

THE GENETIC PROGRAM: A TECHNOCRATIC HYPOTHESIS ON THE PARADIGM OF CIVILIZATION ¹

Tzvetan Semerdjiev

The Hypothesis

Billions of years before the new era, while the third planet in the Solar system covered in dense clouds was still in its sleep, in the dark depths of the endless ocean of organoids, the last module of the *Genetic Program* began. It was part of the perfect algorithm for evolution of life on Earth. Also, it was the beginning of the second of the three qualitative transitions unexplained by the human beings, which mark the separate parts of the Creation.

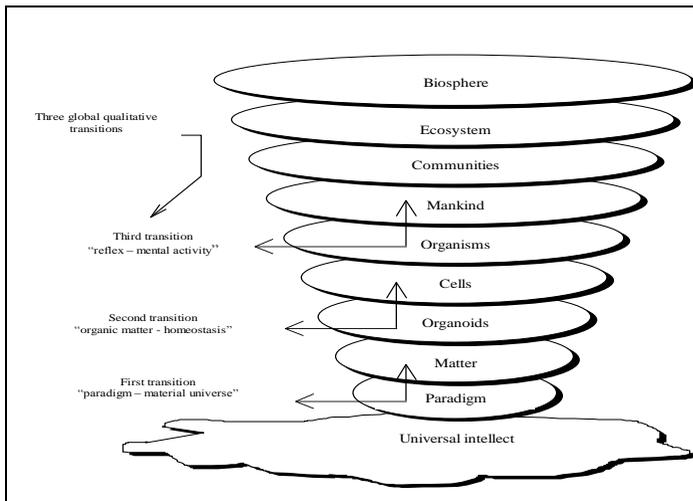


Figure 1: Stratified model of the evolutionary development

In the global evolution, these transitions are known as “paradigm - matter” (the idea of the universal intellect – “big bang” and inflating universe), “organic environment - cell” (cytoplasm – homeostatic system) and “reflexive behavior – mental activity” (first signal system – second signal system).

The three transitions are represented on figure 1. The latest studies show that their sequence in time and space is based on non-linearity, which reflects the giant evolution of the human knowledge about the surrounding reality.² Currently, for every one of these transitions there are new viewpoints. The last scientific hypothesis of the so-called “inflating” universe is transformed in “self-reproducing pulsing net” of “Big Bangs.”³ Viewed as a branching tree structure of growing and shrinking subspaces, the universe is thought to be stationary by the laws of physics and space, despite the “mutations” in its separate nodes. Our part of the universe expands with a rate defined by the Hubble constant, which is reliably measured. By the well-known laws of nature, the general properties and characteristics of the galaxies do not depend on the time of their creation and their evolution, because the branched net structure is stationary and very, very old. During the last 15 years, this allowed the cosmogony to change radically the views on the universe, the intellect and the man’s place among them.⁴

In the context of the old interpretations we could hardly stand up for the Darwinian theory. The theory of origin of species has lots of time-space omissions that started to be filled in only recently. The most fundamental among them is the lack of conceptual interpretations for the new discoveries on the role of the genes in the processes of inheritance. Ever since 1865, when it was created, Gregor Mendel’s theory is still not sufficiently compatible with the Darwinian theory.⁵ The gap was not filled in 1930, when Robert Fisher laid the foundation of the modern population genetics, nor was it filled in 1940,⁶ when Theodosius Dobzhansky, Julian Huxley and Ernst Mayr synthesized the so-called “neo-Darwinism.”⁷ Nothing could have stayed in its way, if it was a complete and structured scientific theory. Unfortunately, it was not. Science continues to discover the mechanisms of life, but provides no explanation on the self-reproduction of gene molecules.

Despite all this, the Darwinian theory is the only empiric paradigm that survived for more than 135 years and that provides a model we can use in practice for solving the hardest problem of modern science – “the way, the super-complex living nature exists and adapts.” If we arrange the events in the last 12 billion years since the Big Bang on a scale of one second for every 500 years, we shall get a general overview of the global evolutionary program in what we call “conditional year.” In that year, man appears on 31st of December at 22:30 h. Evolution on this scale is represented in table 1. Science has enough empiric material to form the hypothesis for a priori existence of primary structural/ functional information, i.e., a core of dynamic paradigmatic

model. The target of this model is to realize a global algorithm for assimilation of our part of time and space by creating an eternal incubator of intellect, which stores knowledge and thus decreases the entropy in the universe. Its mission is to realize the Genetic program.

The hypothesis is based on series of metaphysical analyses concerning the superior, beyond the human senses, only mentally sensible, beginnings of every living thing. It is built on a system (model) of interpreted primary concepts, based on an originating structure of assumptions (axioms). They are derived from the comprehension that the evolution of intelligence on our planet is a movement based on changes in molecular structures and a change over to new, higher levels of complexity and organization. During the human life, the information contained in the genetic structures is updated and developed on the base of the accumulated knowledge and culture. When the passing over of genetic information between the generations is in process, a biological adaptation and development of the human being takes place, thus realizing the global evolutionary program. The genetic program provides development of the human perceptions of beauty and perfection that evolve by psychological fusion and harmony between the person and the structure and organization of nature. The rate of changes in the surrounding environment has no effect on it. The effect is caused by the qualitative-quantitative transitions on structural level in the time-space continuum. The primary information structure (information nucleus) contains the knowledge of the ontological laws for the development of the human civilization and its link with the universal intellect.

At the end of the 20th century, the people working in the field of artificial intelligence reached three fundamental conclusions, summarizing all the achievements and extending the proposed model:

- The vanguard information technologies inevitably form a new class of intelligence that exists outside the human mind;
- Knowledge is the “eye of the mind” of artificial intellect. The computer processing of the natural human language gives sense to the ideas and conceptions as products of this intellect;
- The creation of effective technologies for automatic extraction and processing of knowledge determines the processes of formation of ontological concepts and models of the world’s structure and leads to changes in the way of thinking and the generally accepted points of view.

The above statements are considered to be fundamental axioms in the general theory of artificial intelligence, which is treated as empirical science and is being developed mainly on the base of experience. Knowledge in the classic intellect hierarchy or

computer intellect goes beyond the traditional biological or physical levels of itself (made of either biological neural nets or microelectronic schemes) and its symbolical realization – logic gates or program schemes. The modern technologies for knowledge processing only slightly touch on the mechanisms of the genetic program.

Table 1: Stages of the global change

STAGES OF THE GLOBAL CHANGE	RELATIVE BEGINNING
“Big Bang”, appearance of relict gravitons – about $12-18 \times 10^9$ years ago, Universe size – that of 10 cents coin, density of matter is more than 10^{94} g/cm^3 , temperature $T^0 = 10^{32} \text{ K}$, modern theories of gravity and relativity are inapplicable	01 January, 00 h. 00 m. 00 s, till 10^{-43} s
Establishing a symmetry between the matter and the antimatter	01 January, 00 h. 00 m. 00 s, till 10^{-35} s
Appearance of quarks and transition to thermal equilibrium	01 January, 00 h. 00 m. 00 s, till 10^{-8} s
Appearance of relict neutrino background radiation	01 January, 00 h. 00 m. 00 s, till 10^{-3} s
Appearance of the forces of nature and quarks – expansion to size 100 times bigger than that of the Solar System, density of matter is less than 10^{94} g/cm^3 , the temperature drops to values $100 \cdot 10^6$ times bigger than today’s temperature of the Sun	01 January, 00 h. 00 m. 01 s
Forming of protons and neutrons – expansion to size 1000 times bigger than that of the Solar System	01 January, 00 h. 00 m. 10 s
Forming of atomic nuclei of helium and deuterium – expansion to size 10^6 times bigger than that of the Solar System	01 January, 00 h. 01 m. 00 s
Formation of the initial chemical composition of the Universe – 70% Hydrogen and 30% Helium	01 January, 00 h. 01 m. 40 s
Formation of the beginning of the “Transparent Universe” – neutral gas clouds, permeated by the relict radiation, cooling and forming of clusters of today’s galaxies, expansion to 0.1 % of today’s size of the Universe, the temperature drops to 3000^0 K	01 January, 00 h. 10 m. 00 s
Formation of galaxies and first star clusters, expansion to 20% of today’s size of the Universe	10 January

Production of “heavy” chemical elements in the “nuclear reactors” of the stars – production of elements heavier than Helium, expansion to 50% of today’s size of the Universe	31 January
Formation of the Solar System about $5 \cdot 10^9$ years ago	09 September
Formation of the Earth – the temperature in the Universe drops to $2,7^0$ K, density of matter is about $3 \cdot 10^{-31}$ milligrams/ m^3 (observed), density of radiation is 10^9 photons per 1 nucleon, number of observed galaxies is 10^{11} , Distance to the farthest quasar is $12 \cdot 10^9$ light-years ⁸	14 September
Appearance of life on Earth	25 September
Appearance of bacteria and algae	09 October
Beginning of photosynthesis	12 November
Appearance of the first cells with nucleus	15 November
Saturation of Earth’s atmosphere with oxygen	01 December
Appearance of vertebrates	16 December
Plankton and trilobites	18 December
Fishes	19 December
Land plants	20 December
Insects and land animals	21 December
Amphibians and flying insects	22 December
Trees and reptiles	23 December
Dinosaurs	24 December
Mammals	26 December
Birds, flowers, extinction of dinosaurs	27 December
Primates	29 December
Humanoids	30 December
Appearance of the human being	31 December, 22 h. 30 min.

Obviously, without the common knowledge of the world as a whole, the reality, the reflection and the language, a real intellect cannot exist. The natural language is contained within it ontologically.⁹ However, the ontology is limited by the meta-

language, which is used to express the ideas of the universe and the existence. For this reason, the common theory of artificial intelligence is the human-made principal foundation (basic conceptual scheme) for the essence and the needed characteristics of the relations in the reality (physical or mental), i.e., for everything that exists or happens. This theory includes the semantics of the words and the ideas, along with the ontology of the natural language and the knowledge, i.e. the presumption about genetic (inheritable) passing over of extralinguistic information.

The hypothesis reflects some intuitive understandings of the essence and the role of the genetic program in the process of the human evolution and the realization of the transition to information society. The rapidly increasing new achievements in the field of artificial intelligence gradually accumulate a visionary potential to understand life, which brings us closer to the idea of the “genetically programmed” character of the evolution of the human civilization and the role of the universal intellect in it.

The Technology

It is known that one of the main factors influencing the development of mankind is the information passed over genetically to the individual in the form genetic code. It contains this part of the program that determines the future development of the individual – its inclinations, susceptibility to different illnesses and deformations, intellectual abilities, and talents. From what we know about the organization of the algorithm and its regularities, we can presume that the “brain-genetic code” feedback gives information on the current state of the realization of the global genetic program of mankind. The functions of adaptation, self-development and evolution take place in the process of passing over the genetic code.

Widely discussed in the mid-80s, this hypothesis requires some assumptions. Their validation has gone as far as the validation of the principles in the Darwinian theory. A general overview of the discoveries made in the last decade and an analysis of the tendencies in the technological progress of our civilization allows us to formulate some untraditional theses:

- The Universal intellect is exceptionally ancient and exists in dimensions of time and space still beyond human grasp or perception.
- The rise of mankind in our part of the universe (planet Earth) is just the first stage—the childhood—of the evolution of its mind. After the biological death, the universal intellect extracts and stores the immaterial essence of its “children,” giving them existence in forms and dimensions still unknown to us.
- The para-psychological abilities of certain people prove the means of communication with these forms and dimensions on the base of perceptions insufficiently advanced by the human beings at the present moment. Their

development directly depends on the prolongation of the human life, chances to learn, accumulation of experience, traditions and development of intuition and abstract thinking.

- The need to accumulate and store knowledge is set ontologically (genetically) in the human being. By accumulation of knowledge and development of technology, mankind expands the general extension of human life, which aids the development and use of the mental abilities of the individual. In the near future, with the discovery of cure for cancer and the development of technologies for creation of artificial organs and their implantation, it will be possible to double this extension. So, two or three academic degrees and qualifications in one human life will be a reality, which will bring new levels of experience, knowledge and tradition.
- If we consider that one human life is not sufficient to use the entire potential of the brain's neuron structure, the doubling of its extent will increase their usage abruptly. We can expect development of new perceptual abilities, popularization of para-psychological phenomena and widely spread contacts with presently unknown forms and dimensions of the universal intellect.
- The basic categories and concepts used to evaluate the results of the human evolution are contained in the philosophical theories of the modern humanists, a number of religions, the codes of different environmentalist movements, etc. The main way to measure the progress of the global genetic program is the current stage of the popular conceptions of beauty, perfection and harmony. Their evolution directly depends on the adaptation and self-learning of the individual in the process of the genetic program.
- The local exchange of information between the genetic program and the environment is accomplished in the human life in the form of primary signals, data (encoded signals) and knowledge. The stored knowledge accumulates into culture, which is the most impressive structure created by the genetic program. The enormous variety of cultures illustrates the existence of time-space and quantitative-qualitative differences in the stages of execution of the global genetic program of the civilization.
- Irregularity of civilization is determined by both different geographic conditions for development of human populations and eventual differences reflecting historical facts, events, and processes of evolution. Birth, rise, fall and extinction of various cultures, as well as the backwardness of others, determine the difference in the views for good and bad, beautiful and ugly, peace and aggression, charity and egoism, etc. The level of humanity of nations, advanced in the realization of their genetic programs, i.e., that have existed longer and have created their culture, largely exceeds that of relatively young nations with young

governments and insufficient traditions, experience and culture in the genetic fund.

These theses are a direct outcome of the rapid development of the information technologies and their applications, which strictly repeat the structure of the human being, created by the genetic program. The respiratory, cardiovascular, lymphatic, digestive, hormonal, and other systems provide for the mental and psychological activities of the human being, providing homeostatic behavior in the environment. Given the hierarchical classification of the needs, the present resources and the state of the environment, the human being realizes activities for satisfaction of these needs. They are on five levels – physiological (air, water, food, warmth), need for security (to be free of fear), need of love (positive human relations), self-respect (internal) and realization (external).

From another—information-technological—viewpoint, we can consider the human body to be a subsystem, providing the activity of the “central processing unit”—the brain. With its ontologically embedded instruction and command systems and the genetically emulated logic, the brain controls the body through the channels of the reflexive feedback link. For that purpose it uses the “interfaces” of the neural system and the “controllers” of various subsystems (organs). By going deeper into the mechanical structure of the human body, science touches on the mechanisms of the genetic program and its model for creating a biological carrier and incubator of intellect. Through the development of information technologies, creation of information and cyber spaces (as elements of the information society) and with the advances in the synthesis of artificial intelligence systems, the human civilization reproduces what it has learned about the genetic program and climbs the next step on the evolution ladder.

The human sensor subsystem (which at the present moment contains five senses – sight, hearing, smell, taste and touch) provides information input for the brain (main CPU). The human’s long-term (PROM and EPROM) and short-term (DRAM) memories are well known and studied. The biologic restrictions for data processing in the human brain are classified in three groups:

- Restrictions of the sensor subsystem, i.e. the abilities of the five senses;
- The capacity of the long-term memory (10^9 – 10^{13} bits), which in one human life (about 75 years) is formed using approximately 30 percent of the capabilities of the neuron structure of the human brain;¹⁰
- The storage time in the short-lasting memory is usually between 7 and 12 clusters (i.e. mental processes running in parallel) with the presumption for multitasking in timesharing mode.

Data streams coming through the human sensor system are processed (assimilated) in the “CPU” and stored in the corresponding “memories.” The “operating system” (the technology of processing) is thoroughly studied by the “knowledge engineering” specialists. Taking in mind the imperfection of this technology, mankind has always tried to create brain-enhancing instruments. The first of them is the speech that is ontologically embedded from the genetic program of the biological evolution of the human being. The creation of the others is a result of technological developments and accumulation of sufficient knowledge potential. Created as outside “peripheral” units and systems, they stimulate the communication capabilities and the intuitive creative way of thinking.

Today, 38 000 years after the first signs of human information activity (cave paintings), the society has evidence for the non-linear tendency in the technological development of civilization. It puts an emphasis on the information technologies and the instruments for aiding the extraction of and applying knowledge. The global tendencies for development of computer systems prove that the goal is to create effective amplifiers of the human mental activity. Modern computers can effectively accomplish almost every one of the human’s routine mental functions. They have unlimited amounts of long-term memory with smart information search (relational databases), parallel (multitasking) processing of unlimited number of tasks (gigabyte DRAM fields of operative memory), fast processing (high-performance processors with Teraflops processing speed), automatic multimedia analysis, fusing of information on expert level of knowledge and culture (virtual reality). And then, connected in the global information-transporting infrastructure for integration of the human mind (e-mail and Internet), they allow the artificial intelligence to permeate into the “thin structure” of the cognitive process and to move on the epistemological levels (meta-cognitivistics).

The tendency to enhance the human mental activity finds serious development in the process of improving the man-machine interface (the connection between the man and the computer) and the means of doing this are impressively well developed. The most popular ones are the multimedia products, Windows based software, Hypertext, electronic publications, etc. A “bang” of new scientific discoveries, allowing the creation of a new generation of information technologies, was registered recently. The most popular end products are the global mobile communication and global positioning systems (GSM and GPS), laptop PCs, compact discs, digital cameras, video-magnetic players, fiber-optic networks, satellite radio and television broadcasts, electronic money, automatic bank operations, express postal services, digital television, Internet, laser controlled weaponry and munitions, plane and tank controlling systems, etc.

The human locomotory system provides not only the mobility of the sensor system and the brain, but the means (manipulators) to manipulate the environment. Every separate individual has the triad “*sensor system – data processing – manipulators.*” The union of this triad in the form of global data processing nets (DBS, GSM, Internet, etc.) aims at the creation of a global cyberspace as a new dimension for the human civilization to live and develop in. For example, the annual budget of the US provides significant funds for uniting all schools, universities, libraries, hospitals, etc., in one national infrastructure. It is the information and cyber spaces where in the future mankind will contact and enter the dimensions of the universal intellect.

The computer science achievements and their applications prove that adaptation, self-development and advances in the field of information technologies are the means to make contact and reach harmony between the human brain and the structures of the universal intellect. This is the main goal of the execution of the Genetic Program.

The Processes

Today, two processes are commonly recognized as general social development tendencies – integration of the existing information systems in one global *System of systems* and mass transition of human mental functions to computer systems and robots.

Mankind’s difficulties and the need for many scientists to solve them are the main reason for evolving global processes of information integration. Only the “*shortening of distances*” on the base of development of information technologies will make it possible to solve the problems of the 21st century using the power of the integrated human minds. The general characteristic of these problems is the “*inconsistency of truths,*” which results in an increased complexity and dynamics of the global processes, which enter a totally new state of “*unorganized complexity.*”

The human mind in its biological form is still unable to reach such concepts as infinity, zero (nothing), chaos, etc. The development of the axiomatic approach and the achievements of the theoretic (abstract) mathematics demonstrate the existence of ontologically embedded abilities for intuitive (hidden, unconscious) way of thinking. Through them, the main mission of mankind is fulfilled and its result is the revealed truth. These processes set the tendency for accelerated “aging” of truths and formulation of even more complex concepts for the world.

The process of evolution of the human brain foreseen in the genetic program provides development of the “instruction systems” and the ontologically “emulated logic.” The improvement of the neural nets and uniting them in even more complex organizations in the process of inheritance makes it possible to acquire new levels of abstract thinking gradually. They bring mankind closer to the dimensions and models of the

universal intellect. The genetic program carries information for future special features of the evolving mankind. The reading of the genetic code made a new strategy possible. It provides maximal development and implementation of the talents of the individual, which leads to maximal realization in one human life. This task was made possible thanks to the powerful computer resources that enabled scientists to build all the genetic combinations and to create a unique model of the genetic structure of the human being. Momentous achievement in this field was the creation of high-performance super-computers in the USA.¹¹ This opened the genetic bible of mankind.

The satisfaction of mankind's power supply needs and the production of resources were the most important strategic problems of the 20th century.¹² Along with them, two new factors appeared. Information technologies and data processing enabled technology development to take the place of the power-resource evolution. It did so by innovating knowledge, development and installation of newer, more effective international mechanisms for sharing the world's resources and the GNP of the planet with one goal – providing sustainable development. One of the main models in this area was proposed at the World Conference on Sustainable Development, which took place in 1992 in Rio de Janeiro. It gave knowledge and technological development a higher priority over the power resources considering it the only possible way to avoid the total crisis of the human civilization.

The “developed” nations, which had the chance to have optimal geographic conditions and to be historically well situated (in terms of outbursts of violence, disasters, etc.), have plenty of cultural potential, created by the genetic program. The level of “development” may be characterized by the ratio “production/consumption” of energy and information.¹³ A quick overview of the information supply of any of the citizens of the technologically developed countries reveals that this ratio is in favor of information, while in the developing countries it is towards the energy.

The need for information is ontologically embedded in the human being. That is because the development of the human intellect will lead to contact with the Universal Intellect. Today, this contact is impossible, as it is impossible for the little child to understand the actions of its parents. And then, a premature contact will lead to psychological shock or even destruction of the human civilization. With the creation and development of the global information space this threat will slowly cease to exist, because the genetic link of the generations will make this place a natural environment for the new generations to live in. In it, they will form the abstract models and complex structures of the future, which will take them closer and closer to the truths about infinity, chaos and the Universal Intellect.

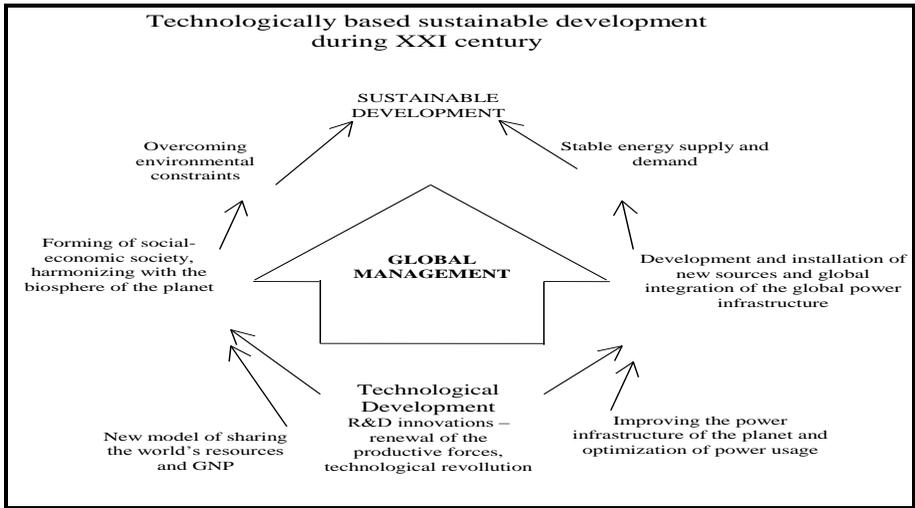


Figure 2: Technologically based sustainable development during XXI century

The man-made changes in the biosphere are significant and with lasting indirect strategic effects. They are showing up already, thus endangering mankind's survival. Also we should keep in mind that the current population growth is the highest in history and started to fall down only recently. The curve is in its declination point, because Earth's population will be doubled by 2025 (quadratic function). This would mean a total "eating," "drinking" and "burning" up of the planet's resources leading to its destruction. The analysis of global tendencies helps define the main elements of mankind's transition to sustainable development. They are varied and include:¹⁴

- Transition to sustainable demographic development on a global scale. Without this, talking about sustainability will make no sense;
- Transition to new technologies for satisfaction of the human needs, with essentially less interaction with the environment of every human being, and a given level of prosperity;
- Utilizing methods of economic development, providing transition in quality with less quantitative accumulations until poverty is overcome;
- Forming a society with less inequality than the one achieved till present, and making the global development possible. Due to the collective actions of the society, the social transitions will be accompanied by successes in overcoming corruption and illegal (criminal) activities;

- The institutions should develop a new, more effective way of dealing with conflicts, especially in the biosphere. The main problem is the balance between cooperation and competition on every level;
- Exploitation of the information essence of the ongoing changes. It consists of mastering new technologies for extraction, processing and use of knowledge and culture, necessary for dealing with ecological, demographic, social, economic, political and national security problems locally, nationally and globally. Only by high level of perception of reality by the society we can achieve the effect of sustainability;
- Ideological transition, based on “planetary consciousness,” solidarity and humanity should stand on the perception of interdependencies between everything and everyone on Earth. Long-term view for sustainability should be brought to every home, to every man. Today’s wide spread destructive utopia is the utilization of the “separatist” approach which opposes the private knowledge and view of life to the rest of the world;
- As a whole, the 21st century will be the time when the human race will make the transition to sustainable development without shocks and disasters. The leading researches of the future will be interdisciplinary oriented. Their work will be pointed towards the global vision of life, security, politics and all other questions related to the future of mankind.

The Paradigmatic insufficiency

The increasing interest in the influence of social factors in the global models is caused by the lack of resources. Today, only a few of us understand that the generation and distribution of the common wealth is still carried out by the same old paradigm, created about 200 years ago by Adam Smith and David Ricardo. The capital character of the management of the global financial-economic system and its development has remained the same to the present day, thus causing disproportion, already considered ineffective by mankind. Despite the obvious financial and economic benefits of the market model of social development and the demonstrated vast possibilities for change and social adaptation, it is still a source of two main problems: (a) gigantic consumption of natural resources and (b) increasing inequality in the distribution of wealth.

Some of the latest studies show that to raise one kilogram of grain one ton of drinking water is needed. However, the water shortage becomes one of the main threats for the world order and security in the 21st century. Food production increases linearly, while the population of the planet increases exponentially. Thus, the accumulating food insufficiency is in direct dependence on the technological backwardness of the

developing countries. According to recent publications,¹⁵ the inequality ratio for the planet exceeds 1:150. The rich part of mankind constitutes about 20 percent and produces 82,7 percent of the global GNP. The growth of this wealth is 2,7 times higher than that that in the developing countries. Today 1,3 billion people live with 30 dollars per month, while the “third world” loses about 500 billion dollars per year. The living standard ratio between “rich” and “poor” countries is 100 to 8 and continues to increase rapidly. The inequality intensifies the imbalance in the genetic program. Entire nations and colossal human abilities, gift and talent remain unused. Misery, poverty and intellectual backwardness is reality for great part of the human civilization. This means that today the human mind still has no model for social organization capable of providing future transition to a steady growth and contact with the Universal Intellect.

Today’s generations witnessed the end of a failed attempt for social engineering. For 75 years, mankind observed the steps of the so-called “real socialism” with hope or suspicion. Built over full nationalization of the means of production, it turned a small part of the community into real, but irresponsible owners of the means of production and the goods. In periods of poverty and restoration, the methods of “equal poverty,” “the economic of deficit,” “postponed consumption” and “total obedience of the personal interests to the public ones” have demonstrated two main defects: withdrawal of the individual from the means of production and opposing personal interests to the public ones. This led to decreasing labor productivity, worsening quality of the produced goods and services and, finally, to the economical crash of the system.¹⁶

Today, mankind is looking for solution to this problem in the boundaries of the evolutionary approach. By accumulating sufficient knowledge about the laws of social development and analyzing the lessons of the 20th century, the new generation will find a new model for effective exploitation of the world’s resources and produced goods. The genetically programmed mission of today’s generation is to pass over as much knowledge and culture as possible to its children and to give them a feel for adherence to the global genetic program which evolves beauty, harmony and completeness in this part of the universe.

One of the most important questions considered in many of today’s publications is the nonlinear exponential character of the social development. The end of the 20th century proved the tendency of increasing frequency of changes and their amplitude. These processes are known as “divergent” in the theory of automatic control. This regularity is an outcome of a specific realization of the genetic program. Mankind’s knowledge treasury is filled with discoveries and new results in various fields of science. Sudden flashes in the interdisciplinary space give birth to new discoveries and technologies every day and every hour. We are on the verge of a series of

discoveries that will change our visions of the world. Today we can expect new breakthroughs in microbiology, genetics and medicine, bio-technologies and nourishment, power supplies, microelectronics, optics and laser technologies, space technologies and quantum physics. Despite today's "explosion of knowledge," building tomorrow's social structures and the beginning of the sustainable development demand more knowledge and technologies. But the most important thing is absent. We witness absence of a common future paradigm, or the so-called paradigmatic insufficiency.

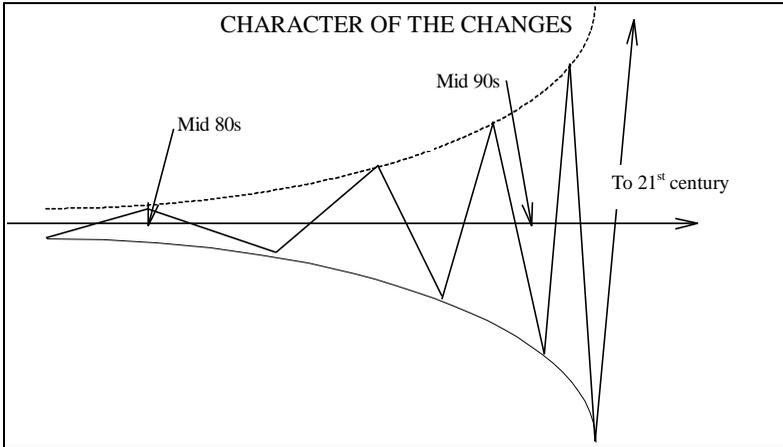


Figure 3: Character of the changes

The main problem is the lack of a common visionary link between the scientists, separated by the great number of explosively increasing schools, trends and directions. This paradigmatic problem leads to loss of the common (philosophical) vision of the on-going changes and appearance of a number of contradictory opinions for the world's future. The only thing that is sure is that the model of the emerging new world will be completely different from what we know, see or imagine. In this sense, the newly rising theses for "third technological revolution," "information society" and "third revolution in the military affairs" pose many new questions.

The Realization

It will be hard to understand the considered hypothesis unless we try to interpret it in the frame of a large historical window. By analyzing and classifying the stages of technological development of mankind, we can construct a common meta-model of the evolution of the mind, represented by the existing trends in art, dominant ways of thinking and the dominant forms of violence. In this way we can achieve a variant of the structural paradigm for the goal of the genetic program as movement of active and

reorganizing transcendentality. The inclusion of creative beginning (as dominant technologies), humanity (the preferred style of art), ways of thinking (the favorable mathematical models) and aggression (the governing forms and means of violence) in one common classification, allows us to value the synchronization and balance in the program, as autonomous goal-originating system. The relations between the development of mathematical models and theories, cultural accumulations and their generalizations in art, technological advances, forms of warfare and concepts for governing the society, presented in table 2, are unambiguous.¹⁷

It is obvious that the human dependence on the technologies could be both creative and destructive. The rapid technological development of an immature civilization could lead to its self-destruction. Through the direct link of the generations “parents–children–grandchildren–...” every society accumulates knowledge and humanitarian values and, as a result, the mind overcomes emotions and violence. This process is determined by the increasing culture of the human society. It is obvious that the direct forms of warfare are fading out and are replaced by new hidden forms. New non-lethal weapons or precisely guided munitions are used to avoid death among civilian population and collateral damage. This tendency dilutes the bounds of organized violence, decreases the effect of its execution and makes it acceptable according to the new levels of humanity of civilization. In the frame of the genetic program an evolutionary shift in the ratio humanity/violence is realized. New forms of warfare became actual and the most prominent of them is the information warfare. It transfers the violence from the physical reality into the noosphere. Forced by the rapid development of information technologies, information warfare became one of the most important threats to the security of every nation.

The Interpretation

In our life, filled with information technologies, the statement that we do not see anything is not valid. With the aid of the media we see everything, but the problem is that we are unable to interpret the reality. Everyone sees the things in his or her own unique point of view. It emerges on the base of experience, traditions and knowledge. It is formed by heritage, by the genetic program. Through the mechanisms of this program the knowledge is “learned” or “borrowed” from the surrounding life without making any effort. The most common point of view is the ontological comprehension of the world, of the way the world is organized and functions. It has global character and is a direct outcome of the accumulation of knowledge and culture, obtained in the different lifecycles of past generations.

The time and the age of the man are the factors, introducing relativity in the created models of the world. Youth optimism, middle age realism and elderly wisdom are the basic, most common factors, influencing the visions shared by every generation. The

shifting of the ratio between the “passed” and the “remaining” time of life of the individual significantly changes his or her strategic vision. The density of critical situations and threats in time is a factor that essentially “compresses” and “stretches” the points of view. Under these factors the genetic code of the individual is changed, which predetermines his and his descendants’ behavior, level of aggression, humanity, etc. The forming of new ethics and culture in the society provides its development and prosperity. However, they also have ideological and religious sense. Thus, the global point of view is formed in this context, but it also includes an inherited orientation.

The professional point of view greatly influences the global view of the world. Medicine, jurisprudence, ecology, military affairs and politics form differences in the ways of using the different viewpoints. These ways are orientation, addressing complex problems and strategic planning. Analogously, human behavior is influenced by the political, symbolic, cultural and structural viewpoints. The mutual usage of all viewpoints is the most powerful technology providing multifaceted view on the reality.

The transition of gifts, professional abilities, talent and susceptibility by the genetic program enables the transmission of knowledge and accumulation of cultural potential in the separate branches of the family trees. This is of great importance to the social development. By providing conditions for multilateral-consensus usage of viewpoints, these cultural potentials are the main reason for the prosperity of a number of relatively small countries like Switzerland, Norway, Netherlands, etc.

Permanent, long-term national level consensus on all critical problems of societal development is the main condition for sustainable development. And vice versa, the unused aggressiveness and violence potential of a number of young nations determines their susceptibility to abrupt changes, revolutions and enforced decisions. Consensual way of thinking is rare in such societies, because of the short history of the execution of their genetic programs and the lack of social wisdom.

The Crossroad

Our days are full of politics, ideologies, someone else’s ambitions and our own problems. The tensions in the media reach unprecedented peaks. The information garbage they feed us with is in monstrous quantities. Today 90 percent of what we read, see and hear is just senseless noise and needless junk.¹⁸ The prodigy of the media experts created seven types of senseless information to cover the absence of reasonable ideas and the fact that there is no common strategy for sustainable development.

Hypnotized by the magic of the failure of the “real” socialism and the destruction of the Soviet Union, we failed to notice how we entered a sophisticated unipolar world, created by the third technological revolution. Many new values, social and economic structures, political concepts, treaties, hopes and ideas inevitably form a new world order. Its increasing complexity and the rapid changes with chaotic dynamic put the human soul to a test. On the dusty ways of existence wander billions of souls trying, with their intellect and creativity, to find out the meaning of life.

Today, the world is in the translucent mist of the paradigmatic insufficiency. The pragmatic search for a universal Know How as a technology of survival foreruns the philosophic Know Why of the future world’s strategic models. Our days are filled with grotesque scenes of distorted reality. The world is on a crossroad. One of the ways leads to self-destruction from the inside and the other will turn the wheel of progress. There is enough pain, insults and hatred for the first road. If we take it, we shall drown in the chaos of indolence until egoism, violence and cruelty stop the sands of time. Then, as it has happened with many civilizations, a branch of the global genetic program will be cut off. Only the memory of our ancient culture will remain. For the second way we shall need sense and creativity. It is steep and walking on it will need lots of thankless work and colossal efforts of the human intellect. These efforts will give life to the future generations and will open the door to the future.

For the human nature, the first way is unacceptable. Only the second one is possible – the way of change that will revive our planet again. Centuries-old traditions and experience along with the modern knowledge accumulated in the genetic program of all nations will inevitably lead us into the information society of the 21st century. More than ever we must remember the answer to the questions asked by many generations – who are we, where are we, where are we going? The answers are in the genetic code of everyone of us. Our civilization survival instinct is there, too. The transition is hard, but possible. We should walk our part of the way with dignity, so that our children will not have to.

Table 2: Stages of the global development

STAGES OF THE GLOBAL DEVELOPMENT		
Stages	Period	Stages of development, art styles, ways of thinking, means of violence (armed combat), mathematical models.
I. Agrarian society, Pre-modernism, Religious-mystical mind		

First	From 6000 BC to the XIII century.	<p>Pre-scientific period</p> <p>(Aristotle-Euclidean linear models)</p> <p>(Direct strategic leadership concept)</p> <p>Cold weaponry, iron armor, chariots, battering ram, catapults, infantry, cavalry, triremes, messengers, stellar navigation.</p>
Second	From the XIV century to the middle of the XVIII century	<p>Reconnaissance and Reformation</p> <p>(Cartesian-Newtonian linear models)</p> <p>(Staff command and control concept)</p> <p>muskets and cannons, cavalry, sails, telescopes, compass, sextant and clock for navigation, signal towers for communication</p> <p>(Napoleon wars)</p>
II. Industrial society, Modernism, Dialectic-materialistic mind		
Third	From the middle of the XVIII century to the beginning of the XX century	<p>First technological (industrial) revolution</p> <p>First revolution in military affairs</p> <p>(Linear dynamic models)</p> <p>(Decentralized systems and operations concept)</p> <p>rifles and artillery, balloons, dirigible, ironclad, trains, automobiles, telegraph, telephone, wired communications</p> <p>(World War I)</p>
Fourth	From the beginning of the 20s to the 40s of the XX century	<p>(Linearized dynamic models)</p> <p>(“Blitzkrieg” concept)</p> <p>Automatic rifles, first generation chemical weapons, armored vehicle, propelled aviation, analogous radios (World War II)</p>
Fifth	From the beginning of the 50s to the end of the 70s of the XX century	<p>Second technological (postindustrial) revolution</p> <p>Second revolution in military affairs</p> <p>(Einstein model)</p> <p>(“Air-ground battle” concept)</p> <p>First (nuclear) and second (thermonuclear) generation nuclear weaponry, second generation chemical weapons, first generation biological weapons for mass destruction, AEGIS cruisers and</p>

		nuclear submarines, jet aviation, radar, radio navigation, TV, digital communications, first generation rockets, satellites and space craft. (Cold war, Vietnam and Afghanistan wars)
III. Information society, Postmodernism, Intuitive-heuristic		
Sixth	From the beginning of the 80s of the XX century to the end of the 20s of the XXI century.	<p style="text-align: center;">Third technological (information) revolution</p> <p style="text-align: center;">Third revolution in military affairs</p> <p style="text-align: center;">(Complex, nonlinear models with chaotic dynamics)</p> <p style="text-align: center;">(machine-oriented warfare, “Information warfare”, “Air-Space battle” concepts)</p> <p>Third generation nuclear (neutron) weaponry, genetic and biological weaponry, information weaponry, laser-optic beam weapons, kinetic energy beams, precisely guided weaponry, robotic combat platforms, unmanned aerial vehicles, second generation air-space military equipment, psychotronic weaponry, non-lethal weapons and systems for early warning, GPS, GSM, global command and control systems. (Persian gulf war, Kosovo conflict and a number of humanitarian operations of UN forces)</p>

Notes:

- ¹ The first version of this article was published in Bulgarian – Tzvetan Semerdjiev, “The Genetic Program – A technocratic Hypothesis,” *Information & Security* 1, 1 (Summer 1998): 26-45. Due to the considerable interested an updated English version is presented in the current issue of the journal.
- ² James E. Peebles, David N. Schramm, Edwin L. Turner, Richard G. Kron, “The Evolution of the Universe,” *Scientific American Presents* 271, 52 (1994), 53-57.
- ³ Andrei Linde, “The Self – Reproducing Inflationary Universe,” *Scientific American Presents* 9, 1 (Spring 1998), 102.
- ⁴ Linde, “The Self – Reproducing Inflationary Universe,” 104.
- ⁵ Daniel C. Dennett, *Darwin’s Dangerous Idea: Evolution and the Meanings of Life* (New York: Simon and Schuster, 1995), 20.
- ⁶ Richard Dawkins, *The Blind Watchmaker: Why the Evidence of Evolution Reveals a Universe Without Design* (New York: W. W. Norton, 1987), 114.
- ⁷ Dawkins, *The Blind Watchmaker*, 239.
- ⁸ One light-year = $9.4605 \cdot 10^{15}$ m.
- ⁹ Thomas R. Gruber, “A Translation Approach to Portable Ontologies,” *Knowledge Acquisition* 5, 2 (1993): 199-220.

- ¹⁰ C. Gunter, H. Kulka, J. Lompscher, H., K. Timpe, G. Vorweg, F. Klix, *Wörterbuch der Psychologie* (Leipzig: Veb Bibliographisches Institut, 1985), 349.
- ¹¹ High Performance Computing Modernization Program, <<http://www.hpcm.dren.net/>>, (20 December 1998).
- ¹² Chihiro Watanabe, *Sustainable Development By Substituting Technology For Energy And Environment Constraints: Japan's View*, Institute for New Technologies, Paper No. 20, (UNU/INTECH, October 1996).
- ¹³ Abe Singer and Scott Rotwell, *Information Warfare: An Old Operational Concept With New Implication*, INSS, Paper No.99 (Washington, D.C.: NDU Press, December 1996).
- ¹⁴ David Alberts and Tomas Czerwinski, *Complexity, Global Politics, and National Security* (Washington, D.C.: NDU Press, 1996); Thomas Czerwinski, *Coping With The Bounds: Speculations on Nonlinearity in Military Affairs* (Washington, D.C.: NDU Press, 1998).
- ¹⁵ Anthony Cordesman, "The Military in a New Era: Living With Complexity," in *The Global Century: Globalization and National Security*, volume I, ed. Richard Kugler and Ellen Frost (Washington, D.C.: NDU Press, 2001), 389-393.
- ¹⁶ Paul Kennedy, *The Rise and Fall of the Great Powers* (London: Fontana Press, 1989), 162-189.
- ¹⁷ David Alberts, *The Unintended Consequences of Information Age Technologies* (Washington D.C.: NDU Press, April 1996); David Alberts and Daniel Papp, *The Information Age: An Anthology on Its Impacts and Consequences* (Washington D.C.: NDU Press, June 1997); Doug Beason, *DoD Science And Technology: Strategy For The Post-Cold War Era* (Washington D.C.: NDU Press, February 1998).
- ¹⁸ Robert Lucky, "The Junk Plague!" *IEEE Spectrum* 34, 9 (September 1997), 25.

TZVETAN ATANASOV SEMERDJIEV received a D.Sc. degree from the Rakovsky War College, Sofia, Bulgaria, in 1986, and Ph.D. and M.Sc. degrees from the Zhukovsky Air Force Engineering Academy, Moscow, Russia, 1973. He is member of IEEE, ICIF, AFCEA and the International Academy for Information Processing and Technologies, Moscow, Russia. Prof. Semerdjiev is member of the Editorial Board of *Information & Security: An International Journal*. E-mail: signal@bas.bg.