were forced to participate in the arm race, that was leading—particularly in the countries ruled by Communists—to the military expenditures well above the reasonable level the countries could afford. As a result, by the end of the century, a clear West-East division appeared ("rich West" and "poor East").

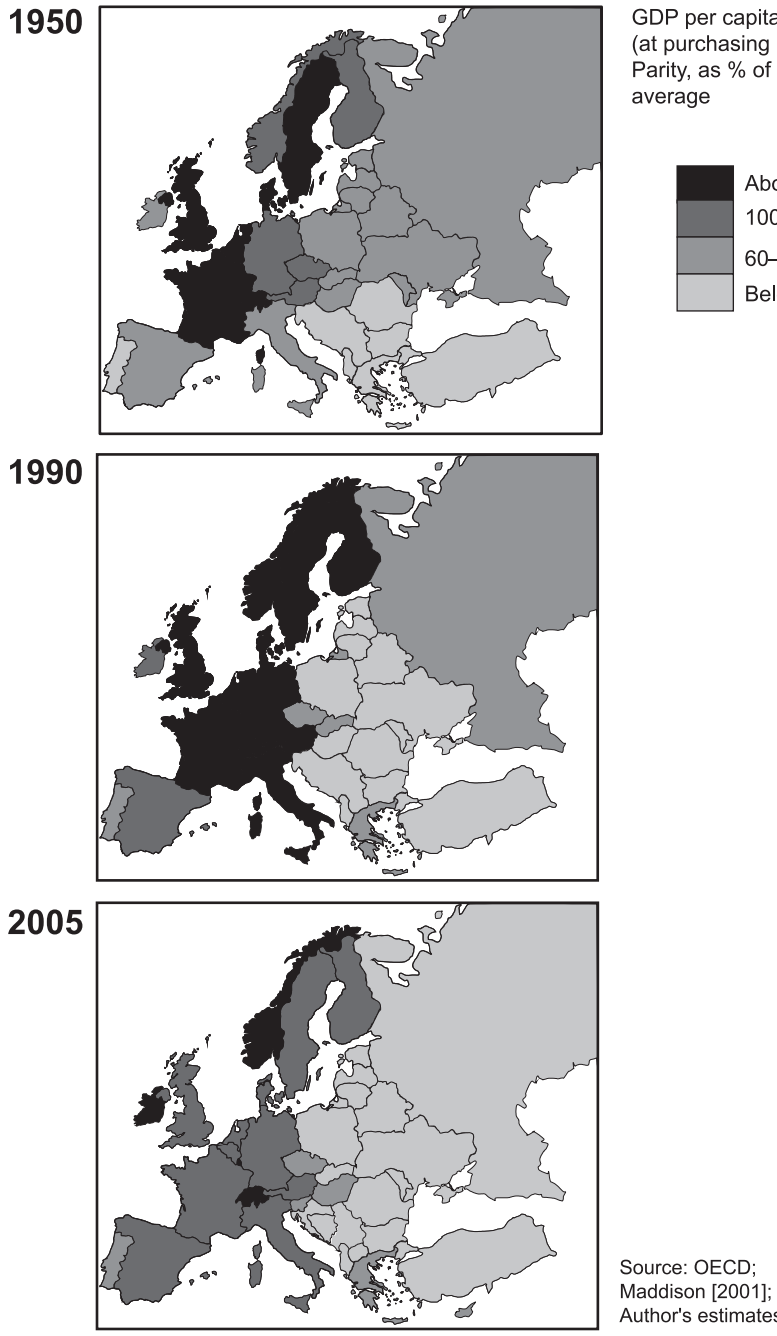
The observed growth patterns in Europe were in clear conflict with the concept of the real convergence (see Barro, Sala-I-Martin, [1995]). Independently either based on exogenous, or endogenous growth models, the theory expects—in the long run—the poorer countries to grow faster than the richer ones, either under any conditions (absolute convergence) or under the assumption of the correct economic policy (conditional convergence). The main factors behind the real convergence process are: (a) high return on capital in a country with a relative shortage of capital; (b) high saving and investment rates; and (c) imports of capital, know-how and technology from the "rich" countries. Both factors (a) and (b) can be derived from the neoclassical growth theory, while the factor (c) is rooted in the endogenous growth model.



Graph 6. GDP per capita in selected countries, 1900–2005 (in constant US dollars, 1999 prices, measured at)

As graph 6 shows, the real divergence in the paths of the economic development took place during the decades of the Communist rule in Central and East European countries. As the result of blocking the natural, market-led real convergence mechanisms, the relative gap in the GDP per capita between the Western and Central Europe (according to the estimates) increased significantly between 1950 and 1990. For example, according to the estimates, the 1950 per capita GDP level of Poland matched this of Spain, and was equal to a third of the West Germany. In 1993, after the painful adjustment to the market economy conditions, it was less than 40% of the Spanish level and 25% of the western länder of Germany (see Orłowski, [1998]). A similar relative downgrading in the economic development level has been observed in all the countries of Central and Eastern Europe. The gap was not only in real income but also in the institutions, legal framework, technology, human capital development, and ability to compete on the world market. Obviously, there was some success in industrialization, human development, literacy, health, or urbanization. The progress, however, was insufficient to secure the convergence towards the West European standards.

Unfortunately, the change of the political regime and economic system under the transition process did not lead to immediate improvement of the situation. The immediate result of the change was the fall of GDP, ranging from 15–20% in the Central European countries to more than 60% in the case of some former Soviet republics (e.g. Ukraine) and Balkan countries (e.g.



Graph 7. GDP per capita in Europe, 1950–2005

Serbia). However, after the adjustment the growth came back, leading to the gradual shrinking of the income gap vis-à-vis Western Europe.

Graph 7 shows the changing map of the development of various countries of Europe from 1950 till 2005. In 1950, after the first years of the post-war reconstruction, partly financed through the

Marshall Plan funds (with the value of USD 22 billion, equivalent to USD 190 billion at current prices), the relatively "rich" countries of Europe were those ones that were already well developed before the war, and were either neutral or not heavily destroyed by the military operations (countries of Western and Northern part of the continent). The "poor" ones were primarily the Balkan countries, as well as peripheral one (e.g. Portugal).

By the year 1990 the big change of the pattern emerged. The process of the real convergence took place in all the West European countries, to a big degree due to the success of the European integration. The latecomers to the EEC (Spain, Portugal, Greece) were still poorer, but advancing fast due to the dynamic effects of economic integration, first of all the enhanced movement of the capital to poorer countries (see Walz, [1997]). The "poor" countries were all the Central and East European countries that had a bad luck of finding themselves on the wrong side of the Iron Curtain.

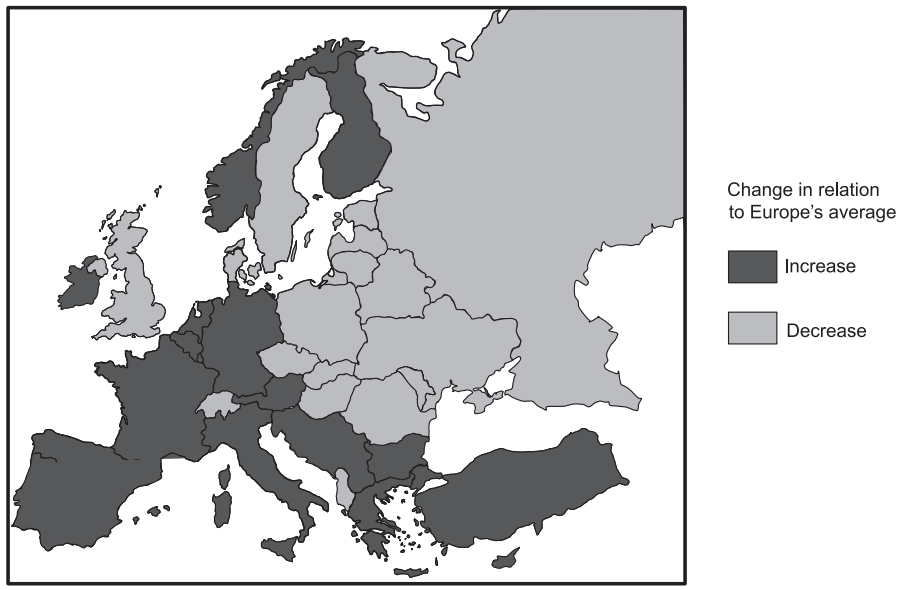
Finally, by the year 2005 the situation changed once again. Albeit the "Iron Curtain line" is still easily visible, the distance between the West and the East slightly diminished, mainly due to the eventual success of the transition in the growing number of post-communist countries.

The analysis of the changing levels of GDP per capita, and changing scale of the economic gap between the two parts of the continent, allows us to distinguish between two important sub-periods of the economic development of Europe after the World War II.

The first sub-period started around the year 1950, after the West European countries entered the path of the economic integration, and the Central and East European countries were forced to introduce the Stalinist system of the central planning. The continent was divided by the Iron Curtain, that cut natural patterns of the trade and cooperation. The capital movements between two parts of the continent were almost totally frozen during the 1950s and 1960s, and then only partially allowed during the 1970s (mainly in the form of credits to Communist governments). By that time the growing inefficiency of the Communist economy resulted in those capital movements becoming counter-productive, and leading to the serious defaults crises rather than to the faster growth (finally, only Poland defaulted on the foreign debt, but the situation of other highly indebted countries—Hungary, Romania and Yugoslavia—became extremely dangerous). The sub-period was marked by the strong divergence in the economic development between the West and the East: the West was gaining, the East was losing (see Graph 8). Within these two areas, only initially the richest countries of Western Europe were losing, in relative terms, the ground (UK, Sweden, Switzerland, Denmark) while in the East only initially the poorest ones were gaining (Bulgaria, Yugoslavia).

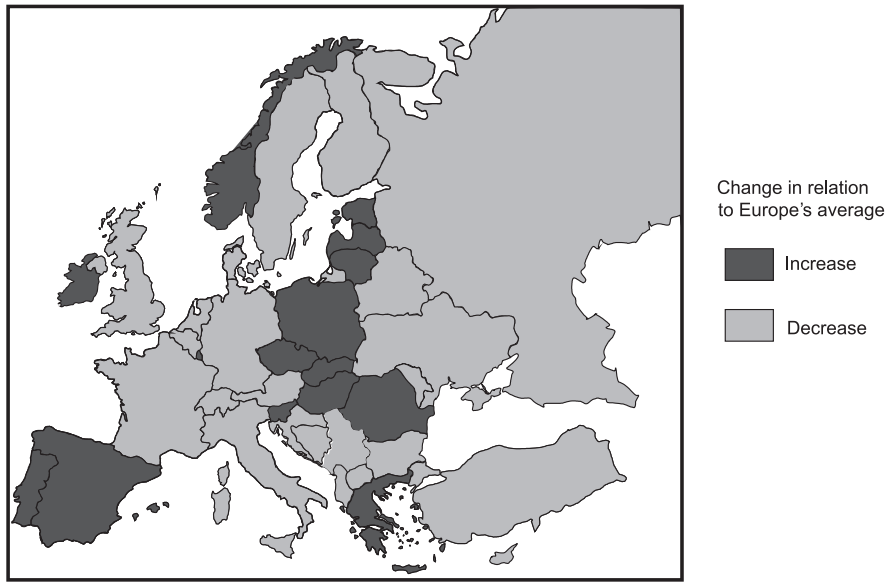
The situation started to change only from the year 1990, once the Iron Curtain was abolished, economic transition in the Eastern part of Europe started, natural trade links reemerged, capital flows from the richer in saving Western part of Europe to the poorer Eastern part of Europe gradually increased, and a big group of post-Communist countries—mainly in Central Europe—got involved into the European economic integration. The new members of the European Union surprisingly quickly started to benefit, as the Mediterranean countries during the 1990s, from the dynamic effects of economic integration (see Walz, [1997]), becoming an attractive place for the capital investment and enjoying the rapid growth of their exports. During the sub-period 1990–2005 the convergence trends continued in the former peripheral countries of the West (Ireland, Iberian countries, Greece, Norway), while the new strong convergence pattern appeared in Central Europe (see Graph 9).

The analysis of the economic development of Europe in the whole period 1950–2005 makes us believe, that the normal market forces are likely to work, in the longer run, in the direction of the real convergence on the continent. This natural process was clearly accelerated in Western Europe by the economic integration, realized in the framework of the European Economic Community



Source: OECD; Maddison [2001], Author's estimates

Graph 8. The period of divergence: relative GDP per capita in Europe, change 1950–90



Source: OECD; Maddison [2001], Author's estimates

Graph 9. The period of convergence: relative GDP per capita in Europe, change 1990–2005

and the European Union. Unfortunately, the Eastern part of the continent did not participate in this process, due to the political reasons. Once only the Communist regimes were abolished, and the market economy rebuilt in the painful but successful process of the economic transition, the convergence trends appeared in the East as well. The trends were especially strong in the case of Central European countries that joined the European Union. One may expect, that the

further expansion of the Union into Western Balkans, and the possible membership of Turkey and Ukraine will change majority of the continent in the area of security and prosperity.

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STANISŁAW M. SZUKALSKI

TURNING POINTS IN THE EUROPEAN ECONOMIC DEVELOPMENT IN THE PERSPECTIVE OF THE YEAR 2050

Introductory Statement

The following study attempts to identify phenomena and processes crucial for the European future which can be called 'turning points' in the development of the continent.[1] Together with A. Kukliński[2], we understand this term as phenomena and processes, as well as structure elements, which transform the character of the global economy, including European economy. These will result in disappearance of the old and birth of the new structures, vanishing of the current driving forces and creation of new impulses in the development of societies, economies, culture. According to Z. Madej a turning point is a change in the global domain, a turning point also means "clear crystallization of new driving forces, which, in a new way, determine the essence of processes functioning in a certain global domain"[3]. Therefore, this term has to be understood as a relatively short-time process, happening with the force which determines irreversible transformations. An attempt to create a clear-cut definition of turning points may always cause controversies and disputes, as well as various argumentations.

Considering Europe in economic, social, political and cultural aspects, one can identify processes and phenomena, which bear characteristics of the defined turning point. It has to be remembered that they all penetrate one another, thus heightening the results of their activities. The study stresses economic factors, as well as draws attention to significant, in the authors' opinion, processes happening on the global stage.

1. Expansion of the Asian megaspace countries

Competition from Asian countries, which Europe has to cope with, can be treated as the most important fact in the European economic development. Moreover, one can predict the competition

[1] This paper has been inpired by the study of the European development till the year 2050, created by the author for the Forecasting Committee Poland 2000 Plus by the presidium of the Polish Academy of Sciences, S. M. Szukalski, *Struktura gospodarki europejskiej "Europa 2050",* June, 2007

[2] A. Kukliński, *Studia nad transformacjami regionów europejskich na przełomie XX i XXI wieku (1985–2025). Innowacyjna inicjatywa Mazowsza*, w: Kukliński A, K. Pawłowski, Przyszłość Europy- Wyzwania globalne-wybory strategiczne, Wyd. Wyższa Szkoła Biznesu –Nasional-Louis University, Nowy Sącz 2006 p.374

[3] Z. Madej, *Punkty zwrotne na scenie globalnej* w: "Przyszłość Świat–Europa–Polska", issue nr 2 (12) 2005 p.70

to strengthen, as long as the current trends are not disrupted by any factors. These can be both exogenous factors such as military conflicts, disasters, and endogenous ones resulting from accumulation of the world economy internal contradictions and growing disproportions, such as shocks on the financial or raw material markets, in the fields of ecology or politics.

By our own estimate, irreversibility of the changes in the world economy is influenced by the potential of the Asian, mainly Chinese and Indian economies, as well as dynamics of their development. So:

1) As long as the current development trends remain, (in the period of 1979–2005 Chinese economy developed at a rate of 9.4% per annum, and over the last three years it was even 10,3%; the investment rate in various years of this period amounted to 36–47%), it can be declared that the perspective of the next 40 years will make the 21st century "the century of Asia".
2) If the development rate of Asian megaspace countries remains, it will change the structure of creating the world's GNP, since whereas in 2004 62% of GNP was generated in the USA an EU, in 2050 this share is to fall to the level of 41%. China's and India's contribution will increase to 45%, whereas it is now 6% (2004r)[4]. This will lead to GNP per capita increasing 14 times in China, 19 times in India, while in highly developed countries it will merely be doubled. What is more, relation of this index for the USA and China, which was 24:1 in 2005, will drop to 3.7:1 in 2050. As far as India is concerned, this relation is 59.9:1 and 6.9:1.
3) Competition growth concerns developed markets (European or North American), but also markets, which are not so strongly consolidated (African or Latin American). The best example of this is the African continent, where China invests mainly in the raw materials sector, has signed contracts to exploit oil resources off the Kenyan coast, invests in the Nigerian oil fields. In the recent years China has become the third largest food supply aid source for the African countries and the third largest African trade partner, after the USA and France. China writes off debts (Liberia 15 million USD)[5], has granted low interest loans for the structure rebuilding, (Angola 3 billion dollars), Chinese companies build highways (Algeria 1.2 thousand km). Over the period of 1995–2005 the amount of turnover between China and Africa increased ten times, and the following two years have witnessed 40% increase in the turnover.[6]
4) Considering the levels of outlays on R+D (Research and Development) in relation to GNP, which in China is 1.3% (in 2010 the index will be 2.0%, and only in 1999 the outlays in this country amounted to 0.6%), and their annual growth rate of 20%, one can assume that, in the perspective of the next few years it will become a strong competitor of the European economy, and not only in the fields requiring high amounts of labour, but also in products from high tech sectors (HT), such as electronics, ICT, machine construction, automobile and chemical industry, as well as science[7]. China, to a larger and larger extent, is becoming a destination of modern services and technologies potential. Thus, if modernization of the Chinese economy is conducted with the aim of adjusting it to the 21st century reality, it can be concluded that Europe will gain a strong competitor also in the field of ICT technology.
5) China has begun to transform from mainly American and European companies selling market for chiefly investment goods, direct investments, and consequently high profits, into a strong

[4] Np. IMF, US Census Bureau, CEI Group calculations quotation from R&A Group: *The changing engines of global economic growth*, Zurich 2006.

[5] Gazeta Wyborcza from 31.01.2007

[6] In 2006 1/3 of the oil import has come from Africa, mainly from Angola (18,2 mln tons). In 2005 China has set up 800 companies and invested 6 billion US dollars. It is predicted, that in 2010 trade turnover will reach the amount of 100 billion dollars.

[7] James Wilsdon and James Keeley, *China: The next science superpower?*, Demos, 2007

competitor on the raw materials, fuel, and processed goods markets.[8] It can, undoubtedly, be expected that in the assumed perspective this competition will be strengthened. All one has to do is to look at the forecasts concerning demands for the conventional fuels. Estimated[9] use of basic energy carriers such as coal, oil, or gas is expected to grow respectively by 93.8 %, 47.3 % and 90.6% by the year 2030. The biggest growth will be witnessed in China (growth rate for coal amounts to 203.4%, for oil 167,9 % and for gas 73%). In India the figures are respectively: 105.8%, 95.7 % and 350 %. As far as Europe is concerned, these indexes are respectively: 4.6 %, 5.2 %, 73 %. Annual average energy growth rate in China in the period of 2004–2030 will amount to 3.5 %, in India 2.8 %, whereas in the European countries belonging to OECD it will be 0.4%, in the USA 1.0%, and the world globally 1.8%.[10]

6) Mass growth of production and export in China has been beneficial for the drop in prices on the world's markets, consumption increase, but also, because of the high surplus of the balance of payments, China has influenced the world economy through financial and capital markets, since it has become a significant world capital exporter, with 15% of share[11].We are already witnessing the process of capital accumulation from Europe and the USA to Asia, which presents one of the main transformation factors in the world economic and political system.
7) Also, India has become a competitor in the field discussed. It is the country which has gained a strong position as the one with large scientific potential. India is the target destination of Business Process Offshoring—BPO. This sector has been developing extremely dynamically—its turnover has increased almost 7 times in the period of 2002–2007 (from 2.5 billion dollars in 2002 to more than 17 billion in 2007). 253 universities and over 13 thousand other colleges are located here, with 2.5 million graduates every year, 300 thousand of whom are engineers. During the last ten years a computer world centre has been created in the south Indian Bangalur, with more than 150 thousand computer scientists employed. Thanks to investments in R+D the country has been ranked as one of the leading ten countries in the world. Every year around 15 thousand patents are filed.
8) Both countries differ in terms of GNP growth rate (in China in the period of 1997–2005 it amounted to 9% per annum on average, whereas in India it was 6.2%), internal consumption, which in relation to GNP was, respectively, 42% and 65%. However, 40% of the world's labour force comes from these countries, both of which suffer from overmanning. It is estimated, that the next five years will witness human resources growth of 44 million people in China and 71 million in India. At the same time labour market in the USA will increase by 10 million people, in Japan it will decrease by 3 million, with no changes taking place in Europe.

[8] According to Eurostat import from China to the EU in 2006 increased by 21%, and import from the USA by 8%, Financial Times 23.03.2007

[9] See: *International, Energy Outlook 2007*, Energy Information Administration Office of Integrated Analysis and Forecasting, U.S. Department of Energy, Washington, May 2007, moreover, it is worth noticing that oil consumption in China increases in China by 7% per annum.

[10] Ditto.

[11] Monetary surpluses are accumulated mainly in the US dollars (it is estimated that over 70% of currency reserves), and partly invested in government bonds. Asian countries have control over 51% of the USA international debt, and despite low bonds sales this year China owns the US bonds worth 400 billion USD.

2. "South American style globalisation", is the 21st century socialism possible?

Considerations concerning the future of the European continent usually emphasize the role of Asia, however much less attention is paid to countries in Latin America. These countries are the ground of interesting transformations, which are the consequence of the fiasco of the 1989 Washington Consensus newly liberal economic policy. Rigid financial policy (rigid money policy), coupled with trade liberalization and economy deregulation (with smaller state interference into economy) were expected to enable these countries to overcome economic stagnation. Thanks to it, the inflation rate has been reduced to 6.5% (whereas a dozen years ago in some countries in the region it was 2000%). Moreover, the export dynamics have been greatly improved. However, the policy's poor effects in the social field[12] have spawned political transformations. The fact that Pro-American politicians were brought to power gave birth to strong nationalization tendencies, building up extremely quickly. Venezuela, which is the fifth largest oil producer in the world and which is nationalizing oil industry, can serve as a good example. The state-owned oil company PDVSA is going to take over most of the western concerns' shares of the oil deposits (at least 60% of all the enterprises). European companies Statoil, BP and Total have allowed Venezuelan government to take over even up to 83% shares in their investments. American oil companies Exxon Mobil and ConocoPhillips are reducing their business activities in this country. Oil deposits belonging to the American concern Occidental Petroleum, exploiting one fifth of Ecuador oil, have been nationalized. Some of the largest gas deposits in South America have been nationalized in Bolivia. Simultaneously, the continent sees transformations, which aim at:

- Economic independence from the USA. This refers to nationalization of some brands of industry, mentioned above, as well as joint enterprises such as Venezuelan-Brazilian consortium building the 10 thousand kilometres long gas pipeline, stretching from Venezuela through Brazil to Argentina, with branches leading to Bolivia, Paraguay and Uruguay.
- Forming stronger economic connections with China, which has intensified trade, by purchasing mainly raw materials. (China is the largest raw materials importer from Chile).
- Common regional policy. A new model of regional co-operation between Latin America countries is being formed. It is much too early to compare it with EU structures, because of significant differences between the countries potential or models of management. However, it does not seem out of question in the perspective of a few dozens of years.
- An attempt to create "Bank of the South", as an alternative to the World Bank and International Monetary Fund, which would become the main financial institution, providing aid to the South American countries. Its creation has been opted for by finance ministers of Argentina, Brazil, Bolivia, Ecuador, Paraguay, Uruguay and Venezuela.
- Creating the basis for building Knowledge Based Economy, participation in wider and wider range of R+D services delocalisation.
- Close co-operation with China and supporting common standpoint in the international field. Attitude of the countries working together within the G-20 group may serve as a good example[13].

[12] In the period of 1996–2006 a number of people living on 1 USD a day increased, and the percentage of population dropped only by 1.4%, whereas globally the figure is 4.1% and in Asia alone 7.5%. See: IMF, *Global Employment Trends Brief*, January 2007, p.11

[13] The following countries belong to the G-20 group: Argentina, Bolivia, Brazil, Chile, China, Egypt, the Philippines, Guatemala, India, Indonesia, Cuba, Mexico, Nigeria, Pakistan, Paraguay, Thailand, Tanzania, Venezuela, Zimbabwe, South African Republic. 65% of the world population and 72% farmers live in the countries belonging to G-20, which produce 22% of the global agricultural production.

European Union's positive approach to the integration processes taking place in Latin America as well as strengthening economic co-operation with the countries in the continent are especially important in this context.

3. Research and science as a development determinant

Today, science and education form the main driving force of the national economies, economic magaspaces. They are also the source of society structure changes, access to culture and knowledge. What can be observed is the increase of the R+D outlays in relation to GNP. The outlay level and dynamics determine the strength of a given economy. Employment in the research field grows. The number of patents in the leading fields of research has become the measure of the research power and economic strength of the economy. What is taking place, is the globalisation of the research potential, that is, its delocalisation, which means transferring of research abroad, where there is available large scientific potential, appropriate skilled manpower resources necessary to provide the discussed services, together with low obtaining costs. Concerns are now taking advantage of research services offshoring outsourcing. These processes and phenomena are adding new dynamics to the research process. D. Bell's[14] concept, from almost 40 years ago, of post-industrial society is beginning to become reality. The concept with scientific research primacy, knowledge of technical information, "intelligent services". The concept which was sarcastically criticised at the time of its announcement.

Domains which determine future, revolutionary changes in economy and society are most of all: biotechnology, nanotechnologies[15] (semi-conductors, ultra capacitors, nanomemories and nanosensors, nanomaterials, nanoparticles), information technologies. The question which arises is: how is Europe prepared for these challenges in comparison to the other economic regions of the world?

Biotechnologies create a possibility of increasing food resources, which leads to drop in prices, contribute to the more balanced development, also in the aspects of natural environment problems. The USA is the leading country as far as the biotechnology development is concerned, even though the biggest number of biotechnological companies operate in Europe—39% (in the USA 27%, in Japan 9.9% and in China 1.9%[16]). Taking expenditures in the biotechnological sector (R+D and production) into consideration, one will notice that they are 14 times higher in the USA than, for instance, in Germany, France or Canada. However, outlays on research in the field of biotechnology in the global relation of R+D outlays amount to 51.4% in Iceland, 23.8% in Denmark, 20.9 in New Zealand, 7% in the USA, 5.7% in France, 3.3% in Germany.[17]

Nanotechnology inventions give hope on significant acceleration of the economic development, new opportunities in the health care, the power industry, optics, environmental protection, chemical technology, technical sciences (e.g. in construction of miniaturized electrical appliances), new materials, new tools. According to forecasts, nanotechnology products are expected to dominate the market in the forthcoming future. At present the nanotools and nanoproducts market is valued at 312–316 million euro, and the figure may well reach 226 billion euro by the year 2015. The demand for medicine batching systems alone which are based on the discussed technologies is

[14] D. Bell, *The Coming of Post-Industrial Society. A. Venture in Social Forcasting*, London 1973; also see: Szukalski S.M. *Sektor usług w gospodarce niemieckiej. Hipotezy teoretyczne i empiryczna weryfikacja przekształceń strukturalnych*. UŁ, Łódź 2001

[15] Those interested are sent to visit www.nanonet.pl website

[16] Brigitte van Beuzekom and Anthony Arundel, *OECD Biotechnology Statistics—2006* p.15 and the following

[17] Ditto, p. 17, the data concerns the year 2003

predicted to increase by 50% a year up to 2012. Research in the field of nanomedicine and nanobiomechanics may play a crucial role in the treatment of, among others, tumour-related diseases (thanks to nanoparticles, the medicine may be carried directly to a cancer cell, which means greater safety of the tumour therapy, nanobiomechanics may prove useful in distinguishing between healthy and ill cells and thus will facilitate the treatment process).

Unfortunately, as far as the number of patents is concerned, Europe is falling behind its competitors from the USA and Asia, despite significant outlays in this field of research[18]. In the period of 1978–2005 34.6% patents in this field came from the USA, 28.4% from the EU (with Germany 11%, France 6.2%, Great Britain 5.1%), 29.2% from Japan, and 7.8% from the other countries[19]. However, taking three key areas of research: nanoelectronics, nanoenergetics and nanomedicine into consideration, it is worth noticing that in the period of 2000–2005:

- 24% of nanoelectronics patents came from the USA, 51% from Japan and 8% from Europe,
- in the field of nanoenergetics, 398 patent appeals came from the USA, 278 from Japan, 77 from South Korea and 43 from China; in contrast—35 from Germany and 18 from Great Britain. Another 28 patents have been applied for in the European Patent Office.
- The leading position also belongs to the USA and Asian countries in the field of nanomedicine. In the discussed period, the largest number of pattern appeals in the field have been made in the USA (380), China (147), Japan (41), Germany (38), France (32).

On the other hand, Europe can boast a strong position in the fields of technologies connected with environmental protection related to renewable energy sources, waste usage or influence of the motor vehicles on the environment.[20]

The list of inventions, crucial technologies which can change our life is very long indeed. Among the mentioned are: epigenetics, that is sequencing of the human genome and getting to know human genetics, which may allow to create tests diagnosing tumours; cell reprogramming—which may help determine sources of such diseases as Parkinson's disease or sclerosis; elastic silicon—which will enable to replace stiff printed circuit board, thanks to which the new technology may have widespread applications. As well as these, there are radio chips, teraherz waves, fuel cells, metabolic tuning, e-paper, tissue engineering, metabonomics, neuroimplants, artificial intelligence.

However, a question arises: What will society's attitude to the inventions from the fields of nanotechnology and biotechnology be? Whether a new technology succeeds on the market or not greatly depends on its public acceptance. Assuming that the public opinion will not hamper the development in the fields discussed, what can be expected is creation of new places of work and strong impulse for Europe's development. Of course, as long as the research in these fields is more dynamic.

4. Increase in price of conventional energy carriers

Irreversible increase in conventional[21] energy carriers prices caused by ever growing global demand can be treated as another extremely important turning point, which can lead to disruptions, or, at best, economic growth rate slowdown. Competition for supply sources between

[18] Such conclusions can be drawn from Marks & Clerk report— http://www.marks-clerk.com

[19] OECD materials, Masatsura Igami and Teruo Okazaki, *Capturing nanotechnology's current state of development via analysis of patents*, STI WORKING PAPER 2007/4, Statistical Analysis of Science, Technology and Industry

[20] According toOECD, *Science, Technology and Industry*: Scoreboard 2007

[21] Oil prces on the world's markets in 2006 were higher by 349% compared to year 1999., OPEC, Annual Statistical Bulletin 2006;

Asian countries and highly developed European countries and the USA[22] may pose a potential threat of an economic or military conflict, but may also serve as an incentive for the science to search intensively and to develop new energy sources (e.g. based on hydrogen), which may become relatively cheap, along with the increase in prices of the conventional ones. Energy demand is expected to rise by 50% by 2030 and to double by 2050, with 75% of the increase associated with the developing countries, especially China and India.

This situation bears direct implications for the energetic policy of the EU. Total energy consumption in EU will increase by 25% in the next 30 years. It means that in 2030 European Union will be forced to import 70% of the consumed energy, whereas at present the figure is 50%[23]. European Union energetic challenge is the function of its geographical location, since almost 80% of the global hydrocarbons resources is situated in the countries lying in the closest vicinity of the European continent.

Therefore, it appears that priorities of the energetic policy of the EU are: funding of research connected with new energy sources, shared energetic policy, energy consumption rationalization (it may partly result from the independent structural or technological changes), actions (also political) taken with a view to saving energy, changing direction of the EU energetic policy in favour of nuclear energy usage. It has to be remembered that, although the importance of the renewable energy sources is on the increase, they will not be able to fully replace fossil fuels, despite all the technological development.

5. Europe's demographic regression and its after-effects

Europe's demographic situations becomes a turning point, as the current demographic tendencies weaken its driving forces. It refers to a combination of factors such as:

- Drop in the size of population (different forecasting[24] variants predict from 66 million people to 165 million in the worst alternative, which is based on the population growth rate so far),
- Europe's population aging. Percentage of people aged over 64 will increase from 15.9% (2005) to 27.6% (2050), and percentage of those aged over 80 from 3.5% to 9.6%,
- Shortage of labour resources, loss of 67 million people in the working age (drop in the percentage of people aged 15–64 from 68.2% in 2005 to 57.9% in 2050),
- Increase in the retirement system burden ratio, which will increase from the current 23% to 48% in 2050,

At the same time population on other continents is predicted to grow. In Africa it is going to be over 1 billion people, in Asia more than 1.3 billion, in Latin America 211 million people. Simultaneously, it is forecasted that migration processes are going to intensify. Undoubtedly Europe will become the immigration continent. Annual migration balance in the period of 2010–2050 will amount to circa 808 thousand people in Europe, whereas in Asia the figure will be -1200 thousand people and in Africa -303 thousand[25]. Currently, in individual EU countries percentage of immigrants lies between 5–20%, while in the discussed perspective it may reach 20% in the whole EU on average.

[22] The USA use up 25% of the world's oil, but exploit only 9% and have merely 2% share in the global oil reserves.

[23] The forecast prepared for the European Commission: *Perspektywy technologii energetycznych na świecie do roku 2050*

[24] World Population Prospects: The 2006 Revision and World Urbanization Prospects: The 2005 Revision, http://esa.un.org/unpp, Friday, August 24, 2007.

[25] Ditto

The data above shows that the labour force consisting of immigrants will not be able to replace the loss of the European labour force. On the other hand, immigration influx will lead to the change of the population structure of the Old Continent in the ethnic, cultural, religious, educational and possibly health aspects. One has to bear in mind that migrations increase differences in culture, customs, religion, and so problems connected with cultural assimilation are bound to arise. To a great extent, it refers to the religion structure of the population. There are 53 million Muslims living in Europe at the moment and Turkish (73 million people, out of whom 99% are Muslims) membership in the EU will increase these numbers. Similarly, procreation features of non-Europeans will affect the changes in the population structure. Population growth rate among indigenous Europeans is much lower than among nations immigrating into Europe (an average Muslim woman gives birth to 4.6–6.4 children, whereas a non-Muslim merely 1.4). It may lead to a significant increase in the percentage of the Islam believers[26].

A problem arises then of how to diminish the cultural distance between the indigenous and the incoming population, how to fight off the feelings of identity threat, xenophobia, racism? In general, immigrants are less educated and are currently working in the service sectors with lower wages. Sectors often connected with old people nursing, housework, etc. The question is: will the immigrants be willing to become "nurses" for the aging European population?

Social issues will probably be mixed with economic problems, even those connected with welfare benefits, of which immigrants will probably want to take advantage. Immigrants are already accused of excessive use of opportunities provided by European welfare systems.

6. Natural environment deterioration

A growing global disproportion between the growth of the population and the natural environment resources systematically deteriorating (arable land, forests) can be treated as a significant turning point for the Europe's development. Growing emission of greenhouse gases, increasing concentration of carbon dioxide[27] and resulting climate destabilization, post-industrial and consumption waste polluting the environment all worsen life conditions. Environment deterioration caused by production purposes (forests cutout)[28] brings the danger of soil barrening, increasing areas devoid of water, and has a direct or indirect effect on the situation in Europe. The results of the threats are as follows: frequent natural disasters (floods, droughts, hurricanes), increasing level of the seas and oceans which threats coastal communities, extinction of some species of animals and plants, growing range of numerous tropical diseases, water ratio deterioration, lack of potable water.

Problems associated with these issues are often discussed in numerous publications, programmes, conferences, and regardless of how heated these discussions may be, or the fact that some of the visions may seem too catastrophic, one is forced to admit that it is one of the crucial factors determining the future of Europe and the world. It can be, however, considered as a threat or as a chance. The latter aspect refers to the opportunity for the development of fields protecting the environment and production of appliances connected with this process.

[26] W. Kieżun leads interesting studies concerning changes in the European ethnic structure, *Zmiany struktury etnicznej ludności Europy-szanse i zagrożenia*, Przyszłość Świat–Europa–Polska, 1/2007, p. 19

[27] By 2030 global emission of the carbon dioxide is going to increase by 1.8% per annum, but the figure is going to amount at 3.1% in Asian countries, with 3.4% in China, 2.6% in India, in Africa 2.3%, and European countries belonging to OECD 0.3%, Quoted from *International, Energy Outlook 2007*, op. cit. p.93

[28] 1% of the green areas, as well as 20% of the coral reefs were destroyred in the period of 2000–2005 and the average concentration of carbon dioxide increased by 0.6 % in 2004.

7. "Weak impulses" and other problems connected with Europe's position in the modern world

So far, analysis of structure and conditions of European economy development in the perspective of the year 2050 brings a number of deep reflections, which formed into questions, can give an impulse to a further discussion.

1) First, a question arises, where are the, so called, "weak impulses" which in the perspective of the years to come may change the world, and so the European continent, and which imperceptibly affect functioning of social economies? Apart from turning points, weak impulses represent significant circumstances, which may either make global economy development more dynamic or conserve existing structures. What it refers to is not only the factors connected with changes in engineering and technology, but also transformations in social structures, economy. To what extent, then, can changes in the European social structure, growing number of immigrants, change of religion structure, customs, etc. affect European identify? What effect can delocalisation of European companies potential to the Far East have? It is necessary to follow weak impulses, which is supposed to, according to M. Gyorgy[29], prevent crossing of the timing point, which means rapid, radical and, most often, adverse system transformation. Its crossing makes it impossible to reverse the course of events. It leads us to another question of where are the hazards of actually reaching "the timing point" for the European economy and culture system?
2) Second, there is a valid question of what kinds of strategic choices does Europe have to make? Or, to put it differently, what should European strategy towards other economic megaspaces of the world (China, India, the USA, Latin America) look like? It refers to the "inward" or 'outward" strategy of widely recognized Europe, and not only in the geographical or economic aspect but also cultural and social one. Liaisons with Russia and countries integrated with it become of significant importance in this context. One has to bear in mind the fact that both of these economic areas are complementary to each other, which is the basis of economic and trade relations between EU and Russia. Both have their own competitive advantages. Competitiveness of the EU economy is the result of its high technological development, as well as strong social-economic institutions. Russian economy is, most of all, abundance of natural resources. Analysis of the trade turnover structure shows that Russian export to the EU consists mainly of mineral fuels and derivatives (64.3%), mostly oil and gas. Russia is the second largest oil producer after Saudi Arabia. On the other hand, Russian import from the EU is mainly machines and appliances, which make up 46.8% and chemical industry products with 14.2%. Positive arrangement of liaisons between EU and Russia is an issue of paramount importance for the European future. The question is: will Russia integrate more closely with Europe or with Asia (and this is not about formal structures)? It will, of course, play a significant role for the global politics and economy, but also for Europe either keeping its strong position in the world or it becoming marginal. In the latter case there are obvious results of the Russia's close integration with Asian countries: EU loses its position on the enormous market for its products, for capital locating, but, most of all, it may disrupt supplies of energy materials to Europe. It has to be remembered that growing demand for goods fulfilling ever increasing consumption aspirations of the Asian societies, leads to stronger competition in the natural resources markets.
3) Third, there is an issue of Europe's development strategy. Nowadays, it is intervention character thinking that prevails. Such attitude curbs thinking about the future in innovation

[29] M. Gyoergy, *Przyszłość Europy*, w: Kukliński A, K. Pawłowski, Przyszłość Europy..., op. cit. p.78

aspects and producing scenarios based on highly developed creativity. Attempts at building development strategies are determined to a great extent by current threats as well as those future ones than can identified: ecological (environment deterioration), political, social (migrations, famines, society aging). We have been caught in the so called "trap of short-term benefits", which are of great interest to those in power, modern societies. That is why future is discussed unwillingly. What can be done to overcome this attitude?

4) Fourth, in the context of ever increasing complexities of economy, challenges which it has to face a question needs to be asked—whether European economy should still operate under a totally free market mechanisms or should there be created a model of economy with essential regulation range? Such a model would mean, wider development of public sector, but with a better satisfaction of group needs (education, healthcare). Therefore, EU institutions, state governments, but also economy theory all have to face a problem of how to settle the following future relations: market — state regulations, private sector—public sector. The fundamental question is: "how much market, how much state"? This context also creates another question concerning the integration model which Europe ought to follow: federation model, union of national states or institutional balance union?
5) Fifth, not only is the problem of the state function relevant in the area of a country, but also on the global scale. Theory has to try to and answer a number of questions connected with relations between national states and the global market[30]. What role is to be played by the public sector in the aspect of economy globalisation, and, in perspective, possible globalisation of public services? What about relations: state-citizen in the aspects of work organization, free time consumption levels, employment strategies executing, model of knowledge based economy, "net economy"?
6) Sixth, Europe consists of regions that significantly differ in aspects of development levels, potential, resources, cultural model. This refers to both countries belonging to the EU and European countries outside this structure. Although the diversity between EU founding members has been positively diminished in the period of 45 years, it has not taken place in the individual European regions. Average EU GNP per capita expressed in purchasing power compared with the same figure in EU individual regions in the period of 1995–2004 will show that a number of regions where this index was above the EU average by at least 25% dropped from 42 to 37. A number of regions with the index lower than 50% of the EU average increased from 31 to 36, and there are only two more regions than there used to be with the index higher than 125% of the EU average[31]. Therefore, there is still a question of the position of European subregions. How should EU regional policy be reoriented in order to decrease disproportions and the technological gap between regions? The basic problem is the issue of development models for the areas, where high tech is the challenge beyond the local scope. What is necessary is the search for the production fields aimed at local markets, which can simultaneously take advantage of the existing local workforce, the so called "intermediate technology" as it would be described by E.F. Schumacher[32].
7) Seventh, there is a question of how to prompt the Europeans to be more creative in all aspects of economic and social life? "Old Europe's" relative prosperity and military, social, economic security have blunted its creativity for over 50 years. "What we need at the moment is the cultural turn, which will bring the appropriate importance to the communities capable of creation and accumulation of the high quality social capital"—R. Galar writes[33]. The question

[30] J. Kleer leads interesting studies concerning relations: globalisation—state, Globalizacja a państwo i usługi publiczne, Forecasting Committee "Poland 2000 Plus" by the Polish Academy of Sciences Warsaw 2006

[31] Based on Eurostat , *Regionales BIP je Einwohner in KKS*, http://epp.eurostat.ec.europa.eu

[32] E.F. Schumacher, *Małe jest piękne*, PIW Warsaw 1981 p.199

[33] R. Galar, *Co robić, by dało się patrzeć w przyszłość z optymizmem*? Kukliński A., Przyszłość... op.cit p. 418

is how can it be achieved? Where is the border between standardisation which simplifies life and excessive regulations, procedures which narrow the scope of the individual's creativity?

8) Eighth, there is a theoretical but also practical problem connected with the question: should paradigm of growth, or paradigm of steady development with close connections of economic growth with social development be a measure of economies and societies level of development? It seems that we will be forced to use not only the indexes of GNP per capita, but also general scholarisation index for all educational levels, average life expectancy, indexes of reading with understanding and writing such as: HDI (*Human Development Index*), or HPI (*Human Poverty Index*).

Closing remarks

The proposed attempt at showing turning points in Europe's development is undoubtedly incomplete, individual factors are of varying importance. However, it seems necessary to discuss these problems, formulate hypotheses, examine them and have the results popularised. This will create awareness of the challenges resulting from the processes taking place in the global economy today, but also of those which will have to be faced in the future. Thanks to this, it will be possible to undertake measures for the common benefits. At the end of the study there are three more remarks.

Firstly, the future state of the European economy will be dependent on the development level of the Knowledge Based Economy, high tech economy, innovations which will determine the level of life if the European society and its competitiveness on the international arena.

Secondly, it will not be easy to reach this goal because of the strong competitive pressure from world's other economies and Asian societies consumption. Whether and to what extent this race will be won in economic, civilization, social and cultural aspects depends on EU institutions, national governments and the European society.

Thirdly, it is the task for the EU structures, national governments, non-government organizations, to define goals, directional actions, law and organizational solutions. But it may still be not enough to defend the Europe's position in the world. It is of paramount importance to make the European society aware of the challenges resulting from the processes taking place in the global economy today.

ANTONI KUKLIŃSKI

THE FUTURE OF EUROPE A MODEST CONTRIBUTION TO THE EUROPEAN DEBATE*

Motto:
Ignoranti quem portus petat nullus ventus suus est
Seneka

Introduction

Europe of the XXI century is facing the greatest challenge in its history—the challenge of marginalization—the challenge of the transformation[1] of Europe into a fragment of a new global periphery. This historical moment is creating a strong demand for a grand debate related to the diagnosis of the present state of Europe and to the visions and scenarios related to the Future of Europe.

We need a special concentration of our wisdom, imagination and courage to analyze the present realities and the potential futures of Europe. We must find the intellectual and moral capacities to overcome the barriers of conventional wisdom, of political correctness and of educational self-satisfaction.

In this short paper it would be impossible to outline a comprehensive vision of a grand European Debate. We would however try to present a very modest contribution to this Debate. This contribution will be outlined as a sequence of the following topics:

I. **The paradox of J.S. Nye**
II. **The lost opportunities to create a better world at the end of the XX century**
III. **The transformation of the global scene in the first decades of the XXI century**
IV. **The four features of the crisis of European Civilization**
V. **The Future of Europe—pessimistic interpretation**
VI. **The Future of Europe—optimistic interpretation**
VII. **Europe 2050—The challenge for our knowledge, imagination and character**

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[1] Compare: P. Opala, K. Rybinski, Gordian knots of the 21st century. Paper presented on the occasion of the 20th anniversary of the Polish Association for the Club of Rome, Warsaw October 25th 2007.This paper will be published in the volume—A. Kuklinski, K. Pawłowski (eds) Towards a New Futurology, Reupus volume 4, Nowy Sącz 2008.

I. The paradox of J.S. Nye

In the path breaking book of J.S. Nye[2] we find the following question:

> *"Can we do better as we enter the twenty-first century? The apocrypha of Yogi Berra warns us not to make predictions, particularly about the future. Yet we have no choice. We walk around with pictures of the future in our heads as a necessary condition of planning our actions."*

I would like to convert this question into a thesis:

"*The previsions of the future are impossible but necessary*". The human mind since the beginning of history is trying to outline an interpretation of this paradox and to find the key to the mystery of the Future. We can indicate three paradigms trying to design this key:

— the paradigm of religion
— the paradigm of art
— the paradigm of science

In the framework of the third paradigm—we should develop a new Eurofuturology[3] facing the challenges of the XXI century.

II. The lost opportunities to create a better world at the end of the XX century

These lost opportunities are a very important element in the evaluation of the global and European scene of the last decade of the XX century. In this context[4] it is worthwhile to review the charming and illuminating intellectual joke of The Economist[5] published in the New Year Issue of 1993 as a *sui generis* science fiction under the title "Looking back from 2992—World History, Chapter 13— The disastrous 21st Century". Let me present three passages from that essay[6]:

> *"This was an opportunity of a magnitude the world had rarely seen before. As Chapter 12 explained, the three-sided War of Ideas that had occupied most of the 20thcentury ended in a sweeping victory for the once apparently doomed forces of liberalism. The defeat of racial totalitarianism in 1945 having been followed by the defeat of communist totalitarianism in 1989–91, the victorious pluralists seemed to have the future at their feet."*
>
> *"The failure of clear thinking applied to all three members of the victorious coalition— the United States, the European Community and Japan. They could, if they wished, have brought a share of liberty and prosperity to much of the rest of the world by the end of the 21stcentury. They did wish it. But they failed to see that to succeed they had to remain a partnership. Instead, each of the three almost at once started to assert itself against others."*

[2] J.S. Nye, The Paradox of American Power, Oxford University Press 2002, p. 3.

[3] Compare: A. Kukliński, Eurofuturology 2050 (in:) A. Kukliński et alia (eds) Towards a New Creative and Innovative Europe, Reupus Volume 5, Nowy Sącz 2007compare also: A. Kukliński, B. Skuza (eds) Europe in the perspective of global change. Polish Association for the Club of Rome, Warsaw 2003.

[4] A. Kukliński, The growth of knowledge and the transformation of Central and Eastern Europe (in:) A. Kukliński (ed.) Baltic Europe in the Perspective of Global Change. Euroreg, Warsaw 1995.

[5] The Economist, December 26th 1992—January 8th 1993.

[6] The Economist, op.cit., p. 17–19.

> *"Looking back from 2992, one can see why the democracies missed the great opportunity they were given in the 1990s. The fact that they had had to spend the 20th century fighting their two-front War of Ideas, against communism and fascism, was itself a sign that a cycle of history was approaching its end. The democracies needed to re-examine the ideas that had created this cycle: but they left the re-examination too late."*

After World War II—the victorious global elite was able to design and establish a new global order. This order was functioning in the second half of the XX century as a *sui generis* global government. Unfortunately the global elite of the end of the XX century was not able to design a new global order for the XXI century. The intellectual joke of The Economist is revealing a real great tragedy of lost opportunities in global and mega historical scale.

III. The transformation of the global scene in the first decades of the XXI century[7]

We observe a process of a very deep transformation of the global scene. From a certain point of view this is the crucial turning point of the last 500 years. The Atlantic community and the Atlantic civilization were dominant actors of the global scene during the great chapter of universal history of the years 1500–2000[8]. The XXI century will be the beginning of a new chapter of this history—the chapter of the dominance of the Pacific community and Pacific civilization.

The world is flat. A brief history of the twenty first century. This is the title of a path-breaking book of Thomas L. Friedman[9]. This book is creating a new mind-set of a new interpretation of globalization as the process shaping the global future. The book is not an academic masterpiece but an attempt to create an impressionistic picture of the global competitive climate of the XXI century. The book is a general but also a deeply personalized story of globalization presented via the experiences of persons and personalities operating in the flat world of the XXI century.

It is at same time formulating a hypothesis of a deep comprehensive transformation of the global scene generated by the emergence of two new mega actors of the global scene—China and India. The global economy cannot function anymore without China and India. This is the most important turning point of the last 500 years.

In the Business Week we find the projection of the dramatic transformation of the global economy as presented in table I:

The analysis of this table is leading to three conclusions. In the years 2004–2050 we can expect:

— *primo*—the stagnation of the rank of USA in global economy,
— *secundo*—the decline of the rank of European Union and Japan in global economy,
— *tertio*—the rapid advance of the rank of China and India in global economy.

Naturally this dramatic projection should be taken *cum grano salis*. This projection was outlined as an extrapolation of the present differences in the rates of economic growth which are very unfavorable for Europe and Japan or even for USA.

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[7] Compare: A. Kukliński, B. Skuza (eds) Turning points in the transformation of the global scene. Polish Association for the Club of Rome, Warsaw 2006.

[8] Compare: D.S. Landes, The Weath and Poverty of nations— Polish translation Warsaw 2000.N. Davies, Europe—A history, Oxford University Press, 1996.

[9] T.G. Friedman, The World is flat, Farror, Strauss and Garoux, New York, 2005.Compare also: H.W. French, China's new paradigm. A thriving dictatorship. IHT, November 3rd-4th 2007.

Table I

Reshaping the global economy—Percentage of World Domestic Product

The ego	2004	2025	2050
USA	28	27	26
European Union	34	25	15
Japan	12	7	4
China	4	15	28
India	2	5	17
Other	20	21	10
The World	100	100	100

Source: China and India challenge and opportunity, Business Week—European Edition, August 22^{nd}–29^{th} 2005.

This projection should be interpreted as a signal of alarm of the emerging spectre of the economic marginalization of Europe.

IV. The four features of the crisis of the European civilization

There are different approaches in the discussion related to the very deep crisis of the European civilization emerging in the first decade of the XXI century. In this context we would like to concentrate attention on four most pronounced features of the crisis:

1) the lost capacity of innovation
2) the lost will to life
3) the lost will to power
4) the lost spiritual identity

1) the lost capacity of innovation

The lost capacity is well outlined by R. Galar[10]:

> *"The main competitive asset of Europe used to be freedom, not perfection. At present perfection receives more and more attention, while freedom is being pushed to the preserves of procedural democracy and unconventional lifestyles. The progressing degradation of the once paramount innovative prominence of Europe might be a direct consequence of this shift. Perfection is tempting as it allows to squeeze most from the existing opportunities. Freedom is necessary as to explore opportunities not yet identified, what is the essence of adaptation. It is needed to open the doors into the world of trial and error, spontaneity and soft selection, where subsequent waves of priorities and high-techs emerge rather than are decreed. The specific predicament of the present European might be that its S&T sector and economy are both: not free enough to compete with the US in opening new innovative horizons, and not perfect enough to compete with the East Asian cultures in exploitation of new technologies."*

[10] R. Galar, Adaptive versus managerial approach in S and T policy (in:) A. Kukliński, K. Pawłowski (eds) Europe—The strategic choices. Reupus, Volume Two, Nowy Sącz 2005.

2) the lost will to life

The lost will to life is well grasped by M. György[11]:

"To balance the dramatic decrease in the number of children European countries must turn to external labour forces, which at the same time deepen the internal cultural differences. Maintaining economic growth, providing the expected standard of goods and services, ensuring welfare services at a relatively high level—still considered low by many people—are possible only by involving external labour force. This will have two types of consequences which will generate complex social effects. On the one hand, the labour force—due to the scope of a relatively free movement—shall migrate from the less developed regions to the more developed ones. It will increase—or at least maintain—the regional differences, differences which in turn will bring about actions directed alleviating them. On the other hand, the settlement of labour from other regions shall become a necessity—it will cease to be an option that one evaluates in terms of its benefits and drawbacks. The choice will only be whether the labour force (and population) is "exported" from (1) quickly industrialized Asian countries with huge populations—which follow a life-programme very similar to the Protestant ethics, but also face similar population problems in the medium-term, or (2) African or Near-Eastern countries where the mentality fundamentally differs from the Protestant life-programme, and which struggle with severe problems of a demographic boom. In the latter case, however, the cultural assimilation problem the host societies face will increase manifold."

3) the lost will to power

The lost will to power is a reflection emerging from the pages of the contribution of R. Cooper[12]

Let us present two quotations of this author:

"Nietzsche is arguing that justice originates not in the desire of the weak for protection, but in the tragic experience of the strong. The same argument could be applied to peaceful, postmodern systems of international relations. Whatever the truth of Nietzsche's insight into the origins of justice, it is certain that the trauma of the twentieth century lies behind what might be described, in Nietzschean terms, as the loss of Europe's will to power."

"The logic of European integration is that Europe should, sooner or later, develop common foreign policy and a common security policy and, probably, a common defense. But the world does not proceed by logic. It proceeds by political choice. None of this will happen unless Europe's leaders want it and choose to make it happen. President George W. Bush has directly explained why we should want it. Speaking to the American Enterprise Institute in February 2003, he said: 'We meet here during a crucial period in the history ... of the civilized world. Part of that history was written by others. The rest will be written by us.' If we want that 'us' to include Europe, we shall need more influence with the United States.

[11] M. György, Futures of Europe (in:) A. Kukliński, K. Pawłowski (ed) The Future of Europe. The global challenges. Reupus, Volume One, Nowy Sącz 2005.

[12] R. Cooper, The Breaking of Nations Order and Chaos in the Twenty First Century, Atlantic Month Press, No. 4, 2003, p. 164–165, 171–172.

And that means we shall need more power, both military power and multilateral legitimacy."

4) the lost spiritual identity[13]

It is extremely difficult to define the spiritual identity of Europe in a global context leaving the Christian tradition outside of our attention. To my mind the atheistic and agnostic domain of the European society could accept the Christian element in the spiritual identity of Europe as a civic value of instrumental character useful in the defense of European spiritual identity in global context.

* * *

Naturally this crisis of the European civilization can be defined only in a multidimensional open minded perspective. It would be however very difficult to support a thesis—that the crisis of European civilization is only an eurosceptical dream[14].

V. The Future of Europe. A pessimistic interpretation

Let us quote the following brilliantly formulated opinion of R. Galar[15]:

"The present prospects of Europe seem clear but are not encouraging.

- *Europe is dying out. At least its indigenous population is dying out. Two generations after millions perished in the deadly war for the lebensraum, children are born some 50% bellow the simple reproduction rate because the potential parents had more vital obligations. Migrations of extraordinary dimensions might be expected in result.*
- *Europe is loosing its purpose. The generation of sexual revolution—the ones who started their long march trough institutions with the: don't believe anybody above thirty battle cry—approaches retirement. It seems determined to go out from the scene with egoistic flair comparable with the famous: Apres nous, les deluge.*
- *Europe is facing generational revolt, as demands of masses of frustrated and xenophobic old burden the relatively few young—usually, the children of the other people. This might culminate in a social upheaval, which could dwarf the events of 1960s, as the causes behind the approaching disillusionment are much more serious.*
- *Europe is loosing common sense in its confrontation with complexities of globalization. Sixty years of historically unprecedented safety and comfort resulted in paucity of life experiences. Learning by trial and error has suffered, as consequences of stupid choices were deflated by social security. In effect, the postulates to fix the decomposing social security are met with flat*

[13] Compare: R. Stark, The victory of reason—How Christianity led to freedom, capitalism and western success, Random House, NY 2005.Compare also the papers of K. Porwit and P. Mazurkiewicz (in:) Towards a creative and innovative Europe, op.cit.

[14] Compare: L. Emmerij, Has Europe a splendid future behind it (in:) A. Kukliński *et alia* (eds) Towards a New Creative and Innovative Europe, op.cit.

[15] compare: R. Galar (in:) Turning points, op.cit, p. 323.

refusal, and immigrants, whose work might help to sustain the system, are fend off.

- *Europe is loosing its creativeness. Education systems have become vehicles for promoting greater equality and devaluating quality. All encompassing procedures and ubiquitous irritating monitoring harm emergence of innovative ideas. The best minds are emigrating to US.*
- *Europe is becoming ungovernable. Corrective mechanisms of democracy get ruined, as the unrelenting consumer conditioning and adulation of individual success make the concept of common good almost incomprehensible to electorates. Instead, there is this arrogant and dangerous convictions that dreadful things might happen only to the lesser people in other places.*

In the developing constitutional limbo after the failed referenda in France and Nederland, all the earlier achievements of EU look suddenly more fragile and less sustainable. Efforts to unify were in the history of Europe plentiful and never fully successful. We should be concerned that tormented by internal egoisms and devoid of common vision EU might follow the downward track of the ancient Greece—from splendor to marginalization and insignificance. The great dream of EU founding fathers is in danger. And the peaceful character of the possible decomposition can only be wished for."

VI. The Future of Europe—an optimistic interpretation

These are (*inter alia)* two magnificent experiences in the history of Europe, the Enlightenment, and the Renaissance. In the beginning of the XXI century we should have the intellectual courage to outline a comprehensive and critical comparative reflection related to those Two Experiences. **We could test the value judgment that a New European Renaissance is a better symbolic metaphor for the Revival of Europe of the XXI century than the New Enlightenment.**

Europe is representing an immense economic, social, cultural and political potential. Europe in its long history has demonstrated many times the capacity and power to find new forces of dynamic development. There are very strong arguments to support the hope that the new European renaissance of the XXI Century is a feasible reality. There is also a strong hope that the unity of Western Civilization will be an important feature of the XXI century—that following the charismatic formulation of T.G. Ash—the "West can be[16] put together again".

Let us note the observation of T.G. Ash[17]:

Economics is a different matter. Even in the American economy will again pull ahead of the combined European economy in absolute size, while China and India are rising fast, Europe will still be the United States' nearest competitor for the foreseeable future. And the two are now so deeply intertwined. In case we get numbed by shorthand billions and trillions, it's worth spelling out the zeros in full: in 2000 American firms had some $3,000,000,000,000 worth of assets in Europe, and European firms had some $3,300,000,000,000 worth of assets in America. There is more European investment in Texas than there is American investment in all of Japan. The U.S. also partly depends on Europeans (although even more on Asians) continuing to buy American bonds, to sustain its huge deficits. In trade

[16] T.G. Ash, Free World, Random House, NY, 2004, p. 22.

[17] T. G. Ash, op.cit., p. 122.

negotiations, the E.U. talks to the U.S. as giant to giant. The euro has the potential to became a rival reserve currency to the dollar, especially if oil sales begin to be denominated in euros. American notions, of unbridled sovereignty will be qualified by these economic realities. Yet the fact that America has to take Europe seriously economically does not mean it will do so politically. As in pre-1914 Europe, there is no automatic "read-across" from economics to politics. All that European investment in Texas did not stop George W. Bush from behaving as he did.

Fascinated by the political and cultural differences we are often overlooking the fact that the integration of the American and European economic potential is a reality of an Atlantic Economy of the XXI century. There is no doubt that the united and integrated Atlantic Community will be able to face the challenges of the XXI century. The Western Civilization will find a proper and honorable place on the global scene of the XXI century.

So we need not only a grand Debate related to the Future of Europe[18], we need also a grand Debate related to the future of the Atlantic Community.

VII. Europe 2050—The challenge for our knowledge imagination and character

I am told that in Beijing you can find a comprehensive document—*China and the World 2050.* Why Brussels is late in the preparation of such document for Europe? It is not a matter of the deficiency of knowledge—it is a mater of the deficiency of moral and political courage to look into the mirror of the true shape of Europe 2050. The members of the European Union should encourage the European Commission and the galaxy of Think—Thanks of the Commission to move fast to establish an example of an open debate related to the global and European vision of the year 2050. It is a great pleasure to note that Poland is doing very well in this field. It is a virtuous coincidence that in November 2007 three interesting volumes related to Europe 2050 were published in Poland:

Europe in the perspective of 2050[19]

Towards a New Creative and innovative Europe[20]

The Future of European Regions[21]

This trilogy is an interesting substantial and methodological contribution to the Grand debate Europe 2050.

Warszawa, November 12th 2007.

[18] Compare the interesting but wrong oppinion of The Economist—Give Europe a say. The Economist, October 27th 2007.

[19] A. Karpiński (ed.) Europe in the perspective of 2050. Polish Academy of Science, Committee Poland 2000 Plus, Warsaw 2007.This volume is a comprehensive and well documented outline of the crucial problems of Europe 2000—2050. I hope that the Polish Academy of Sciences will prepare an expanded English edition of this volume.

[20] A. Kukliński, C. Lusiński, K. Pawłowski (eds) Towards a New Creative and Innovative Europe, Reupus Volume 5, Nowy Sącz 2007.The European Renaissance of the XXI century will open a new chapter in the history of Europe. This volume is a challenge to our minds and imagination trying to answer the question—Is it possible to develop a New Creative and Innovative Europe.

[21] P. Jakubowska, A. Kukliński, P. Żuber (eds) The Future of European Regions. Regional Development Forum. The Ministry of Regional development, Warsaw 2007.The volume is formulating a provocative question—Meaningless Europe? (the paper of K. Rybiński). According to this Author the New Vision of Europe is formulated as follows:"New vision—Europe to become headquarters of the world service hub. Ideas are generated in Europe, simpler parts of business process are sourced in the world".

KRZYSZTOF PORWIT

TRANSCENDENTAL FACTORS IN FUTUROLOGY OF THE 21ST CENTURY

(I)

(1) This text is written from the European viewpoint and it touches some issues seemingly essential for improving the performance of European socio-economic system. They may help to disentangle some of the European counterparts or reflections of global "Gordian knots"[1], in particular these which depend more on the quality of endogenous factors (of intra-European origin) than on exogenous impacts. The latter are heterogeneous, including challenges of globalization as well as those connected to the growth of economic strength in several big Asian countries, seen in conjunction with downgrading of democracy in presently dominating liberal sense of that notion.

These aspects may be essential not only from the viewpoint of position of Europe in competing for one of economically leading positions in a global perspective, but also for the possibility of European role in contributing her cultural heritage to future evolutionary changes in the contents and hierarchy for criteria of evaluating "quality of life" and in endeavors to attain more even distribution of that quality for possibly largest part of the earth.

(2) In a futurological context the relevance of such global changes may be seen at least in two perspectives. First, these changes form increasing challenges for Europe to keep her position as one of the leaders on the global scene. Conversely, they may inspire Europeans to engage in a more farsighted strategy consisting of necessarily long-time essays to reconstruct global scene into oriented more on global aims of attainment human values[2] of universal cooperation and solidarity with hopefully fading habits of concentrating on mutual grievances and excessively sharp and often shady competitive practices.

(3) However, one must also remember that at present many weaknesses and ailments of the global scene are dangerous for the future of all performing actors, also for those from Europe. I have in mind here the issues already tackled by main international organizations but far from a chance of improvements i.e. (i) very large gaps between the wealth and strength of productive

[1] Paweł Opala, Krzysztof Rybiński "Gordian Knots of the 21st Century" pp. 68–102 in *"The Individuality of a Scholar and Advancement of Social Science—The Scholarship of Antoni Kukliński"* edited by Anna Gąsior-Niemiec and Józef Niżnik , Rewasz Publishing House, Pruszków 2008

[2] My reflections and suggestions concerned with these issues were presented in several earlier volumes, *inter alia*: *Przyszlosc Europy—Wyzwania globalne—Wybory strategiczne (The Futire of Europe—Global Challenges—Strategic Choices)*—editors Antoni Kukliński, Krzysztof Pawłowski WSB-NLU, Nowy Sącz 2006 (pp. 13–48), *"Towards a New Creative and Innovative Europe"* editors Antoni Kukliński, Cezary Lusiński, Krzysztof Pawłowski, WSB-NLU—Nowy Sacz–Oficyna Wyd. REWASZ—Pruszków (pp. 320–339, 432–435)

capacities and an attainable performance in the group of most developed and on the other extreme—the poorest countries, (ii) serious destruction in natural environment and consequent threats for living conditions in many parts of the earth, (iii) strong and dangerous storm-centers of terrorism, and war-threats as well as some dangers of new eruptions of unrest in some places, (iv) the threats of catastrophic mortality and unbearable living conditions in the poorest , poverty stricken areas.

(4) All these cases require certainly particular attention on the part of international community but their relevance for futurology seems to be particularly related to the search of probable causal factors, which are likely to reflect causes and remedies for societal ailments: failures, pathological mutations , mischief and vice oriented deviations in the socio-economic systems everywhere and also in more developed and affluent economies and societies.[3] The latter seem to be especially significant because these countries are certainly the most potentially helpful and responsible, not only for a search for peaceful ways from the climate of unrest and threats to stepwise improvements but also for respective contributions of resources and for cooperation in transforming the relatively backward into more developed areas and societies. Higher quality in that group of countries, in professional and also in moral standards, in systemic arrangements, as well as in all sensible kinds of human activities, would be of great importance for the chances of the above mentioned farsighted strategy.[4]

(5) The challenges involved in such a strategy will be enormously demanding, but another perspective (i.e. a continuation of present trends) seems too dangerous and gloomy to be acceptable. Without a feasible alternative trajectory—the threats (see section 3 above) would be likely to gain momentum of their force, up to catastrophic perspectives, which seem beyond the sense of futurologist essays.

The crucial factors for an alternative perspective will involve radical "turning points" in increasingly universal changes of human minds and consciences in the sense of an intrinsically deep renascence of spiritual internal forces, which would drive human persons towards behavioral rightness, for free choice of solidarity in strife for a common weal, motivated not only by fear of punishment pending for wrong-doing but predominantly by transcendentally[5] derived warm feelings of compassion and love for other people, particularly those somehow deprived of chances for adequate well-being. Such feelings are meant to be a token of devotion and love directed to God by faithful persons.

(II)

(1) My suggestions for futurology endeavors concentrate on the above mentioned issues (see sections **I/2** and **I/4**) in the context of Europe and her own prospects . My approach to the questions of prospective systemic changes originates in reflections on numerous diagnostic opinions severely

[3] My suggestions concerned with this "farsighted strategy" are meant to supplement the opinions and conclusions presented by A.Kuklinski in his contributions to the volume *"Faces of the 21st Century"* edited by Anna Gąsior-Niemiec, Antoni Kukliński, Wojtek Lamentowicz , The 21st Century Institute & REWASZ Publishing House Pruszków 2008, i.e. the chapters *"The 21st Century—Brainstorming Reflections"* (pp. 24–28) and *"The Creation and Destruction of the Global Order"* (pp.29–36)

[4] This would be one of the cases of acting according to advices expressed by the late John Paul II in his encyclical *Centesimus Annus* according to which all particularly endowed with talents and capabilities for more successes should give respectively more help to the people in worse conditions. More ownerships means more moral obligations to help.

[5] I am presenting here the point of view of a Roman-Catholic Church member, which may differ in some aspects from those of the Christians from other churches, and still much more—of non-Christian religions (also the main monotheist). I assume that reducing the differences in viewpoints will be hardly probable in some aspects, concerning the foundations of transcendent roles of religion beyond the end of mundane human life , but it may be achieved in the mundane matters of ethics and morals , in aspects derived from transcendental origin.).

critical for liberal democracy and capitalism, although the latter are considered essential for efficiency of frequently prevailing social -economic orders.. My reflections are far from fears that quite soon the era of democracy and of liberalism be will over and that some differently oriented solutions to replace them will be invented. The supposition that criticized systemic solutions deserve mistrust because they have degenerated and are often met at present in ever worsening mutations is much more plausible. Thus, one must look for adequate prophylactic and sanative measures of systemic arrangements based on ideas of democracy and on liberal (liberty oriented) foundations, without revolutionary changes towards any other (seriously different) orientation.

(2) One must also keep in mind memories of utter disasters brought by attempts to force various kinds of autocratic totalitarian regimes upon countries and societies.

In practice, such schemes happened to be sinister in their nature, with pretensions to reflect some lofty aims, presumably based on a holistic ideology but inevitably erroneous, as well as lacking adequate concern for universal human values of personal dignity.

This type of comprehending the state and government has a wider sense, also in systemic arrangements without imminent totalitarian flaws, but attributing to the state apparatus somewhat supernatural role[6], as if possessing by some endowment enough power and abilities to provide at will adequate welfare for the respective population. The government may be assumed exaggeratedly in such cases not only of having unjustified power to overcome inevitable exogenously determined constraints (shortages etc) but also to possess the best knowledge of an unduly wide and deep range of present and future ways of all relevant details in performance abilities for economic and social fields of society in private and public areas. This utopian approach seems to lead also to another assumption: of implicit rights of the rulers to determine most relevant sets of socio-economic matters, through shaping such an institutional order for the population of that state, which offers rewards and punishments according to an extent of obedience to the rulers. Such intentions are sometimes camouflaged under covers of various ideologies, as projects for future, assumedly optimal state of welfare, which unfortunately are most probably composed of wishful thinking . Moreover, it happens that such projects are set to compete in a free election so that a requisite majority vote would supposedly allow finding the best version of ideology, chosen by the electorate. Such understanding of democracy and democratic choice[7] seems to be false as far as most of the prospects of ideologies are very far from expressing real variants of economic and socio-political paths of activities, but they are mainly serving publicity aims trying to advertise respective partisan programs. Majority of votes given to anyone from a set of poor quality variants does not help to increase its quality.

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[6] In mentioning such approaches I wish to warn against exaggerating some lines of thinking in political theology (with references to respective writings of Carl Schmitt) which are included into a very valuable study: Michał Gierycz *"Chrzescijaństwo i Unia Europejska—Rola religii w procesie integracji europejskiej" (Christianity and European Union—The role of religion in the process of European Integration)* Wydawnictwo WAM–Instytut Politologii UKSW, Kraków–Warszawa 2008. I am worried that considering some essential notions (such as solidarity , subsidiarity, unity in diversity) in a holistic consideration of structural principles may lead to weaknesses in political practices if grass-roots foundations are not spontaneously built on the same principles but in different ways, which involve much more personal conscience concern for rightness and truth strengthened through personal spiritual prayer bonds with God. In this way the contents are formed not only on mundane rationality premises but also on transcendentally formed essence of rightness.

[7] Democracy can be useful and efficient only on the foundations of adequately high moral quality of the people in all kinds of their functions, from the grass-roots conditions of family-life and local communities up to stepwise larger organizations and social structures—and finally governmental bodies. This quality is dependent on the nature of moral values operating in practice of human activities and such values cannot be shaped by those people with whose behavior they are concerned. It is essentially important thus to keep these values in conformance with transcendental understanding of right and wrong, truth and lie , good and vile . The late Pope John Paul II reminded that democracy without sufficient care for soundness of the choice between such values will degenerate into a totalitarian regime.

(3) Intentions and promises set in texts included in respective ideological declarations and programs must be necessarily vague and cannot be treated as real commitments A chance to elaborate more concrete programs for applying respective ideologies and ensuring execution of stricter responsibility for their achievement is in practice hardly feasible. It is not feasible in practice to predetermine and codify all detailed elements for the range of rights and obligatory functions of the government as well as their borders and constraints for the range of their enforcement. These constraints inevitably leave enough self-dependence and self- reliance to respective formally independent subjects and their organizations, ensuring their own rights and obligations in their economic and social activities.

(4) Real validity of programs is proved not by attractiveness of words, which describe intentions, but in the practice of real activities and mutual relations among their interrelated performers. Mutual trust among persons cooperating in some actions or participating in commonly undertaken ventures is decisively relevant. Trust should be based not only on promises and expectations but also on positive experiences. The crucial factor of success for the matters touched in these deliberations consists of maximally attainable extension of truthfulness and trustworthiness of the people participating in all respective kinds of economic and other important processes in private and public matters.

(5) Transcendental factors are potentially most essential for the chances to achieve the successes just mentioned above. The earlier mentioned case of introducing quasi- supernatural aspects into considerations of the state and government, as a major force in the socio-economic system, seems to me a case of misusing reference to religion and to the faith in relevance of transcendent factors in consideration of systemic arrangements for human activities and respective criteria of choice.

Even the kindliest attitude to some of centralist endeavors, i.e. looking at them as trials to form a better future for the societies, cannot offer an apology because the matters in question are by far too complex to be managed from the center according to any predetermined model of a centralist nature. (I have in mind here cases, which reject certain human rights and freedom of choice under the assumption that a majority of micro decisions is bound to err so that a more rational center should play the decisive role. Thus, an authority of holding sway over a society is supposed to be tantamount to rulers rights of pre-determining personal behavioral preferences and respective personal choices within a society , by force or by an assumption that everybody would be willing to choose in accordance to rulers appeals).

(6) Thus, one is inclined to accept inevitable diversity for outcomes of human choices and rather to look for the ways to minimize impacts of various ailments and inherent weaknesses of presently prevailing systemic arrangements of liberal democracy. The search for such ways must concentrate on chances for adequate improvements in intrinsic forces decisive for qualities of human minds and consciences. These chances must be basically of grass-roots origin and more spontaneous in their nature than managed from above. I assume that quality of human activities needed ,in the future, for such chances depends predominantly on personal goodwill, wisdom and efforts, which may be much stronger and persistent if based not only on mundane but primarily on transcendent premises. At the same time, it seems that a probability of their occurrence varies depending on the extent of sufficiently friendly environmental conditions for families and schools of all respective grades, (as the basis for upbringing and education of children and young people) as well as for manifold features of culture, similarly oriented on hopefully higher–level values of humanity.

(7) The quality of such an anthropological environment should be monitored and supported by the government, in all its branches, but these governmental functions cannot be conceived as a reflection of any predetermined prescription for a presumably ideal societal order. Their

performance will depend again on personal behavioral features of respective responsible government officers and politicians as well as of all respective persons participating in democratic elections and in a subsequent scrutiny of public activities. The issues considered here cannot be forecasted to happen in a specific period in the future; one can only consider their relatively greater probability to occur in a desirable shape as a response to a respective case of specified conditions.

(8) In other words—it seems useless to engage in disputes on desirable patterns of political denominations in future societal preferences and governments , as well as in disputes on patterns in future evolution of desirable institutions, seen (according to Douglas C North) as manifold "rules of the game" for markets and states, together with interactions and interdependences of their participating actors. It may be also more advisable to abandon concepts of drawing variants of future order as variants of the entity composed of somehow transformed old-time parts, or their newer versions , and forming from them various, mainly modernized, constructions. Any picture of this kind will be an illusion, because we are not able to conceive and to foresee tremendous interplays of "desirable, healthy" elements in that picture, their ideal states and also their undesirable versions: somehow distorted, ailing, pathological. Particular cases may occur in various combinations, depending on respective abilities of immunological grass-root arrangements ready to react on pathological symptoms of illness as well as on the existence of various environmental conditions, health friendly and ready to prevent the most probable causes and factors for occurrence of illnesses in question.

(III)

(1) In a simplified way one may characterize a major part of system failures as resulting from accelerations in speed of proliferating variety in most of economic and societal processes, which makes them hardly controllable and in consequence, open to numerous kinds of mischief in interpersonal relations and to a decay of a moral backbone in personal consciences as well as to a growing atrophy of honesty in compliance with behavioral and professional standards. The latter features are symptomatic for another general characteristics of present tendencies i.e. a supposition that the criteria of evaluation with related measurements and indicators are too one-sided being mainly derived from market transactions (concerned with equivalency of exchange measured in monetary terms).

(2) A strife for novelty and for the speed of ensuing changes become often so strongly subdued to greed for monetary criteria of success that all other criteria of evaluating impacts on human and societal matters are pushed aside, forgotten or disdained. The consequences are frequently detrimental, especially in the fields of family life and its educative roles or through other impacts of social changes on various aspects of welfare. In business—strategies are more frequently based on cost-cutting and mobility than on quality standards and reliability. The features considered relevant for chances of success are biased by overly short-term approach caused by feeling unstable and vulnerable to risk; conclusions from such considerations lead to results justifying such a feeling. Similar motivations and unfortunate feedbacks can be seen not only in business matters but also in among the people active in public sectors. Everywhere—personal strife for quickest monetary success, in the manner of a relentless rats-race, leads to socially negative by-products, ultimately dangerous in a longer perspective also for short-term winners.

(3) It seems too hard to imagine any chance for removing such unfortunate feedbacks without far-reaching stabilizing changes in grass-roots behavioral practice, which need radical improvements in the quality of moral backbones for personal consciences and their role in that practice. Many convincing arguments, based on experiences and on reasoning (with reference to excessive complexity of large social systems) indicate that any centralist manner cannot work in alternative essays to solve these problems.

The chances seem more promising if one assumes joint results of two streams of activities: (1) reflecting a bottom-up orientation of socio-economic micro-processes for achievement of manifold aims, but hopefully striving for common-weal in respectively various fragmentary aspects, (2) reflecting a more holistic viewpoint in undertaking subsidiary studies and actions aimed at providing the former stream (1) with inspiration and information from a much wider perspective and also at setting in motion and performing practical processes which pertain to issues outside the respective fields of capabilities of actors within the bottom-up stream.

The essential common features for the above arrangement would hopefully consist of:

(i) **solidarity** characterizing the motivations and intentions in both of these streams, i.e. honest essays to combine manifold partial welfare aspects into righteous reflections of common weal, as well as honesty in mutual relations with more centrally located bodies,

(ii) good-will in subsidiarity[8], combing two-fold tasks reflecting a **subsidiary** role of the centrally located bodies i.e. (a) expressing utmost will to assist the bottom-up activities, to warn their authors through relevant information and (b) to contribute to the total success of the whole arrangement by respective centrally initiated processes (beyond the range of capabilities in the bottom-up part of the whole).

[8] This good-will, as well as above mentioned honesty of bottom-up part of the whole, are essential for overcoming failures which result in practice from various faults in both parts. Grass-roots actors are tempted to get as much as possible from more centrally located bodies, the latter are tempted to agree treating that as payments for political support.

JAN LAMBOOY

EUROPE AS AN ADAPTIVE COMPLEX INSTITUTIONAL SYSTEM

1. Introduction

Europe has a long, both innovative and troublesome, history, but what about its future? Will that be blessed with shocking changes or with benefits from innovative responses to globalisation and technology. Will there be many new open windows of opportunity?

Contrary to many assertions Europe has already achieved some important goals. The post-World War II period has witnessed a strong sense of urgency to co-operate. Preventing new wars and building a new economy with a reasonable social infrastructure has been an important achievement. More recently the question was posed whether Europe requires not only a new and strong economic renewal, but also a renewed cultural basis and new institutions. The pressure of a new wave of international competition with new economic power blocks in Asia increases the need to think about our possible economic, social and institutional futures. Just recalling the history of European cultural values is not enough for the new challenges. The challenge is that new perspectives have to be developed, coupling old and new systems of values and institutions. In other words: innovation of economic and institutional structures.

We have to bear in mind that innovations also have been accompanied with 'creative destruction', as Schumpeter, the 'inventor' of the innovation concept, has argued. In an innovative and dynamic society it is not always possible to look at the growing components only. Many old economic activities and technologies will disappear and many others will take their place. More in particular a transformation of employment and wealth redistribution will happen, possibly with associated social conflicts. European politics has to enable innovations, but at the same time it has to take care of the disappearing activities and lost employment opportunities, but without harming the dynamics of a vital society. In other words, innovation has not only to occur in production and technology, but also in institutions. *Institutions* are 'sets of rules', based on values and history, and addressed in laws, standards and conventions on how to behave in certain situations. They have to be distinguished from *organisations*, like companies, universities and religious organisations. The EU needs to find a balance between he changing institutions and traditions of the constituent countries on the one hand with the needs of economic development based on technological innovations and the pressure of global economic structures on the other hand.

Political organisations are often focused upon redistribution and the conservation of established rights, whereas economic development needs to pay attention to economic innovation and hence

on growth and selection between old and new forms of production and consumption. In times of change weak governments and many pressure groups tend to show a policy of regression towards previous situations, but by doing so, they are building up the need for a later and more serious reconstruction.

Economic and technological dynamism changes the structure of sectors and employment. Institutional reforms change the balance of power and distribution. However, institutional reforms need to be developed when technology, economics and global restructuring occur, otherwise strong social tensions will be building up, destroying the adaptive process.

Many economists have strong doubts on the social and economic power of this continent, others, like the European Commission, are highly optimistic. Many options on innovative projects have been tabled, but without much success. The question can be raised whether an innovative and dynamic future can be planned? Or, is development, for the greater part of it, not planned but the result of a process of organic growth, or an adaptive all-encompassing feedback process of many persons, organisations, structures, attributes, and above all of institutions? What are the driving forces: government policies, individual 'heroes', ideas and dreams, organisations, states or less poetical factors like demography, technology, natural advantages and serendipity. In this chapter the focus is on long-run economic processes and on the economy as an '*adaptive complex system*', a concept developed by the Austrian school of economics, with authors like Joseph Schumpeter and Friedrich von Hayek. This school argued that overly ambitious attempts of social engineering had almost always had disastrous effects on economic and social development.

In this approach of the adaptive and complex development of economies and societies, the concepts of '*structure*', '*organisation*' and '*institution*' can be used to investigate the processes of change. Structures can change as a whole or by its constituent components. With 'structure' we indicate a configuration of components. With 'organisation' a purpose is connected to a structure, and with 'institution' the rules and values of the actors and of the structure or system are indicated.

In this brief chapter the intention is to use this approach for Europe as an evolving institutional and economic system. Learning from past periods can be important to look forward. In the next section the period since 1800 is investigated, because the entire social and economic system has undergone tremendous changes never seen before in the centuries after that year. The change from agriculture to manufacturing and services has been one of the core attributes of that period, driven by enormous changes in technology, science, and in economic and spatial patterns. However, many institutions show that they were designed for the era of agriculture and of mass-production with strong rural areas and powerful labour unions, but not for the present time with modern technologies in a global economy. In western countries the service-sectors now constitute the main economic base and where knowledge workers have replaced the common industrial labourers. Of course, in many Asian countries the complementary situation is more difficult for the labour force, because, despite the strong general economic growth, a rising dual structure of incomes is a growing challenge for a peaceful further development.

2. Economic development since 1800

In mainstream economic approaches economic growth is 'explained' by theories and models in a synchronic perspective, most often using production functions in which capital and labour are the main inputs. It is necessary to complement this with a diachronic approach, analysing structural changes over longer periods and with a focus on technology and other forms of knowledge and learning. Solow (1957) developed a tool on the macro-economic level, the production function,

but he could not explain growth without adding a 'rest factor' to capital and labour. For our purpose we cannot use the production function approach because Solow's 'rest factor' contains technology and institutions only as a 'container concept' and black box. In many investigations technology is seen as the main driver of economic growth. Apart from technology the 'rest factor' also comprises the influence of the institutional framework. That means that the functioning of markets is contained by the incentive structure, the laws and business attitudes of a society. But technology remains the main driving force, although markets are conditioned and sometimes defined by institutions.

Examining economic growth over a long period (in particular the periods of 1800–1870 and 1870–2000), starting with the time of the Industrial Revolution until about 1870, one can observe that new technologies and the consequent rise in productivity were at the basis of important structural changes. The agricultural sectors were by far the most important in the early 1800s as well for employment as for production. In general the productivity was very low, until the influence of tractors with steam power, artificial fertiliser and new scientific methods increased productivity and caused millions of people to shift to the strongly developing manufacturing sectors, also with a strong effect on urban growth. The impact of the Industrial Revolution on the economic and spatial structure was enormous. But also other social effects could be observed, like increasing urban poverty, the rise of Marxism, secularism, the growth of labour unions. Also an increasing 'globalisation' happened (in the disguise of imperialism, although that was a continuation of the trend since the 15^{th} Century) in order to further population settlements, buying and selling goods in many dependent countries. Colonisation became a common strategy to posit western nations on the global map. The institutional structure also altered tremendously by changing attitudes, new laws, new pressure groups and new types of government. Many monarchies came to an end.

All these processes were enabled by the rise of productivity and the decreased distance-costs caused by new technologies, like steam or oil-driven engines, electricity, trains, ships and cars and later the air planes and telecommunication. Mokyr (2002) emphasised the endogenous nature of the process of technological development by looking at the strong interrelations between applicable scientific research and technological and industrial developments. He found that this 'application-oriented approach to science' was particularly strong in the academic culture of the Anglo-Saxon world, a main reason for the Industrial Revolution to happen there and only later in the continental countries.

The modern view in economics is that research and investment are endogenous to the economic process, but countries can strongly differ in academic attitudes, entrepreneurial spirit and governmental policies. It can be assumed that, although this relation points to the endogenous character of development, observed over longer periods, many exogenous factors remain important, like wars, natural disasters and migrations. The debate as to what is more important, the *endogenous* development of 'waves of economic development' or the occurrence of *exogenous* disasters and wars, is not easy to conclude.

Many theories on long-term economic growth patterns have been developed. In Russia Kondratieff (1926) developed his 'theory of economic cycles', the Dutchman van Gelderen (under the pseudonym Fedder (1913), the Belgian Mandel (1975), and the Austrian Schumpeter (1913) attempted to construct a theory explaining the 'cycles' or the 'long waves' of economic development. They emphasised the existence of a regularity of the waves. Most famous is the Kondratieff-theory, who emphasised a cycle or a wave of between 50 and 60 years. The (young) Schumpeter attempted to explain the waves by the introduction of fundamental innovations by entrepreneurs. His explanation was that development could be explained endogenously as a result of active entrepreneurs, who were exploring new opportunities and new sources for profit. Economic depressions were incentives them to find and develop new technologies, new firms, new sectors.

Innovation was also accompanied by 'creative destruction', the demise of old firms and sectors, with temporary crises in parts of the economy. However, the changing economic structure was very important to understand later bursts of rising productivity and economic growth. Kondratieff, van Gelderen and Mandel emphasised the impact of the cycle of investments in capital goods and infrastructure. After a certain period new investments were necessary and a new growth impulse occurred by the rising demands for capital goods. Van Duijn (1983) also emphasised the waves as being endogenously determined by cycles of investments and innovation.

These approaches were not strongly underpinned by empirical research. In that regard Maddison (1991) has more to say. Although he accepts that technological changes cause fundamental adjustment of economic structures, he refuses to accept the regularities the other authors sustain. He accepts not only technology, but also government policies and exogenous shocks as causes for periods of 'breaking-points'. He speaks (as Rostow has done) of 'stages' or 'phases', not 'cycles' or 'waves', and he denies that regularities exist. Breaking points are the result of exogenous incidents without regularity. But within the phases a coherent development can be shown, which can be seen as a process of complex adjustment. Maddison (1991, p112): 'In the 170 years since 1820 one can identify separate phases which have meaningful internal coherence in spite of wide variations in individual country performance within each of them. Phases are identified, in the first instance, by inductive analysis and iterative inspection of empirically measured characteristics'. He denies the explanation of long-term regularities, which the 'wave theorists' adhere to. He supports a more neutral view (Maddison 1991, pp111–112): 'Although I find no convincing evidence in the work of Kondratieff, Kuznets and Schumpeter to support the notion of regular or systematic long waves in economic life, there have nevertheless been significant changes in the momentum of capitalist development.' He also concludes (Maddison 1991, pp 123–124): 'The move from one phase to another has been caused by system shocks...usually governed by exogenous or accidental events which are not predictable'. And then he distinguishes four main phases for the period of 1870 till now: (1) 1870–1913; (2) 1913–1950; (3) 1950–1973; (4) 1973–1989; (5) 1989–present. Hence he does not accept a regular and predictable 'cycle', but shocks or strong interruptions of a certain growth-path, causing strong changes economic structure. He does not deny the endogenous character of development *within* the phases.

In our perspective the endogenous character of economic development rests on the assumptions of the strong interrelation between the search direction of entrepreneurs with scientific research and the view on demand from certain parts of economy and society, for instance the building industry, transport, exporters, (wealthy) consumers and governments. A developing economic system can adjust to external shocks and by exploring entrepreneurs of new opportunities, with resulting new growth of profits and incomes. This view rests on the same assumption as that of Schumpeter that entrepreneurs are the principal source of changes, although there are no regularities in the sense of waves or cycles of development. Also, we share the view of Maddison that countries can differ depending on their institutional structure and their path-dependence on previous periods of investments and developing of knowledge and institutions.

The result of this process is that unpredictable innovation dynamics can sometimes completely alter economic structures. In the 19^{th} and 20^{th} centuries the principal structural change was the almost tragic decrease of agricultural employment, combined with a strong migration stream to urban regions, within own countries and to the New World. Today the modern world has kept a strong and productive agriculture, but only with about 2 to 4 % of employment and an equally low share of GDP. At the same time the manufacturing sector increased strongly until the early 1960s, after which employment and the share of GDP declined to a percentage of between 10 and 20. The various service sectors are now as important as the agricultural sectors were in 1800. Their contribution to employment and GDP has risen to between 65% and 80%. The

structural change went very gradual, but the main cause was undeniably the changing productivity enabled by new technologies and the more efficient organisation of production, finance and trade. Technological development came in stages, economic development showed breaking points, but the long-term tendency was the same from 1800 on. The present time has come to the end-phase of this structural change, but many other patterns can be distinguished in demographics, spatial structures and in global connections.

An important issue for the European Union is whether the differential growth-paths for the new Eastern European countries can turn into a beneficial development for both the old and the new Europe. For Europe one of the most influential and pervasive technological processes in the recent period is without doubt the introduction of ICT. This has not only an impact on new networks of connectivity, new products and services and on new organisation of business. The effects on location are not yet as clear as the early authors emphasised. ICT would lead to the 'death of geography', but the urban regions were not loosing their attractiveness, most probably due to agglomeration advantages and the forces of tacit knowledge and social capital (Bartley 2006). What did happen, however, is that certain 'high functions', like financial services were even more strongly concentrated in fewer 'global cities' (like London), with a concomitant erosion of the second layer financial centres, like Amsterdam.

To what extent the spatial structure has changed when pervasive technologies (like steam and oil-driven engines, electricity and ICT) revolutionised the economic system? To what extent are cities, rural areas and global connections influenced? To what extent did societies, spatial, institutional and political structures respond to the enormous shifts in economic and technological systems. The spatial structure displays a strong 'path dependence' when one looks only at the physical appearance. Infrastructure, buildings and landscapes change marginally, but the activities and the actors sometimes change considerably. In that sense one can see the economic and spatial structures as *adaptivecomplex systems*. But, what can we say about institutional and political structures? In a time with continually changing technologies and patterns of globalisation the structures do not have to be strongly hierarchical, but based more on the loosely structured networks. Better would be to organise Europe as an adaptive system with a flexible base of citizens and enterprises. In order to get more political and economic strength Europe has to become a networking and co-operating Union, not an organised command system. Its institutional structure has to be flexible and based on the existence of heterogeneity and unpredictability of social, economic and technological events. The other side of this, however, is to maintain specific attributes of the social infrastructure of European countries. More important is that the Scandinavian countries proved that a combination of both goals could be achieved.

3. Technological and institutional restructuring

The European Union has formulated the Lisbon- and Gothenburg programmes, defining a new strategy for Europe. One of the basic goals is enabling innovation and the knowledge economy with a sustainable economy. However, it is not clear how this goal can be achieved. One of the principal tools seems to be investment in education and R&D.

However, the question how institutional structures have to be changed in order to further economic growth is not seriously considered. Various authors, however, have posed that a strong relation exists between institutions, innovation and economic development. North (1990), Mokyr (2002) and Nelson (2005) have contended that the institutional structure is an important factor in the explanation of economic and technological development. Old institutional structures based on the situation of previous centuries and on agricultural and manufacturing societies fail in a modern networked world-economy, where cheap production and a strong knowledge-economy go together. Old institutions can be a barrier to further development. Instead of enabling new events they

can cause a deep stagnation by 'institutional lock-in', that can lead to a regression towards old structures and conservative habits.

Richard Florida (2002) has shown that, even at the scale of urban agglomerations, societies with an open culture for creative entrepreneurs and workers, are the best cradle for new initiatives and economic growth. Adam Smith argued that the division of labour enabled development, an argument developed further by Jane Jacobs (1969, 1984) for urban regions. She also contended that economies with a structural heterogeneity of enterprises, population and urban structures had the best chance to develop new activities. She published several books in which she showed that people do not only want work and income but also an attractive environment. Florida has used and expanded her insights in his book 'The Rise of the Creative Class', in which he considers that kind of people as the principal source for new dynamic developments. Already Jean Gottman (1961) has investigated the effects of the shift to knowledge as the basic input for the production of services on economic and spatial structures. He contended that diversified metropolitan regions were the best location for the modern service and knowledge economy.

In recent studies the concepts of 'knowledge economy' and 'network economy' are used to indicate that the changes in the structure of the economy are fundamental and pervasive. Networks of firms span the entire globe and knowledge is dispersed over many firms, independent of their locations. New production technologies and outsourcing have been applied. Logistical chains connect firms in many countries. Mass production has been replaced by 'modular production', the production of various components and the assembly according to specific consumer preferences, combined by world-spanning logistic chains.

These changes are based on the influence of the strongly increased labour productivity induced by the use of modern capital goods and increased human capital. The knowledge for these processes is increasingly developed outdoors, in research labs and consultancy offices. Many service firms were formerly parts of the large production companies, but were gradually outsourced, like accountancy and law firms, ICT activities, transport and logistics and catering. These activities have shown a very strong growth in the last decades, observable in employment, the share of GNP and in office buildings in many cities. The services are now the dominant sector, with both the lowest and the highest wages, but also with diminishing membership of labour unions and with concomitant loss of social cohesion. The labour class does not exist anymore as a coherent social movement. The rise of the service economy, with knowledge and networked activities has also brought about a shift in the hierarchy of international and interregional growth poles towards Asian capitals, but interestingly only a few new regional developments within the USA and other western countries. As Jane Jacobs and Jean Gottman already argued, in both parts of the world, the Western countries and the Asian ones, the strongest regions are now, more than ever, the differentiated agglomerations with high concentrations of knowledge workers, or the creative class. As we have seen the driving forces of economic growth are in the first place technological developments, but the origin of technology is knowledge and, hence, science and academic institutions, but also induced by the institutional situation in which companies and entrepreneurs have to produce.

The nature of technology is difficult to define precisely, but almost all definitions contain the concepts of 'knowledge and skills', 'tools or capital goods' and 'production of goods and services'. Some add 'organisation' and 'consumption' to the definition. The most usual view in economics is to consider technology as a bundle of human capabilities, skills and routines that is used in production, primarily that of goods but also services (like surgery, consulting or truck driving). Technology is used to transform goods, to enable a certain kind and quality of services, and to enable the use of goods in consumption. In this sense of the use of material goods, knowledge and skills, technology is important in consumption too, like in the use of computers and TVs.

Technology can also be conceived as knowledge embodied in the 'hardware' (or 'tools') of capital and consumption goods (Malerba 2006). Lipsey, Carlaw and Bekar (2005) also include 'organisation' in the concept of technology, but we prefer to see it as a condition for, or a result of, new developments. It is a necessary condition to enable the process of production and consumption. Organisation can be a condition for the development of technology, but it can also be a result of the introduction of new technology. Organisation can also be observed as a result of previous technological and spatial developments. Chandler (1962) and Chandler and Maslish (2005) have argued that the rise of the skyscrapers, the technology of steel construction, the introduction of the elevator, together with telecommunication and the car, have forced corporate America to adapt both their economic and their spatial organisation.

Currently, the introduction of ICT again forces many enterprises to adapt to the new challenges and opportunities. However, the institutional structures of the past can act as barriers to new developments. A bad example is the fear in many West European countries for East European workers after the opening of the borders. Another example is the French and Italian opposition against new labour and retirement proposals. Institutional development, changing behaviour, attitudes, but also the division of power and the redistribution of income are crucial for the investigation of possible futures for Europe.

4. Conclusions: institutional development and changing structures

The development of technology and institutions has to be investigated in a long-run perspective. Both are the result of emergent processes, not planned, but nevertheless sometimes in organisational structures (states, companies and universities) that can compete with each other. In the modern societies the multitude of individual decisions gives rise to the need of co-ordination. This goal cannot be achieved by markets alone, but have to be complemented by other mechanisms. Other structures of co-ordination, like institutions and planning, have to be used also. However, states are influenced by pressure groups and do not have access of much relevant economic and technological information. Free markets can have outcomes that are detrimental to weak groups, because markets function 'rationally' searching for the most profitable solutions. Institutions are developed, sometimes already long ago, to redress the negative effects and to impose certain values and standards on the participants in markets. But also states have to be controlled, because they too are built upon individuals who try to achieve their personal and group goals. Institutions are the result of social and economic experiences of the past and the solutions for the problems raised by the behaviour of actors. Institutions are the framework for decisions and behaviour, but also the result of decisions and behaviour in the past. Many bank laws, property laws, rules of behaviour and the kinds of contracts have been the result of decisions and political choices in the past, but also framed for past conditions. Institutions have to be carefully adjusted to modern times. The difficulty is that the more political structures participate in this adjustment process, the more barriers can be raised. Pressure groups of all kinds, from companies to environmental pressure groups, labour unions and religious organisations, can build barriers to the adaptive process. This takes a long time and often many social conflicts before a solution can be reached. Sometimes severe economic crises or even wars are seen to be a good moment for adjustments. Only then the burdens of the past can be altered into the opportunities of the future.

In Europe not only pressure groups but also the participating states themselves can oppose changes. The more layers are involved in the decision-making process, the more difficulties to change one will meet. This resistance to change can cost much time and money, which could have been invested in goals that are productive and socially wanted.

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HANS VAN ZON

THE 'EUROPEAN RENAISSANCE' SCENARIO some problems in assessing Europe's futures

In the context of stagnating European integration and an increasing commercialisation of all spheres of life some building blocks for a European Renaissance scenario are presented in which communalism is coming to the fore again. This is done with the purpose to highlight some general problems in assessing the futures of Europe. Especially the problem of turning points gets attention because a European Renaissance scenario is only possible if a turning point occurs. We try to be transparent as far as methodology is concerned and contrast our approach with five recent assessments of Europe's futures (see references).[1]

1. Major problems and neo-liberalism

The best assessments of the futures of Europe do not bother very much about methodological transparency but we will show how we can uncover with the help of some standard questions deficiencies in the prospective analyses under review.

- The first standard question is what major problems or challenges Europe will face. A related question is about the time frame. We propose here a horizon of 15–20 years. Among the most prominent problems is that of environmental pollutionalthough only one of the five prospective studies under review (i.e. Commission of the EU, 1999) mentions its potential significance. Recent revelations about climate change, including the accelerated melting of ice caps, have added to the growing concerns among policy makers and the general public. However, the modalities of environmental management depend very much on the perspectives of policy makers. Market fundamentalists would rely on technological progress brought about by the market and corporate responsibility, while refraining from imposing strict regulations.[2]
- Another major problem European politics is facing is that of the prevalence of neo-liberalism in many EU countries and in the Commission of the EU,

[1] Two studies (Clark et al, 2005, and Alexander, 2005) have the character of a pamphlet outlining a vision for Europe while describing major challenges. They are both from prominent members of the UK Labour Party. The third study is one of the Commission of the EU (1999) commissioned by the Forward Studies Unit and which involved many experts, most of them working in the Commission. The focus is here on the description of 5 scenarios. Leonard (2005) and Rifkin (2005) outline a vision for Europe, underpinned by historic analysis.

[2] Liberal market economies, like the UK and the USA, have the worst record in environmental protection. The environmental performance score (in 2001) was for the UK 167.5, the USA 202.3, France 256.0, Sweden 301.3, The Netherlands 324.1 and Germany 370.6 (British Journal of Political Science, October 2001, p. 688).

It is rather unusual to depict the dominant policy perspective of the major actors as a major problem. Usually major problems/challenges, major actors/factors and driving forces are separated. In this scenario though neo-liberalism is considered as by far the biggest problem that Europe is facing nowadays. An additional complication in describing the dominant policy paradigm as the major problem is that whilst challenging orthodoxy, one risks rejecting belief systems that are considered by many as facts.[3]

- A related problem is the corporate capture of the state and the undermining of democracy. While some (like Rifkin, 2005) already see a network society in Europe and a vibrant interaction of NGOs, many others see the transformation of politics into the administration of society whereas the important decisions are taken in the market, i.e. by the multinational enterprises. The sphere of politics is increasingly separated from the economic system while the change-over from regulated to self-regulating markets de-politicize politics.
- There is also the erosion of the welfare state and the declining quality of public services. This has meant, in many EU states, the end of free education, free basic medical care and decent old age pensions. The erosion of the welfare state has been justified using the argument that 'we can not afford it anymore' (one wonders how the Scandinavians manage). Although West European countries became richer since the mid 1970s (this can not be said for all Central and Eastern European countries), inequality increased as did social exclusion.[4] This became most pronounced in those countries that implemented the most rigorously a neo-liberal agenda.
- A major problem that almost all European societies face nowadays is the growing divide between the political class and the population at large.[5] It was shown during the referenda about the draft European constitution in France and The Netherlands (2005). In The Netherlands the overwhelming majority of politicians, most non-governmental organisations (including trade unions) and virtually all news media supported the draft constitution while opponents were depicted as ignorant. Two thirds voted against. Aversion against politics is reflected in lower voter turnouts. This increasing divide between population and political class is related to the changing nature of politics, taking the politics out of politics, and the emergence of a belief system whose core tenets are free trade and self-regulating markets and is shared by most opinion leaders. The media increasingly resemble echo chambers where, about major issues, only one opinion is voiced.

Most of the above mentioned major problems are associated with the coming to the fore of neo-liberalism. It is not only a programme for a new economic policy, it is a programme to remake the whole of society: to create market society and market democracy. This observation highlights the problem of the nature of inter-linkages and a hierarchy of the major problems identified. The establishment of a hierarchy is crucial resulting, among others, in the identification of core and dependent variables within the great variety of major problems Europe will face.

- Another major problem is the prevalence of disintegrating tendencies within the EU, especially since the enlargement in 2004/2007 with 12 new member states. This goes together with declining public support for the European Union.[6] The introduction of the Euro has been

[3] This applies for instance for the belief that free trade is beneficial for all market players. This even became an axiom for neo-liberals. For the British Europe Minister Alexander (2005) the great challenge for Europe is how to push forward trade liberalisation, remove trade distorting subsidies (he targets above all agricultural subsidies), liberalise the trade in services and ease the regulatory burden for business (pp 3,5,20,25).

[4] But neo-liberals like Alexander (2005) say that it is exactly the old model with inflexible labour markets and high regulatory and tax burdens for enterprises that causes mass unemployment.

[5] The concept of political class demonstrates the degree of common ground between politicians and opinion leaders of different parties and institutions.

[6] Support for the European Union has declined from 72 % across all member states in 1990 to 54 % in 2005 (Clark, D, 2005, p. 2). For the 10 new EU member states (2004), the average turnout for the elections for the European Parliament was 26.4%.

hailed as a big success with the promise that the single currency would give a boost to the economy. However, economic stagnation prevailed. Initially, some proponents of monetary union thought that this could be a trigger for political union because a single currency without proper institutional underpinning could not function. Monetary policy was given to the European Central Bank whose sole objective was to keep inflation low. The idea of political union moved to the background while the British conception of the EU as a big single market prevailed, especially after the 2004 enlargement. The strict rules of the Stability and Growth Pact led to stagnation. While the USA and the UK pursued a counter-cyclical demand management policy the Euro countries were tied by the Pact rules. While Germany can boast of big successes in export markets—it became the world's biggest exporter—its domestic demand came, after 2000, to a total standstill, triggering very low GDP growth rates. At the same time, within the euro area, countries are competing with each other over tax policies (here progress is extremely difficult because unanimity is required) while social dumping has become widespread.[7] As Jacques Delors has noticed, the Euro has become a currency without a proper economic foundation (De Morgen, 28 January 2004). The logic of the single currency forces the Euro-countries to harmonise economic policies, eventually leaving the non-euro EU countries behind. The EU commission pondered about going ahead with certain proposals for tax harmonisation with just the Euro-zone countries. The problem is that there is no political framework to do so. It seems that either the Euro fails (some Italian ministers already suggested stepping out), or the Euro-counties harmonise economic policy which would mean a big move towards federalism in Euroland.[8]

2. Shaping actors and factors

One of the standard questions in prospective analysis is the one of shaping actors and factors. Moreover, often a shaping actor is taken as the focus of analysis, especially in policy oriented studies. In our scenario the EU-27 cannot be taken as focus due to disintegrative tendencies. On the other hand the emerging actor of a core EU is yet too uncertain. Therefore the focus of our study is the process of European integration.

- An important factor in Europe's future development is the conglomerate of European multinational enterprises that has a major impact upon policy making. There is also the group of financial services industries (including banks, pension funds and insurance companies) that has a short term perspective and is internationalised. It was above all the pressure of financial services that was instrumental in bringing about economic liberalisation and de-regulation. Shifting balance of forces between domestically oriented enterprises and financial capital often explains the extent to which governments implemented neo-liberal reforms. Multinational enterprises and banks can be considered both as actors and factors. Actors are defined as those players that can influence factors in inter-active fashion. They are recognisable, purpose oriented variables, as opposed to the structural and diffuse character of factors (see Commission of the EU, 1999). For example, in the case of the UK, the financial service sectors that is concentrated in the City of London, is very well organised and can be considered as an actor. On the European level the multinational enterprises are well organised, among

[7] Company taxes diminished in Ireland from 24% in 2000 to 2.5 % in 2005, in Austria from 34 to 25%, in Belgium from 40.2 % to 34%, in The Netherlands from 34.5 % to 31.5%. In the USA it was 40% (Wall Street Journal Europe, 28 Jan 2005).

[8] A substantial harmonisation of economic policies within the Euro area should occur before the next group of countries move into the Euro-area.

others in the European Roundtable of Industrialists, which was founded in 1983 and has an extraordinary influence on Commission Policies. Its 45 members represent a turnover of 550 billion euros.[9] Kuklinski identified the shift of power from the nation state to the trans-national corporations as one of the six major turning points in the period 1950–2000.[10]

However, multinational enterprises and banks are not considered as major actors in any of the five studies under review.[11] One of the reasons that many of the problems, actors and factors mentioned above are not considered as significant in many studies dealing with the future of Europe is the implicit assumption that the changing political economy of Europe is considered as of minor importance. Of course, it is also a subject matter that is very difficult to analyse in prospective terms (compare it, for example, with the problems of demography (ageing) or technological change).

3. Driving forces and turning points

In our scenario there are two driving forces: the first is that of neo-liberalism that underpinned the marketisation and globalisation drive since the late 1970s while the second is that of the conglomerate of counter forces evoked by neo-liberal policies and that will underpin the 'European Renaissance' scenario.[12]

In our scenario the sphere of interest representation in society organises protection against market forces. However, since the mid 1970s traditional interest representing organisations, like trade unions and political parties, have lost in importance while no comparable new ones have replaced them. This has led to a defective system of interest representation. New political parties may come to the fore that articulate the aversion against neo-liberalism among the population. Consumer and environmental organisations and other one-issue organisations might rally against neo-liberal policies. Major actors in the sphere of the economy may recognise that neo-liberal policies are untenable. Especially domestically oriented enterprises may re-assert themselves and push for more investments in material and social infrastructure.

As Karl Polanyi has noticed of the late 19th century '*The great variety of forms in which the 'collectivist' countermovement appeared was not due to any preference for socialism or nationalism on the part of concerned interests, but exclusively to the broader range of the vital social interests affected by the expanding market mechanism*'[13]

Within the European Union the 'European Renaissance' scenario is based in the Euro-area that has got an institutional expression. Initially the Euro-countries cooperate in economic policies, later complemented with other policies. After having sufficiently deepened integration this Euro-area expands to include other EU countries.

Most analyses dealing with the future of Europe are extrapolating current trends and are ignoring possible turning points. But who could have expected, during the mid 1970s when state

[9] See Susan George in *Maniere de Voir,* January-February 2002, p. 29.

[10] Kuklinski, A., Skuza, B. (2006) (eds) 'Turning Points in the Transformation of the Global Scene', Oficyna Wydawnicza 'Rewasz'/The Polish Association of the Club of Rome, Warsaw, p. 47.

[11] Instead, Rifkin (2005) celebrates the coming to the fore of a network economy and society based on reciprocity and trust in which the market parties are becoming a single entity engaged in a common task (p. 186). In this view, the EU's primary role should be orchestral, facilitating the coming together of networks (p.215).

[12] Of course, in a comprehensive assessment of Europe's futures alternative scenarios should be considered. Because of lack of space and the focus on methodological problems just one scenario is highlighted.

[13] Polanyi, K. (1957) *The Great Transformation. The political and economic origins of our* time' First Beacon Paperback, p. 145

led development was popular across Europe and the world and when Keynesianism was dominant, the neo-liberal turn in policies?

Assessing possible turning points is one of the most difficult but crucial tasks in any prospective analysis. According to Kuklinski turning points are deep and relatively rapid structural changes that lead to the emergence of a new trajectory.[14] To identify them one has to detect the accumulation of tensions in society and economy. Problems will be identified that are not problems from the perspective of the prevailing paradigm. The task is to diagnose the factors and circumstances that are conducive to the emergence of turning points.

Historical analogies are often useful. The history of market forces is that of institutional embeddedness. Market relations should be embedded in institutions that generate trust and predictability. But the 'market as such' is self-destructive and undermines the arrangements that can make it beneficial. The market is a relationship that can only be imagined in conjunction with market actors that usually have unequal access to information and assets. The freeing of market forces necessarily mobilises forces that seek to contain it.

This is shown in the case of Latin America where recently a series of governments came to power that oppose neo-liberal policies. However, compared to Europe, neo-liberal reforms started generally earlier and were much more devastating. Moreover, they were often imposed by external forces through IMF imposed structural adjustment programmes.

4. The turning point of neo-liberalism

Because here the European Renaissance scenario is a reaction on the era of neo-liberalism it is instructive to have a closer look at the movement that brought to the fore neo-liberalism.

Neo-liberalism as a coherent alternative policy paradigm emerged during the 1970s as a reaction to the spread of state led development models all over the world. The SU had attained military parity with the USA and apart from the increasing number of 'socialist' states there were many socialist oriented states and countries where the state played a major developmental role (like India). Moreover, there was a movement towards a New International Economic Order, supported, among others, by an important segment of Western social democracy that promised fairer trade to developing countries with, among others, funds that would be used for stabilising basic commodity prices. Increasingly, the state was considered as essential for providing solutions for a range of economic and social problems. In the USA some think tanks (like the Heritage Foundation) and academics (like a group of economists around Chicago professor Milton Friedman) developed an alternative vision that championed the markets as the solution and the state as the problem. The basic tenets were privatisation of state enterprises, deregulation (including labour markets), liberalisation of markets and unrestricted free trade. It also implied an opening up to the world market and foreign enterprises and the undermining of organised labour. The debt trap would enable the IMF to impose the 'Washington Consensus' on many indebted developing countries.

Under President Reagan and UK Prime Minister Thatcher, the new policies would be implemented in developed economies as well. It was from the late 1980s onwards that neo-liberalism became the new orthodoxy in most West European countries.[15] From the early 1990s onwards the Commission of the EU (at least the most important Directorate Generals) would be

[14] Kuklinski, A., Pawlowski, K. (Eds)(2005), 'Europe- The Strategic Choices', Wyzsza Szkola Biznesa, Nowy Sacz., p. 416

[15] This is a rather controversial statement because despite the advance of neo-liberalism socio-economic models still differ considerably across Europe.

won over. A shock wave of marketisation engulfed the European Union. The collapse of communism in the eastern half of the continent contributed to the spread of market fundamentalism.

The creation of an enormous mass of petro and Eurodollars, complemented by the growing liquidity of pension funds, helped to open up national capital markets and from the late 1970s to the mid 1980s the major Western countries liberalised capital markets. This made it much more difficult to implement classical social democratic policies as the socialist French government noticed during the early 1980s.

The liberalisation of international capital transactions was the major trigger of financial globalisation. It meant the creation of dazzling amounts of speculative capital that could lead to the devaluation of major currencies (like that of the English pound in 1992 brought about by the speculator George Soros) or a chain reaction of economic crises (like during the Asian financial crisis of 1997).[16] It also meant the ability of multinational enterprises and banks to move more freely and channel profits and capital to foreign countries and tax havens, so escaping the constraints of the nation-state.

Therefore, apart from a belief system, neo-liberalism is at the same time a material force underpinned by specific corporate interests. It concerns the realm of ideas and that of material forces.[17] It was a teleological turning point in the sense that it was not spontaneous but brought about by purposeful actors, unlike what Madej suggests.[18].

The volatility of international capital markets poses nowadays a tremendous threat to the world economy, including the EU. It is the Achilles heel of corporate globalisation. Although the creation of the Euro protects the Euro-zone to a large extent from speculative attacks, even the Euro-zone is not immune from international financial crises. Especially the potential undermining of the position of the dollar through the accumulation of US debts (in 2006 a current account deficit of almost 800 billion dollars) and the global credit bubble pose a problem.[19] Future historians will wonder why decision makers in the Western world have not been pro-active in view of major financial disequilibria.[20]

The financialisation of the European and global economy led to the greater chance of hostile takeovers and the splitting up of companies that, in principle, could have had good chances to survive. The sphere of finance became increasingly de-linked from that of production. Corporate globalisation means the imposition of a self-regulating market at the international level while breaking down the remaining institutions of regulated capitalism at the national level. It led, among others, to a system of credit default swaps (a kind of insurance against debt default) totalling $45.5 trillion dollars late 2007, i.e. three times the GDP of the USA.[21]

However, those dealing from a neo-liberal perspective with the futures of Europe (like Alexander, 2005) ignore the negative aspects of corporate globalisation.

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[16] Foreign exchange transactions have grown tremendously since the early seventies, from 18 billion dollars a day then to more than 350 000 billion dollars in 2001. More than 80 per cent of these transactions are speculative in nature. By 2005, more than one trillion dollars of currency exchanges flow through the electronic arteries of the global financial network every day. This is more than the total foreign exchange reserves of all the major central banks in the advanced industrial countries.

[17] Here I agree with Z. Madej who stressed the incorporation of the realm of ideas in the study of turning points (in Kuklinski, A., Skuza, B., 2006, o.c., p. 159)

[18] Madej, Z., o.c. p. 169.

[19] In Alexander (2005) there is no mention of global financial disequilibria and speculative capital flows.

[20] The Euro-zone provides in principle a protective buffer but it is not adequately underpinned by institutions. In case of a global financial crisis, the Euro-zone needs control of international capital flows. How to implement them? Clark et al (2005) propose '*a new international system of managed exchange rates and capital controls to prevent speculative financial flows from disrupting otherwise stable economies*' (p. 11).

[21] According to the International Swaps and Derivatives Association, see A. Pettifor (2007, 11 December, 'Globalisation: sleepwalking to disaster', in Open Democracy).

Here one of the main triggers of the neo-liberal turning point, namely liberalisation of international capital flows, could lead, through a global financial crisis that also affects the euro-area, to a major turn in the direction of re-regulation while claiming back some sovereignty for elected governments. The recent interventions of central banks in OECD countries in order to ease the credit crunch as the result of the sub-prime mortgage crises in the USA point in this direction.

Turning points are usually triggered when problems that are accumulated due to a specific policy choice cannot be ignored anymore and lead to policy changes. As a test case, a country can be taken where neo-liberal reforms have been introduced early and where these reforms have gone much further than elsewhere.

5. The test case of Great Britain

In the UK the neo-liberal programme has been implemented with the most vigour. According to John Kenneth Galbraith, *'Britain had, in effect, volunteered to be the Friedmanite guinea pig'* (*The Observer,* 22 June 2003). This has been made possible by the fact that (a) the crisis of the old system was more obvious than in other West European countries after a long period of relative economic decline, (b) the electoral system enables parties to keep power although they do not command a majority of the electoral vote[22], (c) the welfare state was not very much entrenched in the middle classes that were crucial in the electoral system, (d) liberalism has deep roots in Great Britain and (e) the financial services sector that is concentrated in the City of London is very powerful.

Twenty eight years of neo-liberal reforms have had a deep impact on British society. Britain became richer as a nation, but at a high price. Britain became more unequal, the weak were treated worse, education and health care deteriorated as did the transport infrastructure. As a result of worsening working conditions, parents could care less for their children. Crime rates went up as did the prison population. Deregulation had the result of worsening consumer protection. The public good was pushed back in a wave of privatisations. Many competencies were taken away from local government. In 1979, 63 per cent of men eligible for membership were trade union members, in 1997 it was only 32 per cent. Britain aligned itself more to the US model of liberal market economy.

The British government boasts low levels of unemployment but in 2005 there were four times more people on invalidity benefits than in 1975 reflecting a policy of artificially pushing down unemployment.

After 25 years of neo-liberal reforms some conclusions can be drawn with respect to the sustainability of the project. Already in 1992 polls predicted a victory for Labour. But the Conservatives won with a tiny majority. In 1997 Labour won with a landslide. Opinion polls showed that this victory was linked to a deep aversion for Thatcherite reforms. However, New Labour took over the basic tenets of Thatcherism. The difference was a greater willingness to invest in public services and to halt the further increase in inequality. On the other hand,

[22] Governments could get a majority support in parliament without even having a majority of the popular vote. This is related to the first pass the post mechanism of the British electoral system. In 1979 Labour plus Liberal Democrats, both opposed to Thatcherite reforms, had 50.7 % of the popular vote, in 1983 53.0 %, in 1987 53.6 % and in 1992 52.2 %. In most West European countries, Thatcher could never have ruled alone. The district system allows political parties to ignore the viewpoints of the electorate in the safe districts and to concentrate on the swing districts that account for about 200 000 to 300 000 voters, mainly middle class. This contributes to the convergence of party political programmes.

investments in public services were hardly noticeable for the public (these investments were often mismanaged and also linked to private sector involvement) and popular dissatisfaction with these services is still widespread. Public services where safety is crucial like air traffic control have been privatised under Labour. The criminal records bureau, forensic science services, some prisons, gas pipelines and many other core public services have been privatised. The lack of regional policies has exacerbated the North-South divide while making it very difficult for public service workers to survive in the expensive booming areas. For a large segment of the public it has become obvious that free markets have to be regulated.

A long period of sustained growth has eased the negative aspects of the drive towards deregulation and privatisation (the UK, with its developed financial services sector capitalised very much on the process of financial globalisation[23]) but it seems that the UK economy is running out of steam and less investments in public services are foreseen.

Are there signs of a reversal? It is telling that Labour was re-elected in government in 2005 by about 20 per cent of the electorate (and 35 per cent of those who actually voted). Nevertheless, Labour commands a big majority in parliament.

Most British have resisted the drive towards privatisation.[24] Although government de facto re-nationalised the rail track company, the privatisation drive continued in other areas. The big divide between government and public reflects in the shrinking of the Labour Party (as the Conservative Party did under Thatcher) from 700 000 in 1975 to 215 000 in December 2003 (70 per cent of those members joined after May 1997). Also, the Labour government increasingly ignores the Labour Party. It shows a deepening of the problem of interest representation in British society, one of the most centralised in Western Europe. The problem is that in Britain the electoral system does not allow a party to come to the fore that may offer an alternative.

Another candidate for studying the impact of neo-liberal reforms is The Netherlands where dissatisfaction with policies of mainstream parties is immediately felt in voting behaviour. First it was the coming to the fore of a xenophobic protest party (the Fortuin list; it subsequently shrank after internal quarrels, recently new xenophobic parties show high poll ratings) and more recently in the rise of the radical Socialist Party, which also saw an explosive rise in its membership.

Noticeable is that neo-liberal policies are least implemented in countries where interest representation is institutionalised in (quasi) corporatist structures. In those countries trade unions retained high membership.[25] These countries might be especially prone to support a European Renaissance.

6. Fault lines: theorising difference

Possible turning points can be detected by identifying fault lines. One is the growing divide between the political class and the population at large. There are two more fault lines that deserve attention and that are not directly linked to neo-liberalism.

- The first concerns the borders of the European Union. The abolition of communism in Central and Eastern Europe removed the veneer of uniformity that covered the region. Not only did

[23] In terms of share of first tier capital, British banks take the lead in Europe with 19.2 % (2002) with Germany on second place (17.6%) and France on third place (14.0%) (The Banker, 2002).

[24] In a 2005 survey, 84% of British respondents agreed that public services should be run by government and local authorities, rather than by private companies (The Independent, 21 June 2005). In 1983 only 32 % of Brits thought taxes and spending on the welfare state should be higher, in 2003 the percentage was 63% (The Guardian, 27 September 2004).

[25] Trade unity density varies widely in the European Union, from 80–89 per cent in Belgium, Denmark and Sweden to 20–29 per cent in the UK, Germany and The Netherlands (European Industrial Relations Observatory, 2003).

inequalities within countries increase, but also between countries. In terms of GDP per capita a pattern emerged that reminds very much pre-communist patterns of early 20th century. Although geographical variations in social and economic development are rather fluid a clear divide emerged that puts, on the one side, the transition winners that entered the EU in 2004, and, on the other side, the transition losers.[26] The divide not only reflects socio-economic development levels but also different views on state and society. Levels of corruption and political freedom differ greatly on both sides of the divide.[27] Many will say that it just reflects good or bad government. But after 15 years of extraction from communism the question emerges whether structural factors are involved. The Huntingtonian thesis of 'clash of civilisations' is very unpopular in Europe because of the memories of the Nazi pathology of difference. However, some models of living and working together are incompatible. Therefore, the Copenhagen accession criteria for prospective EU states stipulate that they should (among others) respect the rule of law, have stable institutions guaranteeing democracy, freedom of speech and respect for and protection of minorities.

Taking in countries that do not qualify may mean importing problems into the EU with which the EU can not cope (organised crime, corruption, badly protected borders). It may further contribute to centrifugal tendencies. In the Balkans a series of states have emerged where the rule of law and democracy hardly exists. It is an illusion to think that the process of EU integration may lead these countries in a matter of some years to compliance with the Copenhagen criteria (Clark et al, 2005, and Alexander, 2005, ignore compliance problems while pleading for further enlargement). Nevertheless, the EU has an important role to play as a guiding force. Already with the last enlargement, in 2004, the nature of the EU was transformed. Expansion diminished EU capacity for strategic agreement and common action. According to the International Herald Tribune (21/22 February 2004) '*it is imaginable that the EU will simply lapse into a material and economic association. That would not extinguish 'Europe' as a political presence in the world, but it would mean that Europe would only exist by way of individual governments, and by its individual members acting together in terms of ad hoc alliances of national or group interest. That would be very distant from the moral vision of those who created a European community that they hoped could put the past behind and give a new political expression to European civilisation*.' The further weakening of the EU will be a strong argument for the formation of a core of EU countries that can move the European project forward.

- Another major problem that European societies are facing is that of the socially excluded. The dynamism of structural social exclusion tends to lead to disrespect for generally accepted rules. The problem is exacerbated if social exclusion largely affects ethnic minorities that have a totally different social and religious background. Within ethnic minorities, social exclusion is above all found among those who originate from tribal societies, where forced marriages and submission of women are common practice. The integration of the socially excluded who originate from pre-modern societies is a tour-de-force. It can be expected that the share of

[26] The new EU member states in Central Europe score in the Human Development Index 2003 between 26 (Slovenia) and 48 (Latvia). Bulgaria has rank 55, Romania 64 while Belarus 67, Russia 62 and Ukraine 78. GDP per capita varies in Central Europe (EU) between $4440 in Latvia and $11.920 in Slovenia (2003). This is $2260 in Romania, $2130 in Bulgaria, $1600 in Belarus, $2610 in Russia and $970 in Ukraine (Economic Commission for Europe and World Bank).

[27] The government effectiveness index in 2004 is positive for all Central European EU states but negative for Bulgaria, Romania, Ukraine, Russia and Belarus. The corruption perception index in 2004 is between 3.5 (Poland) and 6.0 (Slovenia) for the Central European EU countries, it is 4.1 for Bulgaria and 2.9 for Romania, 3.3 for Belarus, 2.8 for Russia and 2.2 for Ukraine (Transparency International). In Civil Liberties (2004) most Central EU states are ranked 1 (apart from Latvia and Lithuania-2), Bulgaria and Romania 2, Ukraine 3, Belarus 6 and Russia 5 (Freedom House).

ethnic minorities in EU countries will increase drastically, even with stringent immigration rules in place. A cultural tipping point may be reached in which '*the threads of cooperation reaching everyone will be cut and the formerly cohesive community shall fall apart into small groups treating the strangers differently*'(Marosan Gyorgy).[28] This is the course of a xenophobic-populist scenario.

The issue of socio-economic and cultural fault lines in Europe, between and within countries, is likely to remain important in the 15–20 years to come. However, a taboo rests on many aspects of the problem. Ignoring these problems, as all five studies under review are doing, is not only related to historic sensitivities but also to the widespread assumption that culture does not matter very much in social and economic development and that cultural attributes are rather ephemeral. The assumption is that under the veneer of culture is *homo economicus*.[29] In a Renaissance scenario the Copenhagen criteria for EU accession will be taken seriously while a policy of social inclusion will further the integration of ethnic minorities in the framework of a strengthened social contract.

7. The post-modernist conundrum

Looking at possible turning points in front of us, it is instructive to look at recent epochal changes. One of the major shifts that occurred in Western Europe is the cultural revolution that started in the 1960s and that induced major value change. It can be considered as the fastest and deepest societal transformation ever in West European history (of course, the Central and Eastern European countries had their communist revolution). Social changes include the transformation of marriage from a life-long commitment to a contractual arrangement, the spread of single person households, the emancipation of women, the emergence of a youth culture and the growing independence of pensioners. Gays were emancipated and added to the emerging plethora of sub-cultures. Multi-cultural society became a fact. Consumer society emerged in which even toddlers are targeted by sophisticated marketing methods that influence on the subconscious level our choices.

Individual choice became more important while the social contract moved to the background. Solidarity was often replaced by one's own responsibility. It was, among others, reflected in the growing importance of private pension vis-à-vis state pensions. Generally, more aspects of social life became commercialised. Social status criteria shifted: the status of engineers, teachers and other public service workers diminished. A celebrity culture became more pronounced. Inequality spread. Social fragmentation deepened while discussion about social cohesion, so central in the European project, moved to the background.

Surveys have documented the shift to a post-modernist value system across the Western world. An individualism that sought an instant gratification of desires became more pronounced. This is legitimised by neo-liberal theory that proclaims that the pursuit of self-interest serves the common good. People became more obsessed with property as the burden of social insurance was increasingly shifted to the individual.

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[28] In Kuklinski, A., Pawlowski, K. (2005), 'Europe- The Global Challenges', Wysza Szkola Biznesu/ National-Louis University, Nowy Sacz, p. 44.

[29] In the USA this belief has been elevated to official doctrine. In the National Security Strategy of the USA is written (September 2002, p. 22) '*The concept of 'free trade' arose as a moral principle even before it became a pillar of economics. If you can make something that others value, you should be able to sell it to them. If other make something that you value, you should be able to buy it. This is real freedom of a person, -or a nation- to make a living.*'

However, life choices became bigger for a growing part of the population.

Many stopped believing in God and the influence of the churches diminished. Other value generating institutions, such as the family, lost in relative importance. On the other hand, the role of the media became more important while they became increasingly submitted to market forces. A range of traditions and institutions that used to govern social life have been abolished. In academia, the idea of a hierarchy in aesthetic judgements has been abandoned. 'The masters of emptiness' as George Steiner qualified the post-modernists and de-constructionists, contributed to a philosophical nihilism. It looks like the final chapter in the process of disenchantment (Max Weber). The new philosophical fashion of hyper-relativism contributed to the discarding of any grand social theory. In this atmosphere any talk about European civilisation is deemed ridiculous.[30] The post-modernist malaise also contributed to a kind of collective amnesia in which valuable insights of the Enlightenment have been discarded, without even noticing it.

It seems that many of the above mentioned changes in culture and society are inter-connected. Polanyi was right in his observation that the emergence of self regulating markets goes together with the emergence of a market society.

In a comprehensive assessment of the futures of Europe we should ask whether the above mentioned trends can be extrapolated. Here normative questions come to the fore as to what is a good society and what human nature is all about. With respect to the European project the question emerges to what extent shared values matter.

Why having a summary description of recent epochal changes in European society that is inconclusive and that raises more questions than answers?

First of all, important issues are highlighted that are usually ignored in prospective analyses (including the fives studies under review). The highlighted issues refer to a mixture of changes on different levels that are intertwined and difficult to disentangle. There is, for example, the long-term change in the I-We balance and the separate but linked issue of the spread of self-interested individualism.

Second, the overview shows to what extent we are dealing here with a subject matter that transcends traditional disciplinary boundaries and that goes beyond what is commonly considered as 'scientific enquiry'. It touches upon a range of problems that are not studied at all in academia.

Third, it shows a meta level of analysis in which at first sight unrelated phenomena are linked in an all-encompassing movement towards market society, a concept that links changes in society to that in the economy.

It seems that the above described project of the creation of market society is unsustainable. In a European Renaissance scenario there will be the primacy of society over private economic interests.

8. European civilisation does exist

The European deconstruction process started with the Treaty of Maastricht. Since then the trend of inter-governmentalism within the EU prevailed while the EU did not deepen enough in order to prepare for further enlargement. In this process the EU failed to build upon its major assets while trying to emulate the US model in many respects. Many EU citizens valued the social model (as far as it existed in the EU) but political leaders at the national and EU level were busy undermining this model. The EU led the member states in privatisation. For example,

[30] Only on the fringes of Europe, on the area of the former Soviet Union and some Central European countries, there is a clear idea about what 'European civilisation' could mean.

Belgians wonder why their railways should be privatised if it functions so much better than the privatised railways in neighbouring EU countries.

Another remarkable phenomenon was that since the early 1990s the discussion about 'European identity' faded away. This was natural against the background of a movement that sought to reduce the enlarged EU to a single market.

EU leaders downplayed EU's achievements while continuously referring to the superiority of the US economy. But many EU citizens know about inequalities in the USA and the fact that most US citizens have hardly profited from the economic growth since the late 1970s. Moreover, the quality of life cannot be captured by GDP.[31] Many know about the crippling US infrastructure. Few Europeans would like to take over the US model with far lower levels of solidarity, higher levels of existential uncertainty and far higher costs of education and health care.

On the other hand, many in the world admire the European model. In many areas, especially in environmental protection, many see it as Europe's vocation to lead the world. In view of US unilateralism, the doctrine of pre-emptive war and the US rejection of international law, many look at Europe for the defence of the UN based system of international rule of law.

Many outside Europe would like to see a European Renaissance in which Europe re-asserts its role of leading the world by reinvigorating the best sides of European civilisation.

In order to realise this scenario, Europeans have to shed off some complexes of the past. Many thought it is inappropriate to talk about European civilisation in view of colonial history, the devastation of two world wars, the holocaust and the birth of communism and fascism on European soil. Any talk about European civilisation is associated with the idea of 'superiority' and is deemed to be very divisive.[32] The crisis of European civilisation is reflected in the denial of its existence.[33]

However, there is a political rationale for finding common roots among EU nations and studying shared experiences. It is not only to construct an imagined community to underpin the process of European integration but also to re-discover what is really valuable in the European legacy.[34] It was US scholars who pointed to how different Europeans are from Americans and why many of these differences can be considered as assets (see especially Rifkin, 2005).

A European Renaissance should reveal the richness of Europe's legacy. This potential Renaissance is already visible across present day Europe. It is visible in the Irish economic and cultural revival, the Finnish innovation and educational system, the development of Catalonia and especially its capital Barcelona, and the Swedish approach to environmental problems. Behind the wave of neo-liberalism that has captured the political classes in the EU, there is the growth of the green movement, the movement of solidarity with the developing world and the socially excluded in their own country. There is a huge potential upon which a European Renaissance can build. In such a scenario, policy makers will stop bowing to the dictates of the markets and show that globalisation is not a force of nature but can be tamed in order to serve social and economic

[31] Rifkin (2005, p. 17) maintains that '*our* (i.e. US) *way of life no longer inspires but, rather, is looked on as an outmoded and, worse yet, as something to fear, or abhor*'.

[32] The issue of European civilisation emerged early 2006 during the global row over cartoons published in a Danish newspaper depicting the prophet Mohamed.

[33] Usually, Europe is considered as part of Western civilisation. I propose here to speak about a European sub-civilisation, apart from a Latin American and one that encompasses the Anglo-Saxon new settler countries. The discussion about civilisations is obscured by the different meanings of civilisation in the singular and civilisations in the plural.

[34] A seminar on 'What holds Europe together?' concludes that '*the common European cultural space cannot be firmly defined and delimited; its borders are necessarily open, not because of our ignorance, but in principle- because European culture, indeed Europe itself, is not a 'fact'. It is a task and a process*' (IWM Newsletter, fall 2004).

progress.[35] It is such a vision that should become a material force underpinning the European Renaissance scenario.

9. Conclusion

In the construction of scenarios, the identification of major problems is not sufficient; one needs, apart from creating a hierarchy also identify inter-linkages in order to get a grip upon the variety of problems and challenges Europe will face. A key problem in prospective analysis is predicting turning points. However, few who remained within the prevailing consensus succeeded in predicting turning points. The ability to detect counter-currents and fault lines that pose a challenge to the prevailing order is essential for assessing Europe's development prospects. Historical analogies might be helpful. A comprehensive assessment of Europe's futures necessarily implies touching a level of analysis that is hardly dealt with by social science (such as the problem of 'market society').

Although the five studies under review are too small a sample, the following hypotheses can be formulated: methodological transparency is usually lacking in studies dealing with the futures of Europe (the Commission of the EU, 1999, is an exception). The political economy of European integration is neglected as is the role of multinational enterprises and banks. Cultural differences between and within countries are ignored as major variables.

In our scenario a major challenge that Europe will face is the quest for (global) sustainable development and a European and multilateral institutional framework that may harness and guide market forces on the European and global level in a similar way as it has been done at the national level. Here a vocation for the EU is to lead the world (as Rifkin and Leonard recognise). But first a renaissance of Europe is needed with the recognition that Europe has something to offer to the world that no other world power can offer in the foreseeable future.

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4. Leonard, M. (2005) Why Europe will Run the 21st Century, Fourth Estate, London/New York.
5. Rifkin, Jeremy (2005) The European Dream. How Europe's Vision of the Future is Quietly Eclipsing the American Dream. Tarcher/Penguin: New York.

[35] Here we only describe the first steps towards the construction of an elaborate and consistent 'European Renaissance' scenario because the primary aim of this contribution is to highlight some methodological problems. Moreover, in our view, the preparatory process of scenario building is more instructive than the schematic presentation of scenarios itself. Therefore it is regrettable that Commission of the EU (1999) only presents scenarios that are therefore hanging in the air.

MAROSÁN GYÖRGY

THE SCENARIOS FOR EUROPE

On 1st August 1941 Isaac Asimov—a 21 year-old final year student at the chemistry faculty of Columbia University—started writing his series of novels outlining the fate of the Galactic Empire.[1] The scenario of the story—like the fate of the earthly empires—was formed by the inextricable intertwining of the interests of power, human eagerness, the power of knowledge and historic chances. The events were framed by a scientist, Hari Sheldon,—existing of course only in the author's imagination—and his new science called psychohistory. Psychohistory could be used to predict the fall of the Galactic Empire that reached the height of its power. Sometimes strange events—so-called Sheldon crises—set a new track for the flow of chaotic events. In such cases the variables of the equations became so limited that at the end generally only one chance remained to go on and when this final step was taken a new horizon of development opened up.[2]

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The present status of the world astonishingly reminds us of the circumstances of the "Sheldon crisis" produced by the author's imagination. Think of the severe confusions arising in the various areas of our lives. S. Huntington predicted political clashes in his book analyzing the relations between civilizations.[3] Most of his predictions that seemed unrealistic in the middle of the 1990's were proven by events at the turn of the millennium. The book entitled "The Limits to Growth" published at the beginning of the 70's had a similar history. The authors confronted their statements with the occurred changes after three decades. The results confirmed their earlier predictions even more.[4] They found that the situation became worse compared than 30 years before. "Humankind is already in the phase of overshooting—say the authors—when its ecological footprint exceeds the sustainable level, but not big enough yet to wring out such changes that would reduce it".[5] This article, drawing on Asimov's book, accepting the methodological requirement outlined by Professor Kuklinski in "New Futurology"[6], aims to draw Europe's alternative visions of the future.

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[1] Isaac Asimov. The Foundation.

[2] Same, page 8.

[3] Samuel Huntington. (1996): The Clash of Civilizations and Remaking of World Order. Simon and Schuster.

[4] See the scenario version 1–10 of the book. Donella Meadows, Jorgan Randers, Dennis Meadows. The Limits to Growth. (30 years later) Kossuth Kiadó 2005. chapters 3–7.

[5] Donella Meadows, Jorgan Randers, Dennis Meadows. The Limits to Growth. Kossuth Kiadó. 2005. page 183.

[6] Antoní Kuklinski in. REUPUS Volume Four. The New Futurology of New Europe. In search of philosophical plurality on methodological consistency. 3. page.

Basic methodological assumptions

The analysis is based on three assumptions. On the one hand, there are factors with continuously growing pressure. The researchers identified four strategic sets of problems in the life of Europe — to be analyzed later. These—from time to time thickening into crises—force societies to make decisions. At these points the community either solves the problem or only remedies it in part or—even ignoring the worsening situation—continues its former course. As a result of this the problems will occur later in the form of crises.

On the other hand, in the emerging crisis-situations the communities (Europe, nations, international organizations and companies) can follow several basic ways of behaviour. Starting out from the present (or any future moment) following the logics of the alternative ways of behaviour alternative versions of scenarios can be outlined. All of these versions of scenarios project equally real, uncontroversial but astonishingly different futures to the reader.

The third assumption is that the strategic problems mature into decision situations roughly every ten years. This essentialy means that the alternative future threads "branch" or "interweave" again and again every ten years. In real life crises may break out at almost every moment as a result of the numerous intertwining accidental impacts. However, the presentation becomes easier if we assume that Europe will face crises forcing decision making between 2006 and 2010 for the first time, between 2013 and 2015 for the second time, between 2020 and 2025 for the third time and finally between 2030 and 2035 for the fourth time.

In addition to the assumed strategic problems, we can also expect further crisis situations to occur unexpectedly. One such might be the adverse impact of global warming (or a regional cooling down) on the European Continent. There could be other events such as the outbreak of local war(s) using nuclear or biological weapons or the collapse of the world economy giving a new and similarly adverse direction to the future. These may basically rearrange the visions of the future but their discussion is not within the scope of the present analysis. Our aim is only to outline the "surprise-free" yet sharply different alternatives of the visions of the future.

In order to produce alternative scenarios the individual situations where decisions have to be made need to be identified and it has to be thought over how Europe will decide to act in a particular situation. The scenario goes on drawing the route of development following the logics of the decision made, and along this route there emerge new crisis situations which need new answers. Since it is possible to move on in several directions, the visions of the future branch again and again at each point of decision making. The series of visions of the future (scenario) to be outlined in this way are built mostly on qualitative (and often subjective) factors. They cannot be used as maps because their marks cannot be considered as points of orientation providing accurate directions. However, they reflect the *critical forks of the future*; they suggest what strategic problems have to be faced, what variations of decision making are possible and what unavoidable consequences the answers may have.

Challenging strategic problems

Analysing the European trends, four problem-complexes of strategic significance—requiring for a practical answer and maturing to crisis—can be identified. These problems are not independent of the changes going on in the world, however, they concern the Continent in a specific way. All of them decisively influence the future of Europe; none of the countries are able to cope with them alone and they force us to fundamentally change our complete way of life. These problems are the following:

1. The enforcement of so-called *weak sustainable growth* and the question of the "financability" of the welfare state.
2. *Demographic* and other closely related problems: on the one hand, the limits of the welfare state (old age pensions, health care and subsidies), on the other, the consequences of cultural diversity.
3. Switching over to *strong sustainability* from the weak one: specifically the questions of the reduction of the ecological footprint, the constraint of recycling, the environmental economy and the problem of biodiversity.
4. The *global recession* predicted in "The Limits to Growth", which worsens a number of economic, political and social problems and requires a particular European answer.

1. The requirement of weak sustainability

Keeping "sustainability" in view forms part of management-related thinking from the beginning. Each enterprise fits its activity to the logic thereof. Therefore, when firms decide from day-to-day the extent of the resources they invest in or withdraw from their business they always take into consideration the long-term capacity of operation and development. It contradicts the logics of business if—accidentally or consciously—an enterprise runs through their fortune. Thus sustainability is an inseparable part of the economics of enterprises.[7] The break-even point calculations are based on it, which provide information on whether the enterprise is able to make profit with the specific costs. But also the market value of the firms is determined on the basis of the tacit assumption of long-term sustainability: the present value of the total future profits has to be calculated assuming that the particular enterprise will theoretically carry on its activities for a infinite time. Therefore also the general basic principles of accounting validate the view of sustainability.

However, it became unavoidable to take the requirements of sustainability into consideration also at the level of the national economy. Here sustainability means the practical enforcement of two basic principles.[8] On the one hand, the national economy must not grow at the expense of its external partners. On the other hand, it must not shift the burden of growth to the future generation either. However, in reality politics—as it has been proved by the economic history of East-European countries—regularly attempts to ignore the requirement of sustainability being led by transitory interests. The "revving up" of growth based on external resources—due to the underdevelopment of the institutional system—inevitably throttled down the "engine" of the economy a few years later. As a consequence of these "pull it and release it" convulsions of economic policies—similar to a "Parkinson's" disease—the societies slipped back to where they started from and people just became more frustrated, nervous and distrustful.

Rational market behaviour requires the enforcement of so-called "weak sustainability". Weak sustainability means the acceptance of economic rationality—usually referred to as narrow-mindedness. Countries have to understand: they must not shift their problems either to other countries or to the future generations. They have to do the best they can with the resources available. The source of development can only be their own savings, they can finance their expenses only from their internal resources, the growth can be funded only by their own performance.

The difficulty of the enforcement of weak sustainability is well proven by the desperate debates accompanying the budgets of the European Union and certain countries. The question is: will the economic and financial policy announced as liberal (mostly condemningly) be accepted or not? All in all, Europe is uncertain today. The governments that start reforms based upon the

[7] Alexander Haim. The Vest-Pocket CEO. Prentice Hall. 1990. page 11.

[8] László Antal. Is sustainable growth sustainable? Economic Review Foundation. 2004.

enforcement of weak sustainability fall one after another. The European voter is not face with pleasures the requirements of an economic policy which keeps improvements in competence in view and a budgetary policy which keeps the balance of payments in view. Thus today the future is difficult to predict. However, it is edifying to contrast and compare the possible variations of future in terms of the alternative decisions. This decision cannot be postponed for too long: the comprehensive enforcement of weak sustainability is unavoidable between 2006 and 2010.

2. Demography and related problems

At the beginning of the 1980s the world reached the historic height of population growth (2.1% growth/year) and the rate of growth gradually started to decrease. In most regions the fertility significantly decreased—from 6 in 1900, to 3.6 in 1950 and to 2.7 by 2000.[9] While in 1960 there were only five countries in the world where the rate of fertility did not enable the reproduction of the population in the long run, by 2000 there were 64 such countries constituting almost half the population of the world. Within this, fertility fell back so quickly in Europe that the population started to decrease at the rate of 0.14%/year in the region.[10] As a result of these processes the age group distribution of the population significantly changed. In the case of the fast growing population the distribution is of pyramid shape which suggests that every age group born is larger than the previous one. When the population growth slowed down and then stopped, the earlier pyramid-like distribution gradually became column-like: the number of persons of most age groups is more or less equal.

Thus the demographic structure of Europe fundamentally changed. The proportion of age groups able to work forming the basis of the society was significant in the first half of the past century. It decisively contributed to the growth of economy and made the financing of pension and health schemes (gradually including everyone) possible. By the middle of the 20^{th} century the proportion of the young people had already decreased but that of the elderly people to be supported had not yet increased, thus the rate of dependence was relatively low. In the second half of the past century however the decrease of the population growth of Europe started simultaneously in several considerably different countries—in Germany, Italy, Greece and of course in Hungary in Eastern Europe. After the fall of socialism a dramatic decrease occurred all over Eastern Europe and the decrease continued in Western Europe. After 2000—when the birth rate also fell below 2 in Ireland leading the "population field"—the average birth rate in Europe was around 1.7, which is not sufficient to sustain the population. By 2050 more than 50% of the population of Europe will be over 50 and the proportion of those over 65 will reach the proportion of those below 15 years of age.[11]

The number of the population able to work in the EU will abruptly and quickly decrease after 2010 — the "baby boom" generation will retire between 2010 and 2015.[12] It will constrain decision making. In the case of the different societies many factors influence the fact when the worsening demographic situation edges into a crisis making the decision making urgent. In reality the societies come under continuous and increasingly strong pressure. The first reaction: to follow in the wake of tradition. This means the reinforcement of the family model which dominated in the past (living together officially, possibly approved by religion), the social roles (a woman has to be at home) and the tightening of those forms of population control not in harmony with

[9] Joel E. Cohen. Human Population: The Next Half Century. Science. Vol. 302. 14 Nov. 2003. page 1172

[10] Same, page 1173.

[11] Marosán György. Futures of Europe. In: Europe—The Global Challenges. Ed. By: Antoni Kuklinski—Krzysztof Pawlowski. 2005. WSB—NLU Nowy Sacz. p. 42.

[12] Revitalising old Europe. The Economist. 15 March, 2003 page 80.

religion (abortion, the morning-after pill). However, these are only temporary solutions and tend to deepen social conflicts further. The fundamental reconsideration of the social roles will be urgent as well as changing labour market regulations, pension scheme, the health scheme, and the encouragement of savings in the interest of political and economic stability. On the basis of the aforesaid the contradictions shall mature into a crisis between 2013 and 2015 and force decisions.

3. Requirement of strong sustainability

The basic requirements of "weak" sustainability—reflecting mostly economic rationality—have become insufficient in the last two decades of the 20^{th} century. Therefore the literature has been making a difference between the concepts of "weak" and "strong" sustainability for more than a decade.[13] Strong sustainability requires the utilization of renewable resources at a lower rate than that of the natural renewal, keeping the quantity of waste below the capacity of the system and exploitation of the non-renewable resources following the rate of substitutability at most. In order to enforce strong sustainability the ecological footprint of Europe has to be reduced to a significant extent. The ecological footprint characterizes the impact made by societies on their environment. This impact is—reasonably—proportionate to the number of people, the extent of material consumption and depends on the nature of the applied technologies. Finally, the impact made by the people on their environment can be described as the product of the following three factors:

$$I=P\cdot A\cdot T$$

where, I stands for impact, P is for the number of population, A is for affluence per capita and T is for the "voracity" of the technology used for consumption and production.[14] The ecological footprint—as is suggested by the word—means the complete ecologic space including the conditions ensuring the reproduction of the society, all the material and energy required for reproduction outside the direct place of residence and work of the society and the usual social living-space of the particular community.[15]

Humankind's ecological footprint has been continuously increasing during past centuries partly due to the increase in the population partly due to the increase in consumption. The revolution in production also significantly changed the footprint. There were impacts that decreased and there were impacts that increased in size. As the ecological footprint of the communities "reached beyond" its coverlet of living-space the societies adapted under compulsion or collapsed. Such social catastrophes—e.g. Easter Island—occured but in the past they were considered as exceptions. Humankind's ecological footprint increased from 50% of the ecologic capacity of the world in the 1900's to 65% by 1950. By now—while tens of millions are starving—humankind's ecological footprint has exceeded the dimensions of the earth by at least 20%. If the present demographic, consumption and technological trends continue then humankind's ecological footprint will exceed 220% of the ecological capacity of the earth by 2050.[16]

The index system available to the nations for counting the "goods of happiness" at initially only took into consideration the factors of production and material consumption. However, GDP does not express with adequate accuracy either the community's *welfare* or the personal *quality of life*. Researche under the auspices the UNO resulted in a new index, the "Human Development Index" (HDI) used for *fine tuning* GDP and indicating the level of the "state of the human

[13] Charles Pearson . Economics and the Global Environment. Cambridge University Press. 2000. page 476.

[14] Paul Ehrlich—Anne Ehrlich. The Population Explosion. New York Touchstone. 1990. page 58–59. and Thomas F. Homer-Dixon. Environment, poorness, violence. Typotex Publisher. 2004. page 79–81.

[15] R. York, E. Rosa, T. Dietz. Footprints on the Earth. American Sociological Review. 2003 Vol.68 (April 279–300)

[16] Donella Meadows, Jorgen Randers, Dennis Meadows. The Limits to Growth (Thirty years later) Kossuth Publisher 2005. page 17.

development" of a particular country.[17] In addition to consumption in a traditional sense the HDI emphasizes human life spent in a healthy and creative way, making sensible choices possible. The GDP rank of nations is rearranged according to the HDI. For example, the USA is ranked in the 2^{nd} place as per GDP but 7^{th} place according to the HDI, while Norway is at the top of the HDI but 8^{th} place according to GDP. On the basis of the HDI index Sweden achieves a better position by 15 places than on the basis of its GDP while Ireland moves down the list by 9 places. The HDI also extends the concept of sustainability to the components of human capital. Nevertheless, even this is insufficient for the realistic evaluation of societies.

In the interest of further specification a full index number system has been developed.[18] The most significant is the "Genuine Progress Indicator" (GPI) index number system.[19] The approach of GPI already reflects the concept of *strong sustainability*. The strong sustainability exceeds even the model considering jointly the financial, physical and human capital. Its basis is that in addition to the listed items also the continuous, smooth reproduction of the so-called natural capital leading to equilibrium is also inevitable for the sustainable development of the world.[20] However, the natural capital directly connects to the natural system of nature which is the complex of specific networks. In accordance with strong sustainability such modification of the natural system is not permissible which would "eliminate" the important elements of the ecological system. This is why it considers the preservation of biodiversity a vital question and also takes into consideration the risks resulting in often hardly measurable final extinction of living beings.[21]

The problem of the ecological footprint arises very intensively in the case of Europe.[22] Contrary to popular belief, the situation of Europe is worse in this respect than that of the USA.[23] The USA may live more extravagantly than the old Continent but it has a greater area thus the problems occur relatively later. The ecological footprint of Europe is at least twofold of its own area and it cannot be maintained in the long run. The forced change takes away serious resources from other areas and makes fundamental modification of the consumer culture necessary.[24] The ecological footprint of the new members of the EU is relatively smaller, however, due to the fast growth of consumption the assimilation of its structure, as well as the lower level of the environmental culture, the ecological footprint significantly exceeds their area. While these states wish to increase consumption, they resist the introduction of strong sustainability. Therefore they will be politically more unstable than the western regions. These decisions are on the agenda—see Kyoto protocol—and will remain on the agenda in the future too. In a word, Europe is against the USA, but the behaviour of a number of West and East European countries follows the American logic. A number of decisions related strong sustainability have to made in the next decade but the most difficult are likely to be left for the years between 2023–2025.

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[17] Human Development REPORT. 2002. United Nations Development Program.

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[19] Taking nature into account. A Report to the Club of Rome. Editor: Wouter Van Dieren Copernicus. 1996 page 148., and The situation of the world 2004. Earth Day Foundation. 2004. page 33–34.

[20] Raven H. Peter. Science, sustainability, and the Human Prospect. Science. Vol. 297. 9 Aug. 2002. page 954.

[21] Carl N. McDaniel John M Gowdy. Selling out the paradise. Typotex Publisher 2002. page 136.

[22] Marosán György. Futures of Europe. In: Europe—The Global Challenges. Ed. By: Antoni Kuklinski—Krzysztof Pawlowski. 2005. WSB—NLU Nowy Sacz. p. 41.

[23] Global Patterns in human consumption of net primary production. Marc L. Imhoff, at all. Nature. Vol.429. 24 June 2004. page 870.

[24] Anil Markandya, Patrice Harou, Lorenzo G. Bellu, Vito Cistulli. Environmental Economics for Sustainable Growth. Edward Elgar 2002.

4. Possible global recession

The book entitled "The Limits to Growth" outlining gloomy predictions summed up in a report to "Club of Rome" made public in 1972.[25] Its analysis based on a simulation provided some insight into humankind's possible future. Although during the decades preceding the appearance of the work economic growth was unbroken troubles occurred in more and more areas. It made the statements in the book believable: the local problems which seem to be independent of each other are the symptoms of the global crisis which will lead to a catastrophe-like collapse around 2030–2040. The environment will become irrevocably polluted, economic growth will fall back, and food production will dramatically decrease. Starvation, epidemics and their accompanying features, rebellions and wars will decimate humankind.

The dark future shook everyone up for a moment and made them think. But after that life went back to 'business as usual' again. The world continued its usual life unchanged. The—temporarily shaken—belief placed in growth was restored. The global economy survived the first and then the second oil crisis. And most people drew the conclusion: the crisis, if there will be one, is far away. In most countries more and more people consumed more and more. The "goods of happiness" are irresistibly spreading across our globe. Our appetite for possession is almost insatiable. Certainly it all resulted in more and more pollution and we exploited at an increasing rate the non-renewable resources too. Richer people—and don't forget that we from Eastern Europe also belong to them—monopolized the common fortune of humankind and run through the hoped-for heritage of future generations at an increasing pace.

A group of researchers have been rechecking their assumptions during the past years, specifying the data and updating their model. However, the simulation showing the future drew a gloomy picture again. The analysis of the scenario versions reckoning with different and mostly optimistic assumptions—the world is infinite, non-renewable resources are plentiful and easily accessible, pollution is kept in hand, productivity of the soil will increases, effective technologies are applied, the population will be stabilize from 2002, technical development is dynamic—suggested that the increase does not stabilize itself. The average European citizen has not yet detected the natural limits of the Earth, or if they have they are slow at modifying their behaviour. Crucial change occurred in one area compared with the situation 30 years ago: the collapse seemed to be far away then came close enough to be seen. The lesson of the simulation model: only 20–25 years— hardly a generations life-time—separates us from global recession. In relation to the demands of humankind the Earth is limited, global environmental problems are unavoidable and the consumption-oriented life style cannot be continued. The ecological footprint of humankind exceeds the sustainable level. [26] To sum up, a decision will have to be made by 2033–2035 at the latest, the problem cannot be put off.

Identification of behavioral alternatives

In order to create the scenarios—in addition to the strategic challenges—the fundamental ways of coping with problems (behaviour) have to be found which handle the individual decision situations in different ways. The varieties of behaviour can be created on the basis of connecting policy, the economy and culture. Within these areas there are three different varieties of behaviour:

1. Alternatives of the power politics: cooperation, rivalry, or antagonism.

[25] Meadows, Donella, et al... The Limits to Growth. 1972

[26] Meadows, Donella—Randers, Jorgan—Meadows, Dennis. The Limits to Growth. Kossuth. 2005. page 127.

2. The alternatives of the growth-models of the economy: (present) unsustainable growth, weak sustainability, or strong sustainability.
3. The alternative concepts of culture: multicultural (homogenous basic values, but within this free choice), distinguished identity-centred (separating but handling the otherness with relative tolerance), exclusive identity-centred (reserved and handling otherness with hostility).

Since there are 3 areas and we differentiate 3 varieties within them 27 (3*3*3) kinds of behaviour can be imagined in total. Each of these varieties reacts partly or basically differently to a particular problem. Thus in a particular moment of the future in a particular situation choosing and following any of them the community would "set off" in another partly or basically on other direction. However, there are contradictions among the varieties of behaviour and therefore they are not realistic. For example, the variety of political animosity, the economy following strong sustainability and culturally homogenous community can be considered as such. A number of other forms of behaviour are close to each other. Taking these possible mergers into consideration the many kinds of possible ways of behaviour of Europe can be simplified to three basic varieties:

- Variety **A** behaviour = politically slightly mistrustful but ready to cooperate with conditions, following economically weak sustainability, sticking to cultural roots, preferring separation but accepting otherness.
- Variety **B** behaviour = politically trustful, and cooperating, following economically strong sustainability, accepting multicultural identity, handling otherness as a natural feature, supporting the free organization of individuals and communities.
- Variety **C** behaviour = politically mistrustful, even antagonistic, economically not sustainable, following exclusive identity, culturally reserved and refusing otherness.

These three sharply different ways of behaviour react in basically different ways to arising problems and outline divergent future lines. The article attempts to follow the historical consequences of the occurrence of the problems and the different reactions given to them.

Varieties of visions of the future

The listed problems result in forces of decision making often being accidentally intensified in the most different areas. It is almost sure that the decisions overlap and may strengthen each other's—negative—effects. They may force the decision makers of the European countries and communities to continuously make decisions. Since the changes concern adversely many social layers it is expected that the steps forward and backward will follow one another. Thus the decision making will be characterized as drifting rather than strategic decision made at a turning point.[27] The creation of the scenarios is made still easier if we assume the previously mentioned four crucial phases of decision where the varieties of behaviour A, B, C and D described briefly generate different decisions. Of them variety A drifting uncertainly can be considered as the model which describes the present behaviour most precisely. Compared with it variety B describes tolerant and cooperative behaviour, and variety C describes behaviour directed by egoism and mistrust.

The varieties of the visions of future are generated in such a way that Europe "chooses" at the particular points of decision from among these three varieties and moves on in the direction and on the route depending on the selection until it arrives at a further point of decision. The different behaviours lead to different decisions, on the basis of which the "future lines" continuously branch

[27] This duality is characterized in the strategic management literature by the difference between the strategic drifting and the strategic decision. Johnson, G.—Scholes, K. (2001): Exploring Corporate Strategy. Prentice-Hall. 4th edition page 56.

out and interweave again. Moving on in time the number of the varieties multiplies. After the fourth point of decision theoretically 81 different future-variant can be identified. The transitions between the possible variants also become difficult to follow. If we assume, however, that the emerging final vision of the future is less influenced by the fact of when a particular type of decision was made than by what kind of decisions were made on a specific "future-line", then the picture can be simplified. This –anyway strongly disputed—assumption means that the visions of the future connected with the "future-lines" [A, A, B, B], [A, B, B, A], [A, B, A, B], [B, B, A, A], [B, A, B, A] are considered as the almost identical varieties of the vision of future [2 A, 2 B]. "Surfing" on these future lines we can drift towards the crisis or, by facing the problems and solving them successfully we can also struggle out of a previous crisis. The extreme varieties (B and C) appear to have a certain "attraction". If Europe picks variety B of behaviour (cooperating, sustainable, tolerant) for the first time it is more and more likely that it will keep on following track B. But if it chooses reaction C (mistrustful, rival, unsustainable and reserved) for the first time to the arising problems then it will be increasingly difficult to leave this track which might lead to open enmity.

In respect of our final evaluation it is sufficient however to identify the most important, considerably different varieties of the visions of future from the last date of the vision of future — say 2040—in retrospect. On the basis of the aforesaid—taking into consideration the many kinds of transitions between the varieties A, B and C—the number of the final varieties of the visions of future can be radically simplified to five basic variants:

Variant 1.: Developing B (decision types [4 B], or [3 B + A])
Variant 2.: Uncertain B (decision types [2 B + 2 A], or [2 B + A + C], or [3 B + C])
Variant 3.: Drifting A (decision types [4 A], or [3 A + B], or [3 A + C], or [2 A + B +C] or [2 B + 2 C]
Variant 4.: Declining C (decision types [2 A + 2 C], or [2 C + A + C], or [3 C + B]
Variant 5.: Collapsing C (decision types [4 C], or [3 C + A])

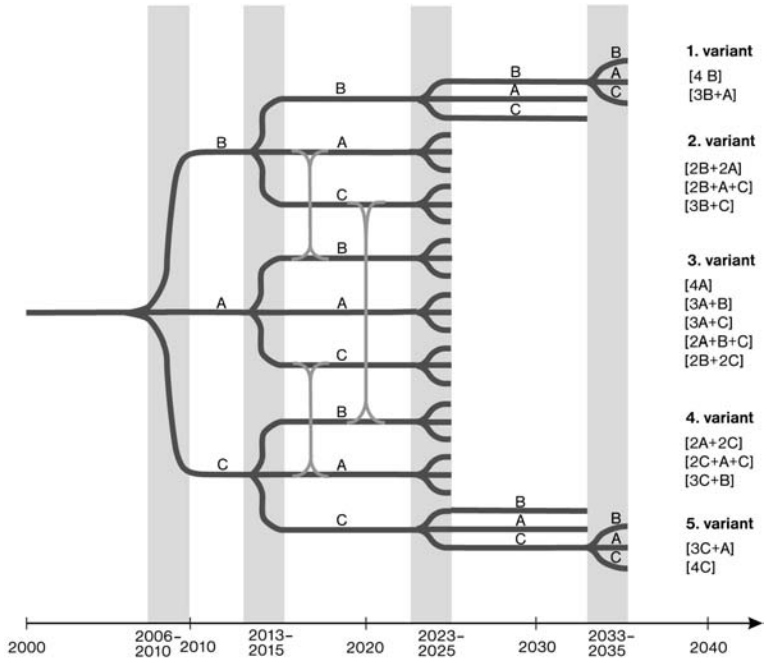

Fig. 1. "Trifurkation" model of futures of Europe

Variant 1.: Europe of sustainable development and personal liberty.

Europe consists of trusting and cooperating regions. The quality of life is at a high level, the standard of living is relatively high and GDP is steadily growing. Growth corresponding to strong sustainability exists. Economic growth is slower here but in return the environmental load is lower and the economic and social differences are balanced. Cultural tolerance is enforced in each region and communities can be freely organized. Multicultural identity becomes accepted thus the role of the traditional identity-centres (nation, religion) is relatively forced into the background. The community does not restrict the selection of the personal life model. High-level liberal civil rights are enforced.[28]

Denomination	Index	Value in 2050 (2000 = 100)
Gross domestic product	GDP	150
Human development index	HDI	175
Liberty quotiens	LQ[a]	140
Genuine progress indicator	GPI[b]	140

[a] The "Liberty Quotient" is an index assumed by the author, which indicates the range of life-models to be freely chosen by the individual, the realistically available number of the communities following such a life-model and the extent and power of the conditions and circumstances restricting the individual's autonomy. It serves only to demonstrate the varieties of the visions of the future. Further research is required to operationalize this measurement.
[b] When describing the development, the GPI takes the state of the environment into consideration and applies a complex index which describes the situation considering the strong sustainability of the environment.

Variant 2.: Growing Europe struggling with problems

Europe consists of partly cooperating regions which mistrust each other in specific areas and strong rivals on economic issues. The standard of living is high but the quality of life is lower. Regional differences are greater. The economic growth is faster, the GDP is higher while the human development index (quality of life) is lower and inequality and the environmental load are greater (the GPI is lower) than in variety 1. The principle of strong sustainability and occasionally the weak is more often damaged. The role of the traditional identity centres is kept, or even rises in value. Mistrust against "otherness" becomes stronger (LQ lower than in the 1 variant). Cultures emphasize their independence, and individuality.

Denomination	Index	Value in 2050 (2000 = 100)
Gross domestic product	GDP	200
Human development index	HDI	145
Liberty quotient	LQ	125
Genuine progress indicator	GPI	120

Variant 3.: Stagnating, isolating Europe cut up by conflicts

Strongly rivalry, mistrust, in certain areas antagonistic Europe. The economic growth though forced by certain countries slows down. Europe globally recedes and turns inward. The GDP is at the level of variety 1 and the Human development index (HDI) is under the level of variety 2. The GPI and the LQ fall below the level in 2000. The environmental problems worsen, social

[28] In the following the numeric values of the indices applied in the demonstration of the varieties of the visions of future are only of informative nature. The figures serving for the description of the varieties of the visions of future have been obtained from the Delfi analysis carried out with students by the author. The indicated numbers resulted from 24 students' opinions received after 3 rounds of feedback.

inequality is high and is not decreasing. The regions are sharply isolated from one another in respect of culture. There is a strong pressure on the individual in order to accept the identity centre originating from the traditions of the region. Civil rights are restricted and subordinated to community identity. Culturally separate and reserved regions.

Denomination	Index	Value in 2050 (2000 = 100)
Gross domestic product	GDP	150
Human development index	HDI	125
Liberty quotient	LQ	100
Genuine progress indicator	GPI	110

Variant 4.: Europe of declining, antagonistic communities

Europe consists of economically declining regions and countries looking antagonistically at one another. The problem of strong sustainability is not solved thus the environmental problems are sharper and sharper. All the important indices indicating the development fall below the level in 2000. Trust is at a low level. Regions feel culturally threatened and carry on "fights for identity" against one another. The identity centre becomes more and more exclusive and there is a great pressure on the internal groups to adapt to them. There are strongly opposing cultural regions, religions and nations. The individual's autonomy decreases, the obligatory adaptation expected from the individual becomes stronger, the individual latitude in selecting a life model narrows. Due to the political and cultural opposition economic and environmental crises occur from time to time, which the European regions are unable to handle. These are abruptly breaking out but relatively isolated antagonistic actions or frontier incidents.

Denomination	Index	Value in 2050 (2000 = 100)
Gross domestic product	GDP	120
Human development index	HDI	110
Liberty quotient	LQ	95
Genuine progress indicator	GPI	100

Variant 5.: Europe of global catastrophe

The world economy is in crisis, and economy of Europe collapsing. The Europe consists of regions opposing or even fighting against each other. The internal contradictions can be eased only by the reality of the "external" enemy. The ties of the division of labour start to break, economic effectiveness decreases, government administration is dirupted and the infrastructure starts to fall apart.[29] The economic policy of dependence on self-financing spreads. The quality of life plunges, the political process is in chaos. Increasing opposition which may also spread within the regions (i.e. to the level of small areas). The most important indexes indicating development fall to the level of those of 1970. People living in the region or even in the area are required to accept the exclusive identity-centre. Otherness is to be refused and ideological adjustment is compelled.

[29] Remember the events of New Orleans's flood.

Denomination	Index	Value in 2050 (2000 = 100)
Gross domestic product	GDP	95
Human development index	HDI	90
Liberty quotient	LQ	75
Genuine progress indicator	GPI	80

The question of the following decade is: how can an unbalanced Europe (and humanity drifting towards crisis) be directed back to the track of sustainable growth? Humanity has gradually moved since the 70's—racing against time—from acquiring the skills of forecasting the problems through recognizing their real weight to making changes in specific areas. There are areas where significant progress has been achieved.[30] All in all, however, globalization, increasing connectivity of networks, and the pressure of global poverty threaten humanity with destruction.[31]

Due to the delicacy of the topic and the uncertainty of the analysis however caution is obligatory. All we can state is that any one of the outlined visions of the future (versions of scenarios) are conceivable. It depends mostly on us, European citizens into what future we lead our common home. If we, as individuals, communities and countries, choose trust, cooperation, economic rationality, and tolerance we shall proceed towards a Europe of sustainable development and individual freedom. But if our behaviour is guided by mistrust, rivalry, egoism then we are heading towards a Europe of catastrophes. Witnessing the shocking diversity of the visions of future hidden in the present, we may regard these alternatives both scepticism and hope. If we live—we will see.

[30] See Chapter 5 of the quoted book which describes the solution of the ozone hole crisis.

[31] György Marosán: How the history is made? Money-Plan. 2006.

Appendix: Methodological comments

Based on the strategic management literature we can summarise the methods of analysis of the long term development of the remote environment. We can represent the different methods on the following picture. The picture arrange the possible forms of environment (and also the different methods) based on two charecteristics: rate of change, and the number of determining factors of the environment (Marosán György, 2006.):

	Rate of change is slow	***Rate of change is rapid***
The number of determining factors of environment are few	STATIC (STABLE) Method: trend extrapolation	DYNAMIC Method: expert's estimation
	Method: Strategic-analysis	
The number of determining factors of environment are many	COMPLEX Method: Simulation	TURBULENT Method: Scenario-wrting

The picture shows—in a very simplistic way—the five basic methods of analysing the different types of environment:

- *Trend-extrapolation* simple extend the past's trends to the future. This modell based on the assumption of "linear respons"—small effect create, small change. The future follows the past track. There is no surprise, and everybody can guess the future.
- *Strategic analysis* using methods of the strategic management (for example, PESTEL, Porter's five force, strategic mapping, benchmarking, value-chain analysis) discover the trends in future.(Johnson, et al. 2006)
- *Simulation* create a complex modell of the environment, and than run it, "plays" the possible future-line of the events of future. (Forrester, 1971).
- *Expert's estimation* from the subjective opinion of experts—by using specific methods, as for example Delfi-method -, make more objective information.(Gordon, 1993)
- *Scenario-writing* try to invent the different future-lines, by the identifying possible — non contardictory and logically connected—chain of future events. (The Oxford Handbook of Strategy. 2006.).

In the middle of the last century the environment of the most industries were STABIL. As a consequences, the actors of the economy could predict the future, and could calculate the changes. They use mostly the trend-extrapolation. However, the changes become more rapid, and the number of determinant evironmental factors—due to the economical and technological developments—growth, the environment slowly "move in" towards of the TURBULENT quarter. The organizations started to use new methods of scanning environment. At first, spreaded the different methods of strategic management. Afterwards—as the change become more rapid, and also because of the globalization and technological break-through—the experts were being driven to invent of different methods of estimations and simulation. (Forrester, J. 1991). Finally, in the 21^{th} century we must adopt very broadly scenario-writing methods. (Faulkner-Campbell, 2006. 308–349). This is why, we forced to use this method—namely, the Delphi-method, and scenario-writing—when trying to invent futures of Europe.

Scenario-analysis

Scenario analysis is an approach to decision making under uncertainty in which the expert create an internally consistent view of the future. "A scenario is a justified and traceble sequence of events which might plausibly be imagined to occur in the future."(Faulkner-Campbell, 2006. 315.). The essence of the method is to outline of the possible future conditions, including possible path the world, or the organizations could take that would likely lead to these conditions. (de Witt et al. 1994. 252–253) There are different methods for writing scenarios. Some expert generate futures by identifying key environmental influences and drivers of changes and than grouping the "future-lines" into consistent classes. (Johnson et al, 2006. 74–77).

In this paper I choosed to use a different method: I created scenarios by using decision trees. The decision tree is a representation of decision-making under uncertainty in which decisions and their outcomes are represented by branches. In our case we have to map the possible strategic situations forcing the determining agents to make decison. Than we identified the possible choices. Finally we evaluated the consequences of the decisions, which lead to a new situation. By systematically maping the decisions, and consequences we could map all possible futures (Mastering Strategy. 2000. 243–249).

Delphi method

The Delphi method is a structured approach to gaining the judgments number of experts on a specific issue relating the future. The method was originaly developed by the Rand Corporation. The Rand used the method not by colleting together the experts, and discuss their views about the specific events of the future, but intentionally kept apart, so that their initial judgement were not influenced directly by other experts involved in the process. Later however the opinions of the experts had got a summary feedback regarding the other experts. (Bartol, et al. 1991. 301–303, Gordon, 1993, 246- 247).

In the analysis of the possible scenarios for Europe I applied the Delphi-method by using three steps for generating informations for every future-line. First, a panel of students (24 person) were asked to estimate the measurement's of a specific future-line. Second, on the basis of the information received, I counted the avarages of the information, and feedback to the students, asking them to consider their opinion. Than, I repeat the process two times. I had find—in accordance with the literature—that the expert's opinion converged to an avarege. The final results you can see in the paper, as measurements of the characteristics for the future-lines.

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PETER FLEISSNER

AT THE TURNING POINT

A Personal Comment from the Year 2025

The sober diagnosis for Europe, 2025, in a word: A wealthy but shaken giant. An abundance of money in the elegant and luxurious metropolitan centers, surrounded by the ugly faces of misery and crime. Twenty-five years after the millennium, the paradise promised by eloquent politicians has not yet arrived. How has it come to this? Why can the wealthiest region of the world not rid itself of poverty and unemployment? Can anything be done to resolve the roiling conflicts now prevailing?

Let us look closer. Over the last 25 years, three factors led to the doubling of labor productivity, and thus of available wealth: by more efficient technologies within individual firms; increased electronically mediated communication between them; and accompanying organizational changes. EDI (Electronic Data Interchange), CSCW (Computer-Supported Cooperative Work), MCC (Mobile Computing and Communication), and to some extent TC (Tele-Conferencing) have become common methods to overcome differences in space and time. EURONET, the European broadband electronic network, connects more than 95 percent of the enterprises and about two-thirds of the homes. Human resources are mobilized and integrated into a worldwide network of production and distribution—from nearly every point of the earth—whenever they are needed. And this is the crucial point. The demand for workers in relation to supply is met only by chance. And here the dark side of the market appears. The competitive striving for increased market share and higher profits, for new products and production processes, split the enterprises and their workers and employees into winners and losers. Although labor productivity rises, and the efficiency of production is increased, by the very process the number of redundant individuals is also growing. Although growth is flourishing, wealth produced is not available to all to more or less the same extent. Well paid and long-lasting jobs have become increasingly scarce. Those who still have jobs must work harder and harder, while a growing fraction of the population is enforced to enjoy leisure time.

In our Europe of 2025, the situation has become even worse than in the other two regions of the "Triad", NAFTA and the Far East. The opening of the former socialist countries resulted in a tremendously increased cheap labor supply in the immediate neighborhood of the high-wage economies of Western Europe. More and more jobs in the West have been moved to the East, and for the remaining ones in the West wages and salaries have been eroded through the pressure of competition. Although these events could be evaluated positively from a theoretical point of view of social equality (to even out disparities inside Europe), the trend towards convergence of wages has not been evaluated positively by government or labor of the rich countries. Unemployment

has become high everywhere, although it should have been lower for demographic reasons. Every cyclical economic crisis has added to the level of unemployed. Any increase in unemployment has produced the next crisis. Thus an awkward vicious circle has arisen. The result: About one third of the labor force in Europe is now without jobs.

The demise of the socialist bloc not only had effects on the economy and politics. An additional consequence could be seen in the level of social commitment: the erosion of holistic views, the rejection of responsibility for all members of society by individuals, groups, political parties, and all other social institutions. After the Second World War, Western Europe was facing young socialist states at its Eastern border. As a defense strategy against communism, efforts were made to try to control the dark side of capitalism: the welfare state was invented. The walls constructed by the communists could not only be used for political propaganda against them; in fact the iron curtain had a beneficial effect on the Western economies, for the workers in particular. To a large extent, they were shielded from the poor masses of the East and their competitive power on the labor market. The wage level rose considerably, and social security systems boomed. In the nineties, when the socialist countries had disappeared, the only force remaining to control and to shape the economy was the market. The religious communities, traditionally in favor of cooperation, struggled hard for change, but their influence was limited to the inside of the churches or temples. In the streets, "catch as catch can" became the terrorist rule.

The large nations of the world behaved accordingly. While the relative economic strength of the USA faded slowly away, they applied their unique military power all over the globe to defend their economic or strategic interests.

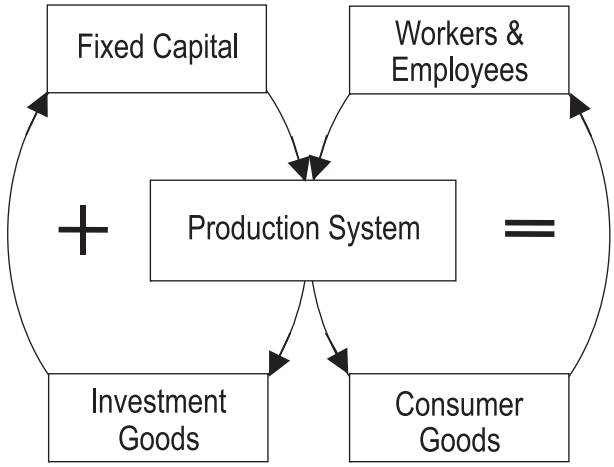
The frustration and despair of the outcasts grew as much as did the economy between the down-swings. After violence was experienced in the capitals of the US, it infected Europe's cities as well. Theft and murder, drugs and sects spread everywhere. The Third World knocked at the doors of Europe, but the European Union remained silent in the face of the demands of the people located in Eastern and Southern regions. The police and armed forces represented virtually the only sectors with growing employment. Right wing parties came into power, with the promise of right and order, but they soon failed when it become evident that they, too, could not solve the chronic crises within society. At some places, pogroms and massacres broke out. The scape-goats now: Africans, Roma, Sinti, or other common people with dark skin. It seemed to be a repetition of the Third Reich, but it was not: the dreadful activities were opposed by governments, but could not be stopped by them. Through spontaneous actions of violence, the killing continued. The wealthy part of the population carried weapons or hired body-guards; the houses of the rich changed into armed fortresses. Telecommunication became more important than ever. Many people did not dare to attend meetings in the evening, so they organized tele-conferences in their homes to communicate without fear via the Internet. Physical access to the working place became dangerous because mafia-like structures and organized crime spread everywhere, in particular from the poorest countries, the former states of the Soviet Union and of Northern Africa. The situation was also aggravated by the state of the environment. The depletion of the ozone layer, the demise of the forests, the high emission rates of toxic substances into the air, polluted rivers and lakes, oil-covered beaches, made it increasingly unpleasant to stay outside. Many flats were supplied with filtering devices which produced clean air inside the rooms. People did not leave their homes unless they had to. Tele-shopping became necessary, tele-work the rule.

It was at this time that intellectuals began to analyze the social and economic situation in Europe. In addition to others, they could go back to scholarly works initiated by **Futuroscope**, a French futuristic park, located near Poitiers, France, in 1995. They sought a rational explanation of the difficulties. Their controversial result: the origin of the crisis was not located outside, but lay in the intrinsic structure of the economy. While markets can be instruments of democracy

and peace under the condition of equal factor endowment, the production system based on private property is not compatible with democratic behavior and equal rights. Firms represent a hierarchical and unequal system, derived from the property rights of the owner. Workers do not offer their services in a voluntary way, but on an obligatory basis. Although the labor market was no longer a system where personal pressure is exerted by its predecessors, slavery and feudalism, it still lacks voluntary and participatory elements important for a functioning democracy. While the economic system produces innovations and is able to increase labor productivity and efficiency of production to a breath-taking extent (within the framework of given prices), at the same moment it systematically produces and reproduces inequality by its very structure.

The following graph shows two basic loops of value-circulation in capitalistic economies. The right one represents the (re-)production of the workers, offering their services—in exchange for wages—to the enterprises. With their wages they are able to buy their everyday needs. The wage level depends on the general level of technology and the political bargaining process. Of course wages may rise or fall, but the main process is a (re-)productive one and is performed more or less on the same level. The other loop on the left hand side represents the accumulation of capital by private or public firms. Entrepreneurs and their shareholders become more wealthy by a completely different mechanism: they are able to accumulate wealth of a different kind (machinery, buildings, financial assets etc.), which remains their property. Consumption to them is not their essential activity. To put it in mathematical terms: the left loop represents an integral operation, the right just a multiplication by a factor of about 1, depending on the situation of political power, economic growth or decline.

The two basic loops of value-circulation in a capitalist economy



Such being the general situation, what concepts were created by intellectuals in those days? They could see that classical approaches, implemented by the crown, later by political parties and religious bodies, had all failed. As history has shown to most of us, and finally to the intellectuals as well, the traditional slogans which accompanied the revolutions of the 20th century, such as “expropriate the exploiters”, were no longer valid. Instead of the antagonistic policy of the socialist revolutionaries of the past, some intellectuals now looked for a different approach. To them it seemed no longer useful to struggle for power for only one social group, and to annihilate opponents, because this could be the reason for self-elimination in this highly interdependent

society, and they looked for a cobweb of institutions which would be able to tame the dark features of capitalism in a new way. What could the new subjects be to achieve this goal? How should they be defined? As the classical subject of history in Marxian writings, the working class, had been dismantled by fractionating workers into too many different jobs, qualifications and payment, the new subjects had to be of a smaller size. Smaller groups should replace social classes or other institutions representative of traditional society. They had to be installed on a legal basis, should take care of their members first, but eventually could be linked to other groups or outside persons, encouraged by certain material and psychological incentives. Egotism should be limited; the individuals should work and live in a social arrangement that prevents them from being too selfish on the one hand, and should promote altruism on the other, by offering rewards for cooperative behavior. The increasing coldness of a technologically integrated society should be warmed by bringing people closer. This integration could not be achieved by technology alone, they declared, but through social constructions which could serve as a vehicle to increase collaboration, to strengthen the ability for self-determination, to exert democratic rights on a group level, to be able to control ones own social, economic, qualification and health-status level.

The above goals and results of a changed "gestalt" of society should not remain abstract, but had to be experienced personally, by each member of society, in an appropriate manner. Thus the size of the groups should not be too large.

The most radical of the intellectuals involved in concepts for a changed social structure demanded the complete transformation of the traditional bodies of parliamentarianism through a different principle of delegation. No longer should political parties fill the Houses of Parliament, but delegates of the new groups. They should be able not only to discuss new laws, but to decide on them as well. Their principle was to increase the direct influence and power of the affected on their social framework and on the overall rules of the social game. The more moderate ones allowed for an interim phase of competition between the new institutions and the traditional ones, but as well they believed in the overwhelming victory of the group-society.

Different kinds of groups with specialized working organizations were focused; partly they could be found in past experience, partly they were invented anew. The groups were to counterbalance the traditional social institutions, and transform them to achieve more favorable effects. To overcome the need for more democratic structures at the workplace, so called **Intrapreneurial Groups** were created. As a side-effect they could eventually create new jobs, with a wealth of very different profiles, time-structures, and qualifications. To make the bureaucratically ossified system of social security more humane and more flexible, **Peer Group Care** was invented. Small groups of singles, couples, with or without children, should take care of a few invalid, impaired, unemployed persons. They should be promoted by state empowering institutions, and by some material incentive. **Study Circles**, deeply rooted in the paradigm of self-organization, should carry out the task of permanent learning. This should be done not by a one-way teaching setup, but by groups with but little hierarchy, and by a continuous shift of the teaching and learning role from one member to the other. The predecessors of study circles go back to the Protestant bible studying circles of Scandinavia in the 19th century, and are redefined now as secularized and democratic learning tools. **Workers' Health Assurance Groups** should improve the health status on the job by direct evaluation of the factors promoting and hindering good health and adequate social climate. These groups could combine their demands for better health with political action aimed at the provision of equipment more protective for health (as done by Italian trade unions in the last century). The following table summarizes the problems faced and the remedies proposed.

New Group Scheme as a Remedy for Societal Problems

Cultural Problem Area	**Proposed Remedy**
Alienation on the job	Intrapreneurial Group
Social insecurity	Peer Group Care
Information explosion	Study Circle
Occupational hazards	Workers' Health Assurance Group

Following the enactment of legislation for new groups in the year 2017, we have seen first steps toward the establishments of such groups throughout the region.

The organizational structure of each group is very similar to the others. Membership in a particular group is voluntary, although sometimes there is a need to be a member in one of the groups (If people wish to earn money they must look for a traditional job or approach one of the Intrapreneurial Groups). The group leaders, called "coaches", are elected for a certain period, usually for several months. In some cases they have money or other material resources at their disposal. The group assembly is empowered to decide upon the use and distribution of these assets in periodic meetings.

At the moment, there is public discussion on how to finance the exploding costs of social welfare in all public media, electronic networks, TV channels, the radio network, and the press. There are divergent opinions: The first one states that social security benefits should be reduced to a minimum, because every person who wants to work can do so without difficulty. It is argued that people are lazy by nature, they should try to get a job, and that they are themselves guilty if they cannot find one, thus they should not receive any public money at all. Social insurance, in particular unemployment insurance, should be canceled, and there would not be any need for financing. The somewhat more enlightened opposition has argued in a different way: because the economy does not supply enough jobs for everybody willing to work, the redundant individuals not having found a job should receive benefits from the state since it is the responsibility of the public hand to compensate the population for the malfunction of the economic system.

The opposition prefers to finance the existing social security system by a combination of progressive direct (in particular taxes on wages) and indirect (in particular value-added or turnover) taxes. The difficulty with this system is that tax rates have to be increased because of the rising government spending for social insurance benefits, and tax-evasion could become more common than before. On the other hand, the opposition says this system is more socially just than any other, because it would involve progressive taxation, and take most from the highest incomes. The traditional social security systems were usually based on tax receipts up to a fixed maximum amount, irrespective of the amount of income.

A third position goes beyond the traditional taxation system. It demands a high tax rate on environmental consumption, in particular on energy, special resources and materials (green tax), and the exemption of all direct taxes on wages and income. This would lower gross wages and thus the personnel costs to the firms. The proponents expect an increase in new jobs because material and energy would become comparatively more expensive than to hire a worker. Saving energy and natural resources would be an important side-effect. Capital investments would be driven in a more favorable direction. New, environmentally sound production and services with all their positive effects on the quality of life would outweigh traditional technologies. More jobs would be created, so that the amount required to finance the unemployed could be considerably reduced. If unemployment went down, a number of additional favorable consequences would result: criminal rates would be reduced, a higher rate of marriages would occur, the health status would improve, and thus life-expectancy would increase on average, among other effects.

The relative weight of the first position is shrinking. The reason could be that more and more people feel it is not sufficient that the state merely leaves them alone and assumes no responsibility for providing a social infrastructure. This opinion is quite understandable at first glance for the large group of the unemployed. But there is a reason for the employed to adhere to this opinion as well: they increasingly fear violence and social disruption, as consequences of a growing mass of unemployed.

The main discussion goes on between the green tax position and the promoters of a traditional tax and social security system. Scientists and politicians write a lot of controversial articles at the moment, and letters to the editor are booming. But this is not the only frontline. Unfortunately for the green tax voters they are split into two or more opposing groups: These differ as to the level of the tax rate required, and to what extent green taxes should be redistributed, as well as to whom. One group favors low green tax rates, just enough to compensate for the direct taxes which have just been canceled, and no redistribution; the other votes for high and permanently increasing rates. The funds generated by continuously increasing environmental tax rates could be spent in different ways over time. The initial use would be to finance unemployment insurance, and a next step could be to compensate for health care insurance, later on for contributions to social security, while a fourth use would be to compensate for direct taxes on employees (in the beginning, tax payments by firms for their employees would remain unchanged), and the last stage—a rather utopian proposal—could be its use for income redistribution. The latter could be done in two alternative or combined ways: first, by financing a base income for every citizen in the country; or, second, as an alternative, by combining it with a negative income tax (as proposed by the well known economist Milton Freedman in the middle of the last century, but only in respect of the contribution of the firm) on the poor. One of the main advantages of the base income approach is the increase in social security, and, perhaps, a reduction in the cost of administration. While the income distribution of wage earners would change only slightly, a fixed income would be assured for the lowest income groups. Thus, the overall distribution would become more equal than before. The traditional social security system could become "leaner".

A negative income tax would do somewhat more for redistribution. Higher wages would be more heavily taxed, and the negative tax would be added to smaller incomes. The problem with the negative tax is the higher amount of administrative overhead which must be financed by society as a whole.

In my opinion, the government should be very careful in any case in using the instrument of the tax rate. If green taxes and/or negative income taxes are introduced, the technique should be applied on an experimental basis first. The government should decide on tax rates by taking into account the number of unemployed. The higher the unemployment, the higher the green tax rates that should be set. The rationale behind this is to achieve a substantial change in relative prices. The price of labor should be lower, while the price of natural resources and energy should be increased. A reduction of unemployment can thus be expected. But I would remind you: unemployment will not become lower automatically. Institutions are needed to enable the unemployed to take advantage of the new jobs; programs for integration into the world of labor are necessary. I am optimistic that the recently initiated group scheme can have a positive impact in the struggle against unemployment. And, finally, it could be useful to bring into the discussion the traditional parameters again, such as the length of the working week and the length of the working life.

TOMASZ ZARYCKI

THE LISBON AGENDA AS A NEW KHRUSHCHEV CALL

On the Relevance of the Soviet Experience of Modernization for the European Union*

The fact that the global scene is becoming more and more competitive and the position of the European Union is increasingly challenged by old and new world powers is a widely recognized fact. The awareness of this constantly growing pressure on the EU, its economic and social systems, in particular from the process of globalization stimulates numerous debates on the future of the continent. European politicians, academic and business communities debate on the ways of improving EU competitiveness, stimulating innovativeness and sustaining growth. New projects, initiatives and directives are launched by EU and national administrations each year with the aim of revitalization of the old continent. In the acacdemic and political debates discussants are looking for new ways and modes of much needed modernization of European economies and societies as well as workings of the institutions of the European Union. This paper is envisaged as voice in the above mentioned debate on modernization of Europe. In particular it is aimed at pointing out at a trap of imitative thinking—a common problem for most peripheral modernization projects. As it seems, Europe is more and more tempted by the simplicity of the imitative thinking, in particular by following the fashionable slogans of discourses of globalization which promise an easy way of facing the future by embracing the principles of the "Knowledge Based Economy" or the "Information Society". In this context the experience of the Soviet Union modernization efforts are reminded below, as they have been one of the most spectacular examples of a failure caused by excessive reliance on following the fashionable trends of the modernization discourse.

Communism as an Extreme From of Modernity

Communism in Europe collapsed over a decade ago but, as it seems, its lessons have not yet been fully studied outside of Central and Eastern Europe. As I would like to argue in this paper, the experiences of the tragic "communist experiment" are worth rethinking not just for the sake of expanding one's historical knowledge but for quite practical reasons, such as the planning of

* This is an expanded version of a comment on Antoni Kukliński's paper "*Universities driving regional development. The challenges of the XXI century*" (Warsaw, 2004) and my own paper in Polish (Zarycki, 2006a).

Europe's future. Among the key questions worth revisiting are the roots of the collapse of the communist system and the sources of its non-competitiveness, both of which seem particularly relevant for analyzing the challenges facing the contemporary European Union.

There are several competing interpretations of the causes of the collapse of the Soviet Union[1]. Among the more interesting in this context is an analysis of the process of decomposition of the communists states viewed from the perspective of the crisis of modernity. As it has been suggested by Zygmunt Bauman (1991), the communist Soviet empire could be seen as the last bastion of classical Enlightenment-born modernity. Its collapse would be, from this perspective, a moment of the final defeat of modernity and the advent of the yet unchallenged era of post-modernity. One could however note that the communist project, as many other social and political ideas and undertakings of Russian origin was in many respects an extreme, radical version of modernity. Its originally totalitarian character and radicalism strengthened such traits as homogenizing tendencies, a reinforced emphasis on rationality, hostility towards any forms of religion and indigenous cultures, reliance on central planning and emphasis on hierarchy and belief in progress and the power of technology. Such radicalism and simplicity of the Soviet modernization project seems to have played an important role in its collapse[2]. However, the simultaneous general crisis of modernity as a mode of Western civilization can not be easily identified with the crisis of modernity in the Soviet version. Thus I am far from calling for adoption of an equally radical opposite attitude towards modernity just on the basis of the collapse of the communist project. Nevertheless, I would argue that the extreme character of the interpretation of modernity in the communist states gives students and historians of these constructs a unique insight into the mechanisms of crisis of the classical modernistic mode of development. This is why the bitter experience of the years of "building up communism" and of the collapse of the communist system seem worth studying even today in the context of the crisis of the European Union. Of course the fact that most of the countries of Western Europe didn't embrace modernity as radically as the Soviet Russia and its satellites implies that they didn't experience its crisis and many of its consequences as drastically as the communist countries. This doesn't mean however, that some of the problems that the Soviet block experienced earlier are not relevant for Western Europe today, as the heritage of modernity is still very strong in the Old Continent. This may also have its benefits, but whatever our view of Enlightenment and its consequences are, we have to take into account the fact that Europe is currently facing the rising challenge of powers in which modernity has never as strong influences as in Europe. This also concerns the United States, which never fully embraced modernity as some analysts point out[3], and this in turn helps them better accommodate to the post-modern era. Thus I would argue, the European Union and its leading countries may be still facing some of the challenges and problems stemming from their reliance on traditional modernist modes and strategies of social and economic development in the context of the global rise of post-modernity. These challenges may be, as I have mentioned, less traumatic and delayed than those experienced by the Soviet Union, but the Soviet experience still demands some serious rethinking in the context of the current debates on the future of the European Union.

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[1] See for example Zarycki (2006b)

[2] See for example Gierus (1998) for an extensive discussion of Soviet Union's modernity.

[3] One of the advocates of this thesis is Samuel Huntington who argued that United States' model of governance and state ideology also comprises important aspects of rejection of modernity. See Huntington (1968).

The imitation trap

Here in particular I would like to point to one of the common traps of the projects inspired by the simplified ideals of modernity, namely the trap of imitation. The imitation trap is caused mainly by an over-reliance on the concept of linearity of economic progress, which is supposed to have some universal mechanisms and a clear sequence of stages of development. The waves of economic developemnt are supposed to spread from centres of growth to the peripheries. In such a model the success of peripheries is defined by the speed and extent of their assumption of the innovations observed in the areas commonly recognized as the poles of growth. This strategy, especially if adapted in an uncritical way, has a major weakness which is the assumption by the peripheries of the goals and priorities of the developemnt of the centre. However, these goals are usually not adequate for areas besides those in which they have emerged. A particular form of this trap is fascination with the status symbols for which the centres of growth are best known and admired. These symbols of prestige, success and wealth are not only usually much too expensive for the peripheries to attain in a short term perspective, but moreover they are often mistakenly identified with the essence of the centre's success. In fact they are just visible, superficial aspects of the prosperity enjoyed by the centres. Adopting such expensive and inadequate goals as acquisition of status symbols by the peripheries may in radical cases worsen rather than improve the peripheries' situation by increasing its dependence on the centre and wasting restricted resources on unproductive or at least not really needed investments. This problem in fact concerns not only the purely symbolic investments but also strategies of development which are theoretically supposed to "modernize" peripheries, or less wealthy countries or regions. However by imitating the un-contextualized solutions of the centres this, in fact, often leads such regions in the opposite direction. In particular the imitation strategy may lead to an often unconscious sponsoring of the centre by the periphery by financing the projects actually impossible to be fully used and taken advantage of outside the core regions of the world. A good example of such a policy is the production of excessive innovation which does not take into consideration local innovation absorption capabilities.

The Soviet communist project, which has been imposed on several countries of Central and Eastern Europe, was undoubtedly a victim of the classic trap of imitation. From its very beginnings Russian communists were fascinated with the West and in particular with the United States and its economic achievements. The most extreme manifestations of this attitude were Nikta Khrushchev's statements during and after his visits to the U.S. in which he declared the USSR's ambition to overcome the U.S. in several spheres of economic and social development. While condemning America in the ideological dimension, Soviet leaders had, in fact, always imagined the Soviet project as an imitation of American success in economic development. In particular the communist politicians became obsessed with catching up to the level of the indicators of development of the US economy. This strategy was highly dubious since these indicators are always selective measures of the state of the economy, and, moreover, many of them appear to have only short term validity as measurements of the development of cutting-edge sectors of the economy. In effect the Soviet Union and most of its allies were trying to catch up with the development of the modes of production which had been often already been outdated in the US and elsewhere in the developed world. At the same time the Soviet Union began copying enormous numbers of American symbols of wealth and prosperity including cars and New York-type skyscrapers, several of which Joseph Stalin ordered to be built in Moscow. Later, interestingly, he decided to build another one in the very centre of Warsaw, as a "gift from the Soviet people for Poland". The building, known today as the Palace of Culture and Science (previously named after Stalin), for a long time dominated the city as its tallest structure and was supposed to be, among other things, a symbol

of Soviet economic might and the ability of communism to implement American-born modernity in Poland. Other Soviet symbols of modernization included copies of Western achievements in the aerospace industry such as the American space-shuttle and the British-French supersonic Concorde. These Russian equivalents, built to a large extent because of political ambitions, were the Buran space-craft and the Tupolev Tu-144 airplane. They both appeared to be very costly and ultimately futile ventures. Buran never reached space and the Tu-144 served for just a few months on regular flights. Today their rusting bodies are among the numerous monuments of the failed modernization initiatives of the Soviet Union.

The Lisbon Agenda in Light of the Soviet Experiences

Taking into account the above context, it is not surprising that when the Lisbon Agenda, best known for its call to transform Europe by means of bureaucratic directives into "the most competitive and dynamic knowledge economy in the world by 2010" is mentioned, associations between the European Union and the Soviet Union immediately come to the minds of many Central and Eastern Europeans historians and analysts who are mindful of the experience of communist modernization. It serves to remember here that it was Nikita Khrushchev, the secretary general of the Central Committee of the Communist Party of the Soviet Union, who wanted the Soviet Union under his leadership to "catch up with and surpass America". The cruel irony of Khrushchev's call was that in the years to come the distance between his country and the United States, quite in contradiction to his ambitions and decrees, grew constantly. Interestingly, the same appears to be happening in the case of the EU Lisbon Agenda, which in fact also amounts to a "catch up with and surpass the US" call. The relative distance between Europe and the United States is growing instead of decreasing. Let us hope that the European Union will avoid the fate of the Soviet Union; that is a complete disintegration after a couple of decades of implementation of the ambitious "catching up with America" strategy. This if, of course, an ironic remark, but one could argue that in some aspects, the EU's efforts to revive its economies and societies are increasingly resembling unsuccessful attempts at modernization as they were undertaken by the Soviet Union and its empire. Even if this thesis may be considered as a considerable exaggeration, it seems that such a provocative view can shed a new light on the problems the EU is currently facing in the process of re-shaping its development strategy. As I have mentioned, the former experiences of the post-communist and now new EU member states may appear useful in the current debates on EU reforms. The sensitivity of the former communist states to excessive statism and its ineffectiveness in management of their respective national economies and societies could, as it seems, help to balance the assumptions of many of EU strategists—which are truly ambitious but largely based on wishful thinking and driven by a growing inferiority complex of Europe towards the US.

I would like to propose in this place to adopt the theoretical framework proposed by Pierre Bourdieu, namely the theory of the three primary types of capital: economic, social and cultural. As it was suggested by Eyal, Szelényi and Townsley (1998), assuming the Bourdieu framework, the logic of economic capital could be related to the organization of modern, advanced societies, while social capital, in particular in the form of political capital, could be seen as characteristic for the functioning of the pre-modern or lagging behind societies. On the other hand, we could relate the economic capital vs. social capital opposition to the centre-periphery dichotomy. The Centre could be characterized by the dominating role of economic capital. Peripheries would rely more on social, and in particular political capital. Political capital as well as cultural capital serves in the peripheries as a substitute for the shortage of economic capital and its logic. The Soviet Union

was a perfect example of a peripheral region relying heavily on the role of political capital in its attempts to overcome its backwardness and dependence on the West. The question in the current context is to what extent the European Union will follow a similar way and chose to use political capital to compensate for other weaknesses as a player on the global scene.

The Imitative Discourse of the EU science policy

The strength of the temptation of the imitation trap facing the European Union is clearly visible in the mainstream discourse of the Brussels bureaucracy. It is full of lofty, ideological slogans referring to dreams of progress and technological sophistication, most of which unfortunately manifest at the same time undertones of the traditional and simplistic "catch up" philosophy. In particular notions of the "knowledge based society" or "knowledge based economy" which play such a prominent role in EU official discourse seem to be based on the largely imitative assumption of replicating the processes observed in the United States. At the same time "innovation" is the buzzword, all present term and the most favourite adjective added to every second noun in the documents on economic and social development. One could note that the EU obsession with the production of innovation and their statistics on and promotion of it, has become the equivalent of the Soviet obsession with statistics on the production of coal, meat or iron. At the same time the discussion of actual needs in this discourse has been marginalized. Instead, the emphasis is put on the necessity of creation of demand for the surplus of innovations. This happens as the EU is sponsoring the production of innovations which are not necessarily relevant to the European context and in effect there is a need to spend additional public funds to artificially stimulate that demand. The whole process is thus not the effect of a rational mechanism of adaptation to actual needs but a classical case of a politically sponsored spectacle devised as a proof of Europe's American-style modernity and commitment to technological progress. Therefore, paradoxically the actual effect of these politically devised mechanisms is largely imitative, even if their official goal is declared as the production of innovations. Such paradoxes again resemble sometimes the organization of the Soviet economy where demand had to be stimulated artificially for not really needed goods and services produced as an effect of the imitative ideological plans of the command economy.

The nature of EU scientific policy is an excellent example of imitative and bureaucratically driven development. As we look for examples in the EU of so called "framework" programs, we see that the majority of them have a predefined character offering money for dealing with specific problems arbitrarily designed as relevant to the EU at a given moment. Most of them are in fact calls to European scientists to "catch up" with America in particular areas (or rather sub-areas as many grant offerings are very specific). The grant rules demand most of the proposals to offer "innovative" solutions for the specific questions which are also expected be instrumental in transforming the EU into the "knowledge based society", almost irrespectively of the area they are related to. The popularity of such ideological, vague slogans as strategic goals of development once again calls to mind the role of the ideology of progress in the Soviet Union. One may recall that most scientific projects financed by the communist states were supposed to be instrumental in development of such abstract notions as "advanced socialist society". Thus, as it can be shown in several others examples, the bureaucratic EU science financing system seem to become more political capital than economic capital driven and more imitation than innovation-stimulating in its nature. Academics are expected to submit proposal for large projects on subjects which are defined by officials in Brussels as important for competition with the US in certain areas, or relevant for other political goals, rather than on topics they feel competent in and have innovative

ideas relating to particular European contexts. Another aspect of the weakness of the system is its institutional format. One of the key problems is a fascination with the notion of "networks" and "networking" which results in demands for compulsory construction of large consortia expected to consist of several teams from different countries. The proposed consortia are often compiled with no other aim but to meet the grant criteria, which were clearly designed with political aims in mind such as developing international contacts. Moreover we deal here with the result of a mechanism typical for peripheral imitative development. Observation of the importance of networking in US science has been transformed in the EU into an administrative directive restricting in effect the flexibility of its own science policy. Such an imitative philosophy is also inspiring the emergence of concepts as "centres of excellence". This is in fact the mechanism where the observation of the existence of several world-class academic centres in the US has given EU officials the idea of creating their equivalents by means of administrative decision.

Norman Fairclough (2006) presents an interesting interpretation of the spread of the "Knowledge Based Economy" discourse which he defines as a type of globalization discourse. In his radical interpretation "the emergence of KBE as an international strategy is in large part due to the USA's decision in the late 1980s to base its bid to defend its global economic hegemony from European and Asian competition on its supremacy in knowledge industries and what came to be called «intellectual property»". (Fairclough 2006:48). Of particular importance is Fairclough's thesis that KBE is to a large extent a discursive phenomenon, or in other words an American project followed blindly in many part of the world. Non-reflexive embracing of the KBE discourse outside the US and treating its slogans as universal truths is theorized by Fairlough as part of discursive recontextualization or rescaling of the nation-state. In effect national challenges (and as one may note EU's challenges as well) are no longer described in national (or European) terms but in global terms of KBE buzzwords. One may again point out to another similarity with the failed Soviet plans of competing with the US. Namely the so called "Strategic Defence Initiative" of Ronald Reagan's administration known also as the "Star Wars" project. Soviet leaders become obsessed with it treating it as the main threat to the geopolitical position of the Soviet Union (Schweizer, 1994). As it later appeared the project was far from feasible although it stimulated several important technological inventions in the US. However, as it has been argued, the Soviet obsession with the Star Wars project become one of the important reasons of the communism's collapse, as it resulted in diversion of considerable resources into futile undertakings aimed at competing with the US in the above mentioned area. The idea of Knowledge Based Economy seems to be equally elusive concept, which stimulates important changes in the American economy but when assumed as an official goal of EU policies, may lead the Union to spending much of its resources for projects not necessarily relevant for its real needs.

Interestingly, in the case of Poland, which just after the fall of communism created the State Committee of Scientific Research (KBN) following the pattern of the U.S. National Science Foundation (NSF), integration within the EU system of scientific policy seems to constitute a step backwards in some respects. Brussels' budgets may be much larger than Poland's national research and development funds but it seems to be much less flexible and at the same time more opaque and political capital driven. It is important to notice that the NSF type system, while opening possibilities of financing research at any topic and at any scale, still gives much room for state control over science policy, for example, by means of shifting funds between priority areas. At the same time it is much better designed in terms of its ability to value the innovativeness of research projects, not just by their "political correctness" or "political demand". It also gives much greater possibilities to younger and individual scholars (or smaller teams) as it does not require membership in large consortia and other hierarchical and long-term networks. Unfortunately, Poland under Brussels' influence is introducing its own national framework-programmes, returning

in this way to the pre-1989 politically driven organization of research. This cycle can be probably called another instance of "a detour from periphery to periphery" (Berend, 1996) at least in this particular area and is to be observed in several other post-communist countries[4].

The EU as a New Periphery?

As I have already mentioned, the imitation oriented philosophy of development is a typical problem of peripheries (which can be defined on different levels including regional, national, continental and others). It is important to emphasize here that peripheries may be dominated by centres not only in the economic dimension but in most cases they are also dominated in the symbolic or ideological aspect. Symbolic dependence is understood here as the inability of choice of development strategies relevant for one's own context (again it may be defined at the local, regional or national level) and instead the adoption of strategies and goals of centres. The above described inclination towards imitation-oriented policies in the EU may be therefore interpreted as one of the symptoms of a move of the Union towards the periphery or as an assumption of peripheral identity. At the same time this increasingly peripheral identity of Europe is evident in internal psychological tensions streaming from its non-acceptance of its own weakening position in the global scene. Such processes have been also observed in the Soviet Block and they included, first of all, the non-acceptance of its peripheral position in relationship to the West. At the same time we could observe the base formation of the Soviet identity as an opposition towards the West and an attempt to overcome dependence and economic weakness by means of political capital based modernization, which, it was hoped, would allow for long-term self-sufficiency. Today in many respects Europe's place in the world system is weakening and Europe is in effect becoming more and more peripherally positioned, in particular with its relationship to the United States. In such context, the realistic acceptance of dependency seems to be a much wiser choice than attempts at ignoring it or uniting against the US with the intention of compensating for economic weakness by strengthening political mechanisms. Taking into account the fact that reproduction of the social and economic mechanisms observed in the centre is most often impossible in the peripheries, such an approach will be more and more disappointing and will increase Europe's objective and subjective backwardness. What Europe should chose instead is, as I would argue, not whether it wants to "catch up" or just maintain its still privileged position in world economy, but whether it can adapt[5]. Adapt to the global world economy and integrate with it using its own strengths, rather just integrate internally with the intention of becoming a self-sufficient "anti-US" as the Soviet Union aspired to be. Instead of Europe trying by all means to be stronger than the US, it may become more complementary with the US and other world economies; strong and influential by being indispensable for their functioning. This attitude of the EU towards the US which seems particularly effective may remind some of the Nordic countries, such as Sweden and Finland in their relationship towards their stronger European neighbours. Swedes and Finns seem to integrate the recognition of their own weaknesses on the international scene with confidence in their role in global economy, openness to international influences with an insistence on the sustainability of their own identity and culture and readiness to face the challenges of globalization

[4] See for example Fairclough (2005) for an interesting study of replication of the EU Lisbon Agenda's discourse in the Romanian government's National Development Strategy. Fairclough points out to the imitative character of the goals set in the Romanian document and in particular definition of the 'information society' as a strategic goal for Romania on the basis implicit and idealised claims about the 'information society' as a universal reality.

[5] I owe my inspiration as far as the importance of the notion of "adaptation" is concerned to Roman Galar. See for example Galar (2005).

with a determination to maintain their own social philosophy and values. This seems to also be a good philosophy for a non-imitative European Union.

A Case for a Two-Speed Science and Education Policy in EU

A good example of how an adaptive, non-imitative philosophy of the EU could look is in the field of science and education. The adaptive approach in this domain could be labelled as a two speed approach based on a distinction between political capital-driven and economic capital-driven science, or globally and regionally minded scientific policies. The regional universities have an important function in making our continent work and in maintaining European values. They should provide good education for the population of their regions on as universal and as cheap a basis as possible. They should serve as mediators in diffusion of innovations from global centres to regions, institutions and firms. They should also be active places of regional culture production, reproduction and revaluation. This function of regional universities seems crucial for building regional identities and in turn regional dignity and the self-esteem of regional communities. On a wider scale, cultural capital reproduction is also a very important function of universities for Europe and self-esteem of Europeans on the global scale.

Returning to the regional scale however, let me question the assumption of the global vocation of regional universities. Instead of trying to turn most of the regions of the old continent into new Silicon Valleys and their universities into Stanfords, one could rather realistically assume that most of the regional universities will be unable to compete on the global scale and should be demanded to deliver first of all their "political" functions. As mentioned above, we would expect them to educate the regional populations, mediate in transfer of know-how and serve as centres of reproduction and symbols of cultural capital of their regions. In accordance with their role, regional universities should be financed on the basis of the traditional political capital based rules. Thus, they could be demanded to concentrate on areas considered as crucial for their regions by officials and politicians, they could even pretend to be "on the cutting edge of world knowledge base society development" in order to elevate the self-esteem of the region's populations as well as engage in networks for the sake of networking by showing off their alleged international character and connections. Another important function of regional universities can be also seen also in providing stable employment for academics, including those who would otherwise not be able to find jobs on the competitive global market. By accepting large numbers of students and providing scholarships regional universities may also play important political role in alleviating such social problems as unemployment.

On the other hand however, stimulation of emergence and separation of a clearly defined economic capital driven science sector in EU seems necessary. Europe needs world class academic centres which would be not just declared "centres of excellence" by some officials but actually be globally recognized centres of excellence. They should be fully fledged participants in the global research and development system. Their financing should be based not on the traditional European political capital based logic but on a flexible, competitive and innovation-rewarding logic of economic capital. Their role would not be to imitate American universities and their research. Instead they would be expected to develop their own identities and ideas to be followed by the rest of the world. To achieve such an aim, development of two separate systems of financing, rather than the arbitrary division of universities into two or more categories, seems crucial. Among several obvious functions of global universities which should emerge in Europe are the restraining of the brain-drain from the Europe as well as the improvement of the continent's self-esteem, which otherwise risks falling into a deep inferiority complex, which, in turn, can lead

to unwise choices in EU development—decisions which will create an impression of "strengthening of Europe" but in fact will only deepen its marginalization and dependence on other leading economies of the world.

Conclusion

Thus, as it has been shown, the contemporary European Union may learn an important lesson from the experiences of the Soviet Union and its communist satellites. It should become more sensitive to simplistic and imitative answers to the global challenges it is facing. It should also learn to better differentiate between innovations which are in fact just ideological slogans used to describe largely imitative strategies, and real innovations which do not follow the processes observed elsewhere but creatively solve existing problems and answer real needs. Such innovations in the wide sense would be solutions which are context-relevant and follow adaptive policies relating to particular cultural and economic conditions. They would be innovations which address the needs of particular societies and economies and not simply follow the fashionable but imitative trends and slogans borrowed from other regions of the world. Moreover, they would be innovations whose primary function would be not to superficially dazzle by novelty and impress by sheer size, price or similarity to objects of pride of the world's richest club. Competing in size, as exemplified by the development problems of the extra-large Airbus A380 aircraft, which was applauded so loudly many EU politicians, seems to testify, may be very costly for the taxpayer and not very effective in improving the societies and economies of the European Union.

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GILBERT FAYL
ULRIC FAYL V. HENTALLER

MORE REALISM—FEWER ILLUSIONS

The European Union (EU) is the greatest political achievement of modern time in Europe.
The Unions founding fathers' initial objective has been achieved: discourage war between previous adversaries and bring lasting peace to Europe.
Everything else that has happened since and led to today's EU is a "bonus". It should be evaluated accordingly. This unique causality must be understood.
There is also room for improvement. Greater openness about past blunders and setting realistic objectives would increase support for this distinctively unique project.

Lessons from History

In 1961 Nikita Sergeyevich Khrushchov, First Secretary of the Communist Party of the then Soviet Union, announced[1] his plan to surpass the United States in per capita production within twenty years [Khrushchov, 1961]. Thirty years later the Soviet Union dissolved itself.

In 2000, EU political leaders adopted astrategic goal for the next decade to become the most competitive and dynamic knowledge-based economy in the world by the year 2010. Five year later the strategy was refocused; the initial objectives remain in the distant horizon.

If history has taught us anything, it is that political leaders make mistakes.

Political determination certainly demands respect. But highflying declarations are insufficient. Even worse, unrealistic and over-ambitious objectives could prove damaging for political leaders when the time arrives to redeem promises.

However, time is often merciful. Political leaders come and go and are seldom held responsible for unkept promises. Nevertheless there is a price to pay.

Some of them will be remembered for blunders; others will be forgotten.

Over-Ambitious Strategy

In 2000, during the EU Summit in Lisbon, political leaders adopted an over-ambitious (in hindsight) ten-year programme to revitalise growth and sustainable development across the EU.

[1] Esko Aho, former Prime Minister of Finland, recalled this "prophecy" at the recent *Budapest Round Table 2007,* 28 November 2007.

Against the background of sluggish economic growth, the EU "*set itself a new strategic goal for the next decade: to become the most competitive and dynamic knowledge-based economy in the world*". The initiative is also known as the *Lisbon Strategy* or *Lisbon Agenda* or *Lisbon Goals*.[2]

Discerning policy analysts should have raised eyebrows and questioned the political realism, soundness and validity of the *Lisbon Strategy*.[3]

Yet the opposite happened. The notion *Lisbon Strategy* has become one of the most frequently used buzzwords within the Brussels political playground and its gravitational pool.

It was only five years later in 2005 that political leaders understood that the objective had been far too ambitious and unreachable by the set target date. The first five years had shown little progress. A high-level independent committee recommended re-focusing the *Lisbon Strategy* towards growth and employment.[4]

If not before, policy analysts must by now ask whether the *Lisbon Strategy* was even realistic at its inception? Was it achievable within such a short time? Was it a far-fetched illusion? Could a group of 15 states (i.e. EU Members at the time when the *Lisbon Strategy* was agreed) within ten years transform themselves to "*the most competitive and dynamic knowledge-based economy in the world*", while at the same time being determined to take on board a number of new states?

One might want to consider that eight of these new member states (and later two more) and their economies had been stifled by more than 40 years of repression and systemic political dictatorship.

Nevertheless, giving credit where it is due, eight years after its launch the process has become more important than the initial objective. As a result of the re-focused *Lisbon Strategy* and the persistent reference to it at the highest political level, some of the necessary dynamism seems to be gradually injected into the EU. The *Lisbon Strategy* has started a process that can only be beneficial for the entire EU and possibly well beyond.[5]

But the objective to become "*the most competitive and dynamic knowledge-based economy in the world*" remains on the distant horizon. If not before, then at the latest at the set target date in 2010, the political leaders will be obliged to publicly admit that the initial *Lisbon Strategy* was over-ambitious and unrealistic.

The above development raises three critical issues for the EU system: firstly, the credibility of objectives set by political leaders; secondly, the potentially damaging consequences of unfulfilled promises; and thirdly, the validity of objectives set for the EU as if it was a homogeneous unit.

At the core of this complex problem is the reluctance of political leaders to be more open about unrealistic goals and admit blunders. Sometimes one might get the impression that the EU is a continuous success story moving forward from one achievement to another. Hiding behind lofty declarations and shying away from candid dialogue could be damaging. Taxpayers will not

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[2] A similar highflying goal was the so-called "3 % objective". In 2002 the EU leaders agreed "*that overall* (i.e. public and private) *spending on R&D and innovation in the Union should be increased with the aim of approaching 3% of GDP by 2010*".

[3] The issue is discussed by the authors in another article in this publication *The Broader Context of EU Research Policy* [Fayl, 2008].

[4] The committee also underlined the need for real ownership by the EU Member States of the reforms. Resulting from the recommendations, most Member States have become more actively involved in the realisation of the revised *Lisbon Strategy*.

[5] In December 2007 the European Commission reported that the Lisbon Strategy to boost jobs and growth in the 27 Member States was finally paying off. Economic growth had increased from 1.8% in 2005 to 3% in 2006 and employment rates reached 66%—close to the Lisbon target of 70%. But the report also states that despite the much-improved results over the past two years, EU governments will have to focus more on "*investing in people*" and "*unlocking SMEs' business potential*" in the next three years if they are to cope with the competitive challenge of globalisation. The report underlined that "*not all Member States were undertaking reforms with equal determination*".

be able understand and fully appreciate that formulating principal EU policy objectives is, while being necessary, inherently risky.

Let's underline and repeat the well-known reality: only an open and transparent system is able to create the atmosphere and conditions for confidence building between political leaders and taxpayers. This holds true in politics as it does in business. Shareholders demand it from their companies. Taxpayers are shareholders of the political system they inhabit and should demand the same.

As regards the third issue, certain objectives should take more account of specific circumstances and not be set uniformly for all Member States. A single reference point is not always helpful.

To illustrate: instead of the so-called "3 % objective" for R&D and innovation (see footnote 2) that most Member States could realistically not reach for the set target date, an annual increase expressed in percentage would have been more supportive for the scientific community.

That would have provided a simple instrument to keep political leaders accountable for promises.

The Buzzwords

Although the *Lisbon Strategy* has been re-focused, its initial objective is still around and will apparently remain in the political arena for some time. Some have not even realised that the objective has been altered.

It is almost as if the *Lisbon Strategy* formulated in 2000 had become a doctrine of its own.

It has become "good Latin" to drop the buzzwords "*most competitive knowledge-based society*" at every possible opportunity. In speeches by politicians or in policy related speeches by others such references are routinely made. It is almost as if they would ask, "How are you?" Obviously, one doesn't question the meaning behind the words since everybody knows that the response is without exception just a meaningless standard phrase.

Knowledge-Based Society

There is a fundamental intellectual dilemma with the expression "knowledge-based society".

On the one hand, there is no clear definition of the concept. Consequently, there is no unambiguous criterion for when a society has reached this stage of development.

On the other hand, it must be understood that "knowledge-based" means using best current knowledge. Consequently, each society throughout history has by definition contained "knowledge-based" elements. This must be acknowledged. It would be total ignorance of our ancestors' achievements to disregard or reject this essential fact. Indeed, it would be a moral dilemma to do so and an intellectual mistake.

Throughout history, progress has always been based on state-of-art, i.e. best current knowledge. The first stone wheel, iron tools, steam engine, electric power, etc. have represented the then "best-knowledge". They all became stepping-stones to further progress. In this respect, progressive societies have always been knowledge-based.

There are, however, a few regretful examples of the opposite such as the following: "*...the decision to ground the Chinese fleet in 1433 and destroy most official records of its existence was perhaps the single greatest blunder in all of modern history. This act, whose repercussions shaped the modern world order within which we all now live, plunged China into 600 years*

of decline and represents the ultimate triumph of partisan politics over common sense and the national welfare" [Smith, 2006].

The search for new information and experience has always takes place, even despite the burning and prohibition of certain books and the elimination of intellectuals by the church in the middle age and later by communists- and fascists regimes in the 20th century. And this search will always continue because of aspiration for more and better understanding of nature around us and about ourselves, and the search for new "knowledge terra incognita" are inherent in the human nature.

Today's society is progressive. Biotech, IT, nanotech, etc. represent our current best-knowledge and are being used accordingly. With their help we have been able to enter into the "21st century knowledge-based society" and will continue our journey into the future. But this is not a straightforward process. Knowledge creation will continue with an unpredictable speed and often in random directions.

Individuals who have failed in traditional educational systems sometimes profoundly influence this development. A few famous examples would be: Thomas Edison was called "addled" by his teacher. Albert Einstein failed the examination that would have allowed him to study electrical engineering at the "Eidgenössische Technische Hochschule" in Zurich. Bill Gates is a university dropout. Ingvar Kamprad (IKEA founder) admitted to being dyslexic.

These and others examples have demonstrated beyond any doubt that in the 21st century –also and in spite of the use of the Internet– individuals' creativity and imagination[6] are more important than simply "memorized" knowledge and "old-style" education. Creativity and imagination in connection with communication and marketing have become the key driving forces of today's progress and competitive success. In addition, the choice of appropriate co-operative partners has become a determining factor for success.

This development has led to the current situation where the competitive focus has moved from hardware to intellectual products such as copyright, patent, trademark and design. This explains the current successful performance of comparatively small Scandinavian countries—Denmark, Finland and Sweden.

The above considerations suggest moving away from the overused expression "knowledge-based society". The authors of this article agree with the suggestion that it is more appropriate to refer to the current situation as "creativity-based society" [Howkins, 2001].

Therefore, excellent educational establishments able to produce uniquely qualified individuals, while promoting the true spirit of creativity and imaginativeness, are more important than ever before.

It is expected that the wealth of creativity-based societies will increasingly come from maximising knowledge content in products, processes and services. *Stricto sensu*, "knowledge-based society" will remain a moving target, and consequently remain a challenge for both present and future societies as well.

It seems that some of the proponents of the initial *Lisbon Strategy* overlook the above facts and considerations.

Think-Tanks

Optimally, Brussels based think-tanks should provide realistic and inspiring advice, and "ring the bell" in time when the EU system needs a helping hand.

[6] Regretfully, these attributes are not sufficiently encouraged in European educational systems.

The situation on the ground is quite different.

Stanley Crossick has recently painted a gloomy picture of Brussels think-tanks compared to similar bodies in Washington D.C. The Europeans ones suffer from structural disadvantages and are badly funded. In most cases it reflects their practical merits. [Crossick, 2007]

According to Crossick, *"EU decision-making lacks the underpinning of the type of public policy debate that exists in Washington.* (There are) *four principal reasons for this. First, political, think-tank and business leaders in Washington interchange within a single "class", whereas they form three permanently separate groups in Europe. Second, European Union decision-makers do not seem to value think-tank input to the degree that it is valued in America. Third, European think-tanks are more reticent than their US counterparts in seeking to influence decision-making. And the final reason is that private-sector financial support for think-tanks is very limited compared with the United States. The insufficient role played by think-tanks is one of the reasons why there is so little strategic thinking in Brussels".*

The authors of this article concur with the following less-than-encouraging analysis of the situation: *"given the importance of decisions taken by the European Union, both the level and quality of public debate in the EU capital are depressingly low".* Furthermore: *"Too many think-tanks spend their time offering straight commentary on the Brussels machine.... In Washington think-tanks thrive not by reacting to the usual political process, but by supplying it with "the next big idea". In Brussels analysts are sometimes said to be too outspoken.... In Washington, if you're not outspoken, people will not listen to you."* [Charlemagne, 2007]

Those who are not occupied with chasing EU funds observe that most think-tanks in Brussels—with very few exceptions—have voluntarily limited their roles to watching and commenting events. Hardly ever do they do any scientific analysis, and even more seldom forward-looking analysis. This explains why it has become good Latin to pick-up from time-to-time opportune catchwords with limited (or without) scientific foundation, like *knowledge-based society*. In the absence of discerning debate, buzzwords get their own life and remain hanging in the Brussels environment and its gravitational pool. At least until a new buzzword drops down from the political Parnas.

In the mean time visitors from Parnas explain from time-to-time publicly the meaning behind the words. And think-tanks and others dutifully listen.

One can't avoid getting the impression that in Brussels the potential value of active and forward-looking think-tanks and academic bodies is greatly under-estimated and under-utilized—or saying it more bluntly, largely overlooked and even undesired. It is disappointing. Think-tanks and academic bodies could be of great help to engage civil society in EU related dialogue.

But these organisations would need adequate funding without political strings attached—and without time-consuming bureaucratic procedures.

Admittedly, more funds by themselves are no assurance for better and more strategic thinking.

Let's Look Forward

In the EU system there is room for improvement.

Greater openness about past blunders and setting realistic objectives would increase the support for this distinctively unique project. Such efforts would also bring the public closer to political realities.

Outspoken think-tanks would also be of great help. In particular, if they would articulate critical but constructive advice and act as early warning structures that signal unanticipated developments in time.

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ANTONI KUKLIŃSKI

POST SCRIPTUM
—The emerging cognitive and pragmatic landscape of Polish Futurology

The volume "*Futurology The challenges of the XXI century*" is not an isolated phenomenon on the Polish scene. It is an important element in a set of 14 volumes which were published in Poland in the years 2003–2008. The innovative content of this set is expressed in 300 contributions of eminent authors of the Polish and international scene. In these contributions we find the evaluation of the global experiences of the XX century, the visions o the Gordian Knots of the XXI century and the paradigms of futurology as an activity trying to face the enigma of the future.

In these methodological framework the most important is the comprehensive field of interaction emerging in the encounters of diagnoses, visions, scenarios and strategies. The 14 volumes are a convincing document that in the global field of futurology we can find a rich stream of Polish—empirical methodological and pragmatic contributions. The set of 14 publications is demonstrationg also that we remember well the roman rule verba volant scripta manent.

This set of 14 publications is both a Polish and global phenomenon. The list of eighty authors, who have published their contribution in these 14 volumes is well balanced in the network of Polish and non Polish names and locations. I will not try to analyze the content of the 14 volumes—taking into account that in most cases these volumes are in the scope of attention of the readers of the volume—"*Futurology the challenges of the XXI century*".

I think however that is an necessary to present a list of titles of these 14 volumes and a list of institutions which have published these volumes.

A.

The WSB-NLU , Nowy Sącz, Reupus—Recifer Euro Futures Publications Series

1. Europe—the global challenges, Nowy Sącz 2005
2. Europe—the strategic choices, Nowy Sącz 2005
3. Europe—Reflection on Social Capital, Nowy Sącz 2007
4. Futurology—the challenges of the XXI century, Nowy Sącz 2008
5. Towards a New Creative and Innovative Europe, Nowy Sącz 2007

B.

Ministry of Regional Development, Regional Development Forum, REDEFO

6. The Future of European Regions, Warsaw 2007
7. Gordian Knots of the 21st century, Warsaw 2008

8. The future of Regions in the Perspective of global change, Warsaw 2008

C.

The Polish Academy of Sciences

9. The Future of Europe Proceedings of the International Symposium, Vienna 2007, Scientific Center of the Polish Academy of Sciences Vienna, Austrian Chapter of the Club of Rome
10. Polish Academy of Sciences Forecasting Committee Poland 2000 Plus, Europe in the perspective to 2050, Warsaw 2007

D.

The Polish Association for the Club of Rome

11. Turning points in the transformation of the Global Scene, Warsaw 2006
12. Europe in the perspective of global change, Warsaw 2003

E.

The 21st Century Institute of Global Futures Forum

13. Faces of the 21st century, Warsaw 2008
14. An Introduction to Future Studies, Warsaw 2008

* * *

The Club of Rome is launching a mayor international cooperative programme on the broad theme "A new Path for World Development". This new Programme of the Club of Rome is creating a new inducement to see the 14 volumes as a potential source of some ideas and approaches which can be successfully applied in the design and implementation of the new Programme of the Club of Rome

* * *

In the emerging cognitive and pragmatic landscape of Polish Futurology an important role is performed by the new Forum for Strategic Thinking created in spring 2008 by the Polish Economic Society and by the Polish Association for the Club of Rome.

* * *

We hope that the critical Readers of the volume Futurology—the challenges of the XXI century will recognize that this volume is an important contribution visible in the emerging landscape of Polish futurology. Naturally we have a long way to go to create an innovative school of Polish futurology. May be the 14 volumes would be recognized as an opening of these trajectory of thought and action.

Warsaw June 13 2008

ANTONI KUKLIŃSKI

THE TRIPLE MISSION OF THE VOLUME "Futurology—the challenges of the XXI century"

The rich and comprehensive content of the Volume is open to a large set of imaginative interpretations. In this context of this short paper[1] I would like to concentrate attention on three interpretations of the Mission of the Volume[2]:

Primo – the dilemmas of the XX century
Secundo – the visions of the XXI century
Tertio—the challenges for the New Futurology

I. The dilemmas of the XX century

It is very difficult to try to find a key for the definition and evaluation of the great and very often tragic dilemmas of the XX century. To induce our imaginative thinking in this field let me outline five dilemmas of the XX century:

1) the tragic dilemma of war versus peace
2) the dramatic dilemma liberal democracy versus totalitarian systems
3) the contrasting experiences of global capitalism deep depression versus log boom
4) the dilemma of two ideologies as trajectories of the development of the global order Keynesism versus neoliberalism
5) the glory and misery of the XX century Gordian Knots versus Alexandrian Solutions

The Tragic dilemma of war and peace

The Tragic dilemma of war and peace was the most dominant feature of the XX century. The experiences and results of World War One and World War Two opened new contrasting chapters of glory and misery of heroic expressions of wisdom and courage and of diabolic experiences of crime and unbelievable moral decline.

Two visions of peace were designed and implemented. The vision of the League of Nations which was a total failure not able to prevent the ignition of World War Two.

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[1] This short paper is an integral part of the volume—"*Futurology—the challenges of the XXI century*"—it is assumed that the most important papers published in this volume are already known to the critical reader of this paper

[2] For comparative purposes please see the two papers of Antoni Kukliński published in the volume—"Faces of the 21st century"—A. Gąsior-Niemiec, A.Kukliński, W. Lamentowicz (eds.), REWASZ Publishing House, Pruszków 2008

The second vision was the vision of the United Nations which has created on era of peace in the second half of the XX century and prevented the ignition of World War Three. I am fully aware of the dramatic experiences of Cold War and all weakness of global governance after World War Two. It is difficult however to deny the positive end result of the historical process.

The dramatic dilemma liberal democracy versus totalitarian systems

The XX century has created a scene of tragic weaknesses and historical blunders of liberal democracy. The grand liberal democratic countries were not able to prevent the ignition of World War One and World War Two and the emergence of totalitarian regimes in Russia, Germany and China. The immense spiritual and material resources of the liberal democratic countries were however the source of their historical victory and their prevailing role in the global landscape of the end of the XX century.

The contrasting experiences of global capitalism, deep depression versus long boom[3]

The XX century created two contrasting experiences in the history of global capitalism. The experience of the Great Crisis of the early thirties and the experiences of the golden age of capitalism in the years 1950–75.

The dilemma of two ideologies as trajectories of the development of the global order Keynesism versus neoliberalism.

In the development of the global order of the XX century two ideologies emerged in prominent and charismatic roles. The ideology of Keynesism and the ideology of neoliberalism. In this context we are concentrating our attention not on the theoretical dimension of these two doctrines, but on the role of keynesism and neoliberalism as an ideology organizing the global scene.

The glory and misery of the XX century—Gordian Knots and Alexandrian Solutions.

The metaphor of Gordian Knots and Alexandrian Solutions can be seen as a new methodological instrument in the analyzing and evaluation of the experiences of the XX century.

* * *

This panoramic view of the XX is an inducement to see the main transformations and processes of this century, as an opening stage of our thinking related to the prospective experiences of the XXI century.

II. The visions of the XXI century

Let me propose the following seven theses, as a starting point to outline a pluralistic set of visions related to the prospective experiences of the XXI century.

[3] W. Michalski, *The anatomy of long boom* [in:] H. Bunz, A. Kukliński (eds.) *Globalization Experiences and Prospects, Warsaw 2007*

Thesis one—the 21st century will be an age of global risk and universal uncertainty
Thesis two—We are witnessing the deep transformation of the global scene
Thesis three—In the beginning of the 21st century we face a very deep crisis of the global elite of power, money, science and culture
Thesis four—The experiences of the 21st century may reverse the omnipotent trend of globalization
Thesis five—The experiences of the 21st century poses a great challenge for the system of liberal democracy
Thesis six—The experiences of the 21st century may lead to the collapse of the system of global ecology
Thesis seven—The experiences of the 21st century may be seen as a challenge of Gordian Knots and a scene of Alexandrian Solutions related to those Knots

Naturally this list of theses may be formulated in different ways—following different cognitive and pragmatic assumptions.

This list is formulated in the climate of pluralistic anticipantions and value judgments prevailing the volume—"*Futurology—the challenges of the XXI century*".

III. The enigma of the XXI century as a source of dramatic challenges for the New Futurology[4]

The enigma of the XXI century is creating a set of challenges which may be outside the boundaries of our wisdom and imagination. We know that the prevision of the future is impossible but necessary. We know that we should master the art to expect the unexpected we know that, we are living in an age of unprecedented global risk and universal uncertainty. This knowledge however should be a source of our intellectual modesty, but not a source of surrender to the enigma of the XXI century. This enigma is creating an unprecedented historical demand to promote a New Futurology integrating our wisdom, imagination and moral courage to see the emerging blessings and disasters of the Future.

We hope that the volume "*Futurology the challenges of the XXI century*" is a very modest but somehow visible step leading in this direction.

Łańsk, 23 July 2008

[4] Compare R. Galar, Regions in one generation ahead perspective [in:] P. Jakubowska, A. Kukliński, P. Żuber (eds), *The Future of regions in the perspective of global change*, The Polish Ministry Of Regional Development, Warsaw 2008 (in print) REDEFO, Volume 3

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