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On the basis of the dialectical methodology, the philosophical foundations of technological singularity and trans-posthumanism (for the first time in world practice) are considered. The book provides examples of specific application areas of dialectical methodology viewed as a matrix for scientific research in the sphere of innovative technologies.Scientific edition. This book is intended for a wide audience.

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Содержание

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Preface

Two centuries ago, Friedrich Engels emphasized: dialectical materialism must change its form in the course of each new major discovery in natural science. It was evident for him, that scientific philosophy is not a dogma, but if it claims to be a worldview, it must develop and substantially enrich itself both in respect of its form and in content together and in parallel with the scientific progress in science. As the history of the development of the Soviet philosophical school showed, that this was not always the case.

In the former Soviet Union space, philosophy today is experiencing a serious crisis, primarily because of its ignoring of the new reality that has now been formed, which is briefly described by the term “informational society”. Concentrating on the historically established, traditional model of the world cognition – through the binary opposition “matter-consciousness” – still not enough attention is paid to “information” as the third element, forming scientific ideas about objective reality and very significant for a scientific worldview the construction.

Meanwhile, here are found such intensively developed ways of creating information technologies that require reflection, primarily at the worldview, philosophical level, in order to create an adequate methodological basis for scientific research in this area, to provide an adequate understanding of human practice and creativity. It is important for us to understand, comprehend, explore this new perspective from the standpoint of its informational phenomena and give informational concept on the background of the small number of works in this area, thereby partially compensating for the lack of knowledge and ideas that has arisen here, covering the absolute blank that is also called tabula rasa. It is exactly this way, that the research program by B.G. Shulitsky is being developed, moreover, very effectively.

It is important to mention, that the author, unlike other modern research groups and teams looking for new ways, means and methods of cognition through the exploitation of metaphysical ideas, correctly focuses on the need of comprehensive using of dialectical methodology as the leading epistemological line of conceptual development in the scientific search of the third millennium. The book attempts to apply the dialectical methodology in its generalized interpretation, with the involvement of its informational element, which greatly expands its capabilities, providing its effective application in a number of interdisciplinary areas. In particular, it concerns the integrated worldview of applied internetics, where it acquires a new appearance and new functions, further, exploratory research of information-stimulated processes in nanotechnology, as well as in other areas. The author raised a number of fundamental questions. The answers to them have beenyet received by neither science nor philosophy, but these questions are of undoubted interest for interdisciplinary complex analysis and synthesis.

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Doctor of Philosophy, Leading Researcher of the Institute of Philosophy of the National Academy of Sciences of Belarus
E. M. Soroko

Author preface's

…To look at the world in a new way, you need to change the interface and reboot the matrix of perception. The world will reboot…
From the movie "Matrix. Reboot"

Speaking about the practical activities of man, G. W. Hegel prophetically pointed out the special role of its material elements – ***the instruments of labour***. People "*seek to satisfy their interests, but because of this, something bigger is accomplished, something that is hidden in them, but that they were not conscious about and that was not part of their intentions…*". "*People work, set limited goals, achieve them, but at the same time something different is achieved than these goals people actually set…*". This is something that Hegel associates with the active nature of the Absolute Idea, which dwells beyond human passions, interests and goals, acts as if behind people's backs, but at the same time is hidden inside them, solving the infinite task associated with the function of its self-knowledge. It is here that the brilliant prophetic insight of Hegel can be found: "***The instruments of labour,***" as stated in "Logic," *stand above those final goals of man, the realization of which they serve…*".

At present we see practical confirmation of Hegel's brilliant insight. The analysis of the processes, phenomena and trends of the modern technocratic world shows that what is happening really contains elements that may be something different than the declared goals of people; these are elements that are above the interests and goals of people, as if staying behind their backs, concealed, but at the same time present in people's goals. In this regard, exploratory research is in the field of adequate understanding and awareness of the true role and real place of a person in the world, its objective evolutionary goals and tasks, as well as optimization of ways to achieve them, taking into account its personal interests, is of utter importance. This should be possible as part of a new general scientific global picture, the formation of which has long been in demand by the scientific and technological revolution of the last few centuries.

One of the options of search for a new general scientific picture of the world is a hypothetical picture of the world, which is based on certain axioms and hypotheses. The criterion of the appropriateness of this kind of conceptual constructions is the correspondence of the conceptual conclusions of this kind to the real processes of the surrounding world, as well as its heuristic and prognostic capabilities, in particular, in the field of searching for fundamentally new, innovative technologies to be practically implemented. This criterion allows the method of successive iterations, through a series of hypothetical worldviews, to reach, step by step, the real worldview.

This book suggests a constructive research program focused on the formation of one of such possible hypothetical pictures of the world and an assessment of its correspondence to the surrounding world. An axiomatic approach is used as the basic element, that is, an experimental matching of a key (code, cipher) to the structure of actual reality in the form of an initial set of basic axioms. This is a well-known principle of stepwise scientific knowledge of the new, consisting of six stages, six steps of scientific search: "axiom → hypothesis → concept → experiment → theory → practice". The indisputable and final criterion to verify the hypothetical conceptual constructions is the correspondence of the conceptual conclusions to the real processes of the surrounding world, as well as its heuristic and predictive capabilities that open the way to applied innovative technologies.

At ***the first stage***, a set of basic axioms is suggested, which has shown its practical effectiveness (efficiency) as a key, a code to the structure and global processes of actual reality. The starting point for the new general scientific worldview, or let us designate it as the "*energoinformational world view*", are two basic axioms:

– Dialectics is the universal inherent basic property of actual reality (*the axiom of the universality of dialectics*).

– Structurality is a universal inseparable basic property of actual reality (*an axiom of structurality*).

As a consequence, the basic mechanism for structuring actual reality in the process of its regular evolution should have a dialectical specificity. The concept of "*actual reality*" includes both objective and subjective reality.

The second stage of the worldview constructing is a hypothesis. In the conceptual framework the working hypothesis is suggested about the structure of actual reality, using the well-known method of scientific knowledge, namely, the method of "*associative analogy*". The structure of reality is associated with the internal hierarchical structure of modern mathematical theory. The main content of the hypothesis is that *the general internal structural organization of modern mathematical theory reflects the fundamental features of the structural organization of actual reality (the hypothesis of associative analogy)*.

To describe the model of the structure of reality within the framework of this hypothesis, auxiliary basic concepts (structural parts) of the substances "*information*" and "*energy*" are introduced. The substances "*information*" and "*energy*" are used as working concepts of the hypothesis to form a hypothetical worldview, as well as the project of research program. A certain period ago in natural science such concepts as "*subtle matter*", "*thermal matter*", "*phlogiston*", and "*entelecheia*" were used in the same way. Today it is believed that these concepts were legitimate and useful as a kind of anticipation of the field worldview, the formation of which marked the beginning of a new stage in the development of the natural sciences. In our case, the essential concepts of the substances "*information*" and "*energy*" are also auxiliary concepts for generating a hypothetical worldview and research program, therefore they do not require strict justification, they should be considered as one of the possible options for working concepts of the hypothesis project, and nothing more.

You can look at the other side. There are certain mosaic representations of the special sciences of the surrounding world that implicitly bear some information about its general structure. The task of the researcher can be defined as the search for a code to decrypt this information, and the search option can be an experimental matching of the code and check it for validity. One of the well-known axiomatic variants of such a code can be considered the binary concept "*material-ideal*" ("*matter-consciousness*"). Repeatedly, another axiomatic variant may be a binary concept "*energy-information*". As part of the energoinformational view of the world, it is suggested to build a system of interrelations of new concepts using selected axioms and hypotheses and on this basis to put a mosaic of separate fragments of knowledge, related to special sciences into a coherent hypothetical worldview. The conformity of the constructed hypothetical worldview with the real one is supposed to be tested based on feedback on the hypothetical construction characteristic, allowing it to serve as an effective matrix of scientific search for new phenomena, processes and new technologies in the field of special scientific disciplines.

Further, at ***the third stage***, using this axiomatic key and the hypothesis of associative analogy, a hypothetical picture of the surrounding world is constructed, that is, the concept of the "*energoinformational*" world. In the hypothetical energoinformational world view, aperson is the basic element of one in the variety of interconnected and interdependent structural levels in the multilevel hierarchical organization of the surrounding world. In such a scenario, a person cannot be a "crown of nature", a finite, terminated element in the hierarchical organization of the surrounding world. The main content of the evolutionary scenario is the process of infinite added complexity of the structural levels hierarchy, the process of self-organization of the new structural levels and forms of the surrounding world. A person is not able to stop the universal cosmological scenario of the world

evolution directed to the infinite added complexity of the structural levels hierarchy, self-organization of new forms, including rationalones, of the surrounding world.

Indeed, one of the universal principles (concepts) of the dialectical theory is the principle of development. According to the generally accepted definition, development is understood as "*an essential attribute of matter, an endless process of regular self-renewal, self-organization and generation of qualitatively new forms, including rational ones, of its being and movement.*" Taking into account the universality of the dialectic method of cognition and in the frameworks of the concept "development", it is obvious that organic life as a structural level of the surrounding world organization and *homo sapiens* as its highest form is one of the transitional forms of organization, suggesting the possibility of further generation of qualitatively new, more highly organized forms of matter, which are aimed at continuing the endless process of its regular self-renewal, self-organization, the process of qualitative, step by step, added complexity of the thinking matter structural forms "from simple – to complex", "from the particular – to the general".

As a result, anthropocentricity is another misconception of humanity, from it is useful to withdraw, because it inhibits the correct understanding of the evolutionary process and the real view of the surrounding world. As history has shown in the certain period, it was useful to abandon geocentrism in favor of heliocentricism, so now a similar situation is emerging for the opposition "anthropocentrism – cosmocentrism".

To assess the adequacy of the chosen conceptual approach, a selective comparative analysis of the processes of the hypothetical worldview and the real processes of the surrounding world was carried out. A preliminary analysis showed an unambiguous correlation of hypothetical and real processes of universal meaning.

In particular, in the hypothetical view of the world at the person's structural level, the fundamental basic trend is human production activity aimed at forming of the next structural level in an endless hierarchy of structural levels of the surrounding world organization, reflecting *the endless process of regular self-renewal, self-organization and generation of qualitatively new forms of its being and movement.*

Indeed, in the real worldview the main content, the "a golden thread" (according to K. Marx) of the historical process is human labor activity, development of the production base and production relations related to it (social formations). And the most noticeable tangible result of the entire historical process is the improvement of ***instruments of labour***, the evolution of ***instruments of labour*** from the stick in the hands of ape-man to robotic industries and cybernetic monsters, from the first calculating devices to supercomputers, artificial intelligence, mechanical intelligence and the world wide web, which is developing now completely independently and spontaneously, like a real living organism.

In the hypothetical worldview, the evolutionary process unfolds in accordance with the dialectical mechanism, in which the trend of evolution is oriented towards the formation of the next structural level and manifests itself through random mutations and natural selection. Natural selection is aimed at preserving mutations that contribute to the formation of the next, more highly organized structural level in the hierarchical organization of the surrounding world structural levels. Indeed, in the real worldview, the real content of the entire world geo-economics is endless mutations of the productive relations form, as well as those of the structural organization of society, followed by the approval of the most productive and technologically effective ones. Productive and technological efficiency is determined by the level of potential for the transformation and structuring of the world, in essence – by the level of ***technology development*** – the level of ***the instruments of labour***, both physical and intellectual.

The inherent and effective mechanism for securing the "correct" social mutations, leading to an increase in the production and technological efficiency of societies in the hypothetical worldview, is power intra- and intersocial conflicts. The indestructibility of power social conflicts

throughout all real centuries-old history of mankind clearly confirms their significant role in the mechanism of the surrounding world evolution. Industrialization, informatization, cybernetization, internetization, globalization, artificial intelligence, the forthcoming expected and frightening technological singularity, etc… – all of the abovementioned and actually occurring processes fit perfectly into the framework of the dialectical mechanism of the evolution of the *homo sapiens* structural level, are predictable, integral and inevitable elements in a hypothetical view of the world. There are reasons to argue about the correspondence between the suggested hypothetical picture of the world and the real one.

Accordingly, further, ***at the fourth stage***, based on a hypothetical view of the world, a working research program is formed; the directions of priority research in the special sciences are defined in terms of searching for specifically prognosticated new phenomena, processes and practical innovative technologies. As a result, the content of the fourth, experimental stage is the organization and carrying out of specific applied works in the field of special sciences in the areas of priority research, following from the general scientific hypothetical worldview. The results obtained in the field of special sciences in the form of fundamentally new phenomena, processes and innovative technologies will be indisputable evidence confirming the performance of the original axiomatic in the hypothetical view of the world, and at the same time serve as the definite criterion of the correspondence of the selected code to the real structure of the surrounding world.

The ideological aspect of the suggested concept is of particular interest. Ideological views are a fragment of the general scientific view of the world; they are more subject to variability than the general scientific worldview on the knowledge of the special sciences. The worldview, in contrast to the general scientific concept of the world, is, as a rule, general knowledge of the world in conjunction with the system of value system, with a certain subjective assessment of the concrete events and phenomena.

In the energoinformational concept, the three basic components of the suggested ideological representations about the role and place of a person in the surrounding world are three scientific disciplines – *dialectical philosophy, psychoanalysis and cybernetics*. These are the three components of the code, the three components of the key to explanation of the mechanism of human evolution, which successfully approached the solution of the puzzle about the role and place of *homo sapiens* in the structure of actual reality in the framework of the new world view. Using three initial components, one can show the universal dialectical mechanism of evolution of the of *homo sapiens* structural level, similar to the mechanism of evolution of other structurallevels of actual reality in accordance with the principle of self-similarity of mechanisms of evolution at all levels of the surrounding world organization.

It should be noted that at present, there are many special scientific theories and disciplines worthy of respect and attention, however, the three mentioned above can be considered as one of the possible variants of experimental matching of the code for deciphering the laws of evolutionary processes at the human structural level, nothing more. *Psychoanalysis* gives the key to explanation of the energy mechanism functioning at the person's structural level in terms of the first law of dialectics (internal contradiction as the psychoenergetic source of human functioning), and *cybernetics* allows explaining the trend, the direction of person's the structural level evolution in terms of the second law of dialectics (forming of the negation). The second law of dialectics predicts the possibility of the appearance of a new structural level of actual reality in the near future, following the level of *homo sapiens*, that is, the level of dynamic models of the *New type* (new generation of information technology (*IT)* systems).

At the same time, the process of changes, as evidenced by the third law of dialectics, will have a spasmodic, explosive, singular character with serious, perhaps even catastrophic consequences for human ideological concepts. The dialectic mechanism for the evolution of the *homo sapiens* structural level suggested within the framework of the energoinformational concept has all the

reasons to become the basis for the development of new sociocultural theories that can adapt the human psyche to future world view cataclysms. In particular, to become a philosophical base for a number of new rapidly developing theories, such as theories of future technological singularity, trans- posthumanism and, the *IT* industry in general.

Consequently, the energoinformational concept suggested a constructive approach to building a general scientific picture of the world, using a hypothetical view of the world as a basis, grounded on axioms, hypotheses and constructive basic working concepts – the *information and energy substances*. Stated, and it is necessary to emphasize once again, as one of the possible options for auxiliary model constructs, nothing more.

Further, it is supposed to assess the adequacy of the hypothetical worldview based on the specific results of scientific research in the framework of the work program of experimental research aimed at finding specifically prognosticated new phenomena, processes and innovative technologies in the field of special sciences. And here there is required an activeinvolvement of professionals from different areas of scientific knowledge. Philosophy now looks like an outside contemplator, a "Cinderella" at the celebration of life, and it should become an effective matrix of scientific research, including that in the field of natural sciences and the rapidly developing *IT* industry. And this requires the unification of different, sometimes contradictory, conceptual approaches in an attempt to build an adequate general scientific worldview.

The exponential acceleration of the historical process leads to the fact that philosophical thought does not have time to comprehend the newly opening horizons of historical events, leads to the anachronism of philosophical thinking. The existing variety of theories of the world historical process (religious, secular, formational, civilizational, etc.) turns out to be helpless and childishly naive in understanding of the real processes of the surrounding world, for example, phenomena of artificial "intelligence" in the near future or the upcoming technological singularity.

A radical restructuring of ideological concepts and, in particular, the abandoning of the anthropological thesis is required. As the criterion of truth there should be recognized the real, observed in practice, processes and phenomena of the surrounding world, and not speculative piles of abstract philosophical thought, peculiar to the well-known concepts of the historical process. An unbiased and correct attitude, including that to the "carbonarist" approaches, is a necessary and indispensable condition of the effective search for a solution to interdisciplinary ideological problems.

Introduction

The end of the second and the beginning of the third millennium is distinguished very significantly against the background of human history with the rapid development of science and technology. Human capabilities in the field of knowledge and transformation of the world unusually increased. Even greater speed of science and technology evolution is expected in the third millennium. In this aspect, the role of the worldviews of researchers and the general scientific view of the world as the guiding matrix of scientific research increases many times over.

The objective basis for the interaction of the general scientific picture of the world and special scientific knowledge is their common object of study – the external world. The general scientific view of the world summarizes and systematizes knowledge about the world received from other sciences, while it itself rises to a higher level and gives the ideological generalization of the results and general methods of further research, which, in turn, allows the special sciences, on condition of new empirical data accumulation, to use this general scientific level of knowledge as a matrix for scientific research in the process of restructuring its own logical foundations during its intensive development. This ensures the emergence of new fundamental theories, in connection with which natural science enters the next phase of its historical movement.

But at the same time, factual material also appears for generalization within the framework of the general scientific picture of the world. It summarizes the achievements of science of a higher development level, clarifies the previous methodological principles and, in an updated form, brings them back to the natural sciences. Along with the heuristic role of the general scientific picture of the world in relation to the processes of formation of new theoretical ideas and hypotheses (as a matrix of scientific research), another important methodological function should be mentioned, namely, the ideological one – as a matrix for building a coherent system, uniting the fragmented mosaic knowledge and forming a value system orientation of the researcher. According to academician A.D. Aleksandrov, "… the statement about the uselessness of dialectics, philosophy, etc., is nothing more than the self-satisfied lack of culture, shown by the undeveloped"hard worker"shows, who boasts of the fact that all these theories are not needed." Outstanding researchers Louis de Broglie, M. Planck, A. Einstein, I. Pavlov, the founder of cybernetics N. Wiener and many others adhered to a similar point of view. Philosophical principles have great methodological significance and provide an opportunity to intensively develop the special sciences.

At the beginning of the third millennium, it became possible to correct the general scientific picture of the world based on information obtained in the field of special sciences. This process is a multi-stage one; it includes a number of well-known stages of scientific knowledge of the new content, including hypothetical views of the world. The constructive elements of the hypothetical *energoinformational* view of the world suggested in the book are the concepts of "*energy*" and "*information*", and the *dialectical methodology* has been adopted as the main method of analysis. Only from the standpoint of dialectics can one understand the complex, full of contradictions, path of the objective truth formation, connection of the elements of absolute and relative, stable and changeable at each stage of the science development, transitions from one form of generalization to another, deeper forms of cognition of the surrounding world. Chapter *I* considered the general provisions of the dialectical methodology. The suggested hypothetical view of the world allows the separate areas of scientific knowledge to be integrated into a single system, adequately explaining the actual vital processes of the surrounding world in their integrity, dynamism and inseparable interconnection, as well as heuristically prognosticate the evolutionary processes development. Chapter *II* considers the possible structure of the surrounding world in the framework of the energy-information concept of the world from the standpoint of universal cosmocentrism.

The universal concept of the dialectic theory is the principle of development. According to the generally accepted definition, development refers to "*the endless process of regular self-renewal, self-organization of matter and the generation of qualitatively new, including the rational forms of its being and movement*". It is appropriate to raise the question: if development is an endless process of generating qualitatively new forms, then can be organic life and homo sapiens, as its highest form, the final, finite stage of the evolution of being in itsrational forms of being, as well as the movement of matter? Or is it still transitional, suggesting the possibility of the further generation of *qualitatively new, more highly organized rational forms of matter, continuing the endless regular process of its self-renewal and selforganization*? The answer to this question, perhaps, will determine the development of philosophical thought of the third millennium and will lead to the division of thinkers into two camps – anthropocentrists and cosmocentrists.

The analysis of scientific information of the beginning of the third millennium is evidence in favor of the cosmocentric approach and makes possible to reveal the undeniable signs of continuing the process of *qualitatively added complexity of the thinking matter organization forms, and its endless regular self-renewal*. The conceptual and informational basis for this is new scientific disciplines born in the 20th century. First of all, *cybernetics*, which showed the unity of control and communication in the animal and the machine. As a consequence, the fundamental possibilities of inorganic devices self-organization can be the considered, which effectively reproduce rational anti-entropic productive activity of man in the course of transforming and structuring the surrounding world.

Another scientific discipline is *psychoanalysis*, which discovered the energetic sources of human mental activity. "*If it were not for Freud,* – said N. Wiener, the founder of cybernetics, – *there would be no cybernetics*". The very fact of the existence of dialectic patterns of human functioning, the *dialectic of homo sapiens*, follows naturally from the universality of the dialectical method of cognition and the inseparable interconnection between the surrounding world and man as an element of one of the related and interdependent structural levels in its hierarchical organization. Chapter *III* is devoted to the analysis of the dialectic patterns of human functioning and the principle of universal cosmocentrism arising from them.

As it was already mentioned, the correspondence betweenthe constructed hypothetical worldview and the real one should be tested based on feedback concerning its ability to serve as a scientific search matrix for special scientific disciplines in terms of searching for the fundamentally new phenomena, processes and practical technologies. Chapter *IV* considers examples of the constructive use of a hypothetical energoinformational worldview as a matrix for scientific search.

First, in the applied aspect, the energoinformational worldview requested as the ideological basis of the AppliedInternetics, which is the new direction of science that studies the properties, patterns and ways of using the global Internet in various spheres of human activity. At a certain stage in the network information formations development, it is completely unexpected for *homo sapiens* (but predictably and regularly in a dialectical evolutionary scenario) a spontaneous jump-like transformation of *IT* systems into a fundamentally new quality may occur. The prospects are fantastic, but from the point of view of the energoinformational picture of the world, they are inevitable in the scenario of the dialectical evolution of the surrounding world. How to carry out (and whether it is necessary to carry out?) practical counteraction to the development of such a scenario?

Another significant applied moment is the fact that within the framework of the new view of the world there is a categorical apparatus for analyzing fundamentally new formations of actual reality that can change our daily life in the near future, that is, informational-productive"smart dust" Internet complexes (*smart-dust* formations). Prototypes of the latter are already being produced by research laboratories. Essentially, we have to deal with mobile local Internet complexes "scattered" in a certain space, unregistered by organs of human senses, but capable of intelligent dynamic interaction with the environment (including human one), and in the future, aimed at targeted transformation of this

environment. How to classify such objects of the *IT*-industry in the context of traditional orthodox ideological views?

In chapter *V*, the fundamentally new innovative technology of information-controlled self-assembly of nanostructured materials is seen on the horizon. It can be designated as one of the priority areas of applied research in the framework of a new picture of the world. The technology of information-driven processes assumes the ability to control the processes of self-assembly and self-organization of physicochemical systems using super-weak energy (informational) signals and is characterized by the transfer of information between objects, leading to the excitation and development of energy interchange processes that alter the state of objects in accordance with the specified initial requirements. One of the key aspects here is the ability of physicochemical systems to perceive external information with a recorded change in the physicochemical properties (the so-called "*informational behavior*" systems). Research work in this direction will open the way to fundamentally new innovative technologies, primarily in the field of opto-, nano- and microelectronics, nanostructures replication, recording, storing and reading of the information, and will also be indisputable evidence of the hypothetical worldview the correspondence to the real structure of the surrounding world.

Further, the energoinformational view of the world can become a philosophical basis for new, rapidly developing theories, such as trans-, post-humanism and the theory of technological singularity. Transhumanism (from lat. trans – across, through, and homo – a human) is an international movement that supports the use of science and technology to improve the mental and physical capabilities of a person in order to increase the efficiency of human existence. The question is to what extent the ideas of transhumanism are grounded? Then followsposthumanism – a rational worldview based on the idea that human evolution is not complete and can be radically continued in the future. Supporters of posthumanism believe that if the mind (posthuman) is created, which is fundamentally different from the human, then the future fate of society and civilization cannot be predicted. In this aspect, the energoinformational picture of the world is the only one that currently exists, in which, using scientifically based methods of dialectical methodology, it is possible to predict the further fate of civilization and man, to give logically intelligible correct answers to fundamental questions.

Technological singularity in futurology is a hypothetical explosion-like increase in the speed of scientific and technological progress, presumably following the creation of artificial intelligence, self-replicating automated devices and human integration with *IT* systems. According to the forecasts of the well-known futurologist R. Kurzweil, the technological singularity may occur already around 2045. One of the fundamental open questions about singularity is whether it will come, when it comes, how fast the technological changes will occur and what awaits us beyond the stage of singularity? Adequate answers to these questions are currently missing.

The energoinformational concept of a worldview allows the theory of singularity and R. Kurzweil's forecasts to be entered into the scientific view of the world, after withdrawing them from the field of futurology, which creates the basis for a scientifically well-grounded search for answers to the questions posed using dialectical methodology. The paradoxical forecast in the frameworks of the energoinformational concept is that the singularity may actually be more radical than in the view of R. Kurzweil and will not be limited to the improvement of human capabilities (dynamic models of the *Old* type). We can talk about the formation of a new structural level of actual reality – the level of dynamic models of the *New* type. A concrete step in this direction is the emergence and going beyond the human control of an intellectual monster – the global "web" of the network information space – the Internet. Following the creation of artificial intelligence and its symbiosis with the network web, a person will lose the ability to understand and control the processes occurring in it. From the point of view of dialectics, the inevitable leap of IT systems into a fundamentally new quality, which is not amenable to perception at the structural level of *homo sapiens*, can occur unexpectedly. Dialectic analysis of the processes in progress warns that beyond the horizon of the

singularity we expect a new world – a world of dynamic models of a New type. The prospects are fantastic, but from the of the dialectical methodology point of view they are inevitable.

Chapter 1 Basic Axiomatics

1.1 Dialectics as a methodology of science

Dialectics (Greek dialegomai – talking, reasoning) – the science of the most general laws of the nature, society and thinking development. A long history preceded the scientific understanding of dialectics, and the very concept of dialectics arose in the course of processing and overcoming the original meaning of the term. Even in ancient philosophy was put strong emphasis on the variability of everything that exists, it understood reality as a process, shed light on the role that the transition of any kind of each characteristic to the opposite plays in this process (Heraclitus, partly Miletian materialists, Pythagoreans). Then the term "dialectic" has not yet been applied to such studies. Originally, this term (*dialektike techne – "the art of dialectics"*) denotes the ability to argue through questions and answers or the art of the concept classification. Aristotle considers Zeno of Elea as the inventor of the dialectic, who analyzed the contradictions that arise when trying to think about the concepts of motion and set. Aristotle himself distinguishes "dialectic" from "analytics" as the science of probable opinions from the science of proving.

Plato, following the Eleatics (the Eleatic School) defines true being as identical and unchanging, nevertheless in the dialogues "Sophist" and "Parmenides" he substantiates the dialectical conclusions that the higher categories of the things existent can only be thought of in such a way that each of them is, and at the same time is not, is equal to itself and is not equal, is identical with itself and passes into its "other". Therefore, being encompasses contradictions: it is one and plural, eternal and transient, unchanging and changeable, resting and moving. Contradiction is a prerequisite for encouraging the soul to think. This art is, according to Plato, the art of dialectics.

The most important stage in the development of dialectics was German classical idealism, which, unlike metaphysical materialism, considered reality not only as an object of knowledge, but also as an object of activity. Leibniz was the first to make a breach in metaphysics with his doctrine of monads self-development and the contradictory unity of the principles of knowledge and Kant, who indicated the importance of opposite forces in the physical and cosmogonic processes, introduced (for the first time after Descartes) the idea of development into the knowledge of nature. In the theory of knowledge, Kant develops dialectical ideas in the study of "antinomies". However, the dialectic of reason, according to Kant, is an illusion, and it is eliminated as soon as thought returns to its limits, reduced only to the knowledge of phenomena. Later in the theory of knowledge, Fichte developed an "antithetic" method of deriving categories, containing important dialectical ideas. Following Kant, Schelling develops a dialectical understanding of the laws of nature.

The apex in the development of dialectics was Hegel's dialectic. Hegel "*for the first time presented the whole natural, spiritual and historical world as a process, that is, in uninterrupted movement, change, transformation and development, and made an attempt to uncover the inner connection of this movement and development*". It was Hegel who first "discovered", as Marx wrote, and described the inner essence of dialectics – *the dialectical method of studying nature, society and cognition*. In contrast to abstract definitions of intellect, the dialectical method, according to Hegel, is such a transition of one definition into another, in which it is found that these definitions are one-sided and limited, that is, contain a denial of themselves. Therefore, the dialectical method is, according to Hegel, "*the soul of all the thought scientific unfolding," it isexactly it, which brings the necessary internal connection to the content of science, and its insuperable strength lies in the internally contradictoryprogressive movement and development*". The discovery of the dialectical method constituted a whole epoch in philosophical thinking. In the first issue of the journal "Dialectics" are the following words of the founders of the journal (G. Bashlyar, P. Bernays, F.

Gonset): "*The idea of dialectics turns out to be the core one for modern scientific thought. However, it goes beyond this thinking to become a central element of the philosophy that embraces the diversity of knowledge*" (Dialectica 1947).

At present, the understanding of the term "dialectics" is multidimensional. The use of the dialectical method in specific aspects of research has generated many variants of derived concrete dialectical theories, such as dialectical materialism, dialectic existentialism, dialectical structuralism, dialectical negativism, etc. And it is completely incorrect to use the term "dialectics" to denote these theories as then materialistic, existential, structural, negative, etc. dialectics. The dialectical theories that followed the Hegelian philosophical system, including dialectical materialism, did not introduce anything fundamentally new to the dialectical methodology; therefore, Hegel's philosophical system is of undoubted interest as the primary point of genesis for the dialectical method and the example of its use in the study of nature, society and cognition.

Thus, first of all, the term "*dialectics*"means the *philosophical method of researching nature, society and cognition*. Only from the standpoint of dialectics one can understand the way of the objective truth formation, complex, full of contradictions, the connection of the elements of absolute and relative, stable and changeable at each stage of the science development, transitions from one form of generalization to another, deeper forms of the surrounding world cognition.

1.2 General guidelines for dialectical method

The reality, according to Hegel's dialectic, does not stand still, but changes, develops. Everything that was valid, reasonable, necessary some time ago, is denied in the course of the next time period, loses its right to exist. The place of dying reality is occupied by a new one, more viable. Hence the conclusion: "*everything that is real in the field of human history becomes unreasonable over time, and everything that is rational in human heads has reason to become real, no matter how it contradicts existing apparent reality*" (30-XXI, 275).

Hegel's dialectic, as Engels notes, finally refuted all sorts of ideas about the final significance of the results of human thinking and action. In other words, the process of cognition can never be completed, since the object of knowledge, namely, the nature and society, is in constant change and development. "For dialectic philosophy," writes F. Engels, "there is nothing entirely and permanently established, unconditional, sacred. On everything and in everything it sees the signs of an inevitable fall, and nothing can stand it except for the continuous process of emergence and destruction, the infinite ascent from the lower to the higher. It itself is only a simple reflection of this process in the human brain…" (30-XXI, 276). "*We should never forget that* ***all the knowledge we have acquired is pro re nata limited and are determined by the circumstances in which we acquired them****… What is stated as necessary is formed by the pure coincidences, and what is considered a coincidence is in fact a form, beyond which necessity is hidden*" (30-XXI, 302). These are revolutionary conclusions implied by very spirit of Hegel's dialectic.

1.3 Universality of the dialectical method of knowledge

The universality of the dialectic theory of development has recently caused great debates, and in the course of criticism of the recent past, dialectics in all its variants is often rejected as "the ideological support of totalitarianism". They avoid dialectic, guided by very superficial considerations: the collapse of the social system, which, as it seemed, was constructed on the foundations of materialistic dialectics; failure to build a system of categories of dialectics suitable for any material; unpromising controversy about the relationship between formal-logical and dialectical contradictions; scandalous condemnation from the standpoint of dialectical materialism of the most outstanding achievements of modern scientific knowledge (31, 33).

K. Popper, for example, believes that "Hegel and his school put forward a theory that exaggerates the significance of dialectics and is threateningly deceptive" (5, 127). One can hardly take seriously the criticism of dialectics by K. Popper, because it is aimed at the most primitive ideas about dialectics that have taken place in Russian philosophy and are associated with an understanding of the contradictions in formal logic and dialectics. A number of researchers (for example, V. Sadovsky, V. Smirnov, and others) do not accept dialectics because "dialectics in Hegelian (and, therefore, in Marxist) understanding forms the basis of the ideology of both fascist and Soviet totalitarianism" (5, 139). This is similar to the absurd rejection, for example, of the theory of

atomic physics only because it is the basis of destructive nuclear weapons.

It must be admitted that the baselines of the "professional dialecticians" themselves in Soviet philosophy also contributed to the rejection of dialectics. Unfortunately, serious and honest supporters of the dialectics tradition, who sought to rely on the experience of the history of philosophy, primarily on the German classics, failed to adequately modernize the dialectic and demonstrate its constructive potential for the philosophical and scientific thought of our time (5, 152). However, this does not diminish the significance of dialectics as a phenomenon of philosophical culture. According to B. S. Bibler, – *dialectics is "the most characteristic offspring of philosophical logic – especially that of the modern age*" (5, 171). *"It is wrong to disregard the dialectical tradition in philosophy* — said B.S. Shvyrev, – *it is necessary to clearly identify its real semantic content, which has not lost its constructive significance in our days*" (5, 158). At present, in modern Western philosophy, there is a new interest in dialectics, and "well-known experts in symbolic logic are discussing the possibility of creating systems of dialectical logic" (5, 118). A number of research schools are solving the problem not only of rehabilitation, but also of the further development and improvement of the theory of dialectics (39, 130).

Despite numerous and fruitless discussions, the dialectics in rather vigorous and quite correct way, without references to Kant, Hegel or Marx, is mastered by modern natural scientists. Whatever branch of knowledge we take, dialectic situations are found everywhere, more precisely, movements towards dialectics, that is, towards acquiring a holistic vision of the object of knowledge. First of all, this refers to the branches of modern scientific knowledge, where contradictions in the dialectical sense are presented in the most obvious way: a view in the biological theory of evolution, exploited by the methodologists of science in the branch of special scientific knowledge; set, topos in mathematics; phoneme in linguistics; socio-economic formation in historical knowledge, etc. (32, 50). It is exactly the dialectical contrariety to create the implications, which allow things to enter the historical process. All the sciences, that are on the evolutionary path, finally come to the conclusion on the necessity of the dialectically contrary characteristics of the evolving object (31, 32). According to the Nobel laureate I. Prigogine, the time of the science of Galileo, Newton, Kant is over, and the time of the science of Hegel, Darwin and, especially, Marx begins (31, 45).

Thus, it can be stated the following: dialectics, dialectical logic is one of the most significant achievements of philosophy for all the time of its existence, is "***the central element of philosophy***".

The attention of philosophy to dialectics as a universal logic of thinking is especially evident in periods when philosophical reflection on thinking reaches an extremely developed form: it was so in antiquity, in the era of German classics, in Marxism. During these periods, among all the forms and methods of human attitude to being, thinking that was considered to be the most important, and dialectical logic is today the most profound system of thinking (39, 77). The idea of dialectics is the core of modern scientific thinking.

At the beginning of the third millennium, ideas, forming the viewpoint, undergo a profound transformation of their foundations. It is connected with the consequences of the scientific and technological revolution, with the informational "explosion", with the rapid development of the *IT* industry and the technology of artificial intelligence (mechanical intelligence), as well as the imminent and frightening technological singularity. Our crisis time is one of those periods when the ideological rethinking of the evolutionary paradigm is required, which is possible only with the involvement of the deepest system of human thinking today – the dialectical method of scientific knowledge.

1.4 Axiom of the dialectic universality

Based on all mentioned above in the previous sections, it can be claimed that *dialectics is a universalinherent characteristic of actual reality*. Accordingly, the basic evolutionary mechanism for structuring the surrounding world must have a dialectical character. Indeed, the roots of dialectics are in objective reality, in the surrounding real world *("dialectics is an objective situation, an objective rhythm of a thing"*). Let's recall Hegel: "*All the things in existence hide within themselves a dialectic process that turns out to be a truly all-pervading method of substance. Everything lives dialectically… The dialectic process determines the fate of all reality*" (21, 119).

Further, the dialectic is peculiar to not only objective, but also subjective reality. Thinking in its form is subjective, however, dialectic patterns are also characteristic of thinking. This is because logical forms of thinking (philosophical categories) are nothing more than appropriately rethought and transformed objective relations of things. Philosophical categories, by definition, are the essence of the expression and reflection of the laws of the objective surrounding world; these are definitions of the "*objective world*" expressing "*essential in things*". In their interrelation, philosophical categories form a system of objectively reproducing the *interdependence of things, nature, and "the universal ways of the relation of man to the world".* The forms of interrelation of thoughts in thinking are correct only if they are an adequate reflection of objectively existing forms of interconnection between objects, phenomena, reflected in these thoughts (3).

Thus, all the above mentioned gives us reason to suggest the following as the first basic axiom of a hypothetical energoinformational picture of the world:

Dialectics is a universal inherent basic property of actual reality
(the axiom of the dialectics universality)

As a consequence, the basic evolutionary mechanism for structuring actual reality must have a dialectical character. The concept of *actual reality* combines both objective and subjective reality.

As part of the axiomatic approach, the axiom of universality of the dialectics is taken as one of the starting points for further general scientific constructions and does not require a detailed substantiation of its truth. The truth criterion of it will be the practice, the correctness of the theory conclusions, built based on this axiom, the real processes of the surrounding world, its heuristic and prognostic abilities to serve as a matrix of scientific search for fundamentally new properties, phenomena, processes, theories and applied innovative technologies.

1.5 Structure as philosophical category

Philosophical categories are the result of knowledge, the synthesis of the cognition experience and practice of the entire previous history of mankind. These are the key points of knowledge, the "steps" of the thinking approaching the essence of things. In their content, as already mentioned, they reflect the existing reality, properties and relations of the objective world outside us.

The new categories of dialectics included in the scope of philosophical categories in the 20th century, are the concepts of "*structure*", "*element*" and their combination – the *system (systematicity)* (34, 45). This means that there has taken place an awareness of these concepts as universal ways of the human relation to the world, as *general and essential properties of objective reality.*

An *element* is a philosophical category that characterizes a relatively independent part of the whole, an object that is a part of a particular system and is considered within it as indivisible. *Structure* is a philosophical category characterizing the way of the elements connection in the whole, which is inherent in it and peculiar to it, characterizing the structure and internal form of the system organization, acting as a unity of stable interrelations between its elements, and the laws of these interrelations.

In the 20th century, the development of philosophical thought led to the conscious understanding that *structural property (systematicity) is an essential element, an attribute of all real-life objects and systems*. There can be no bodies in the world without a structure, without a certain internal organization (system). Thanks to the variety of structural levels of matter, each material system is polystructural. For example, society has an economic structure, a political structure, and others. In systems of nature, a certain structure of objects corresponds to each structural level of matter (42, 462).

Thus, *structural properties (systemicity) are the universal inherent characteristic of the matter. Movement (development), space, time, structure are the forms of the matter existence. Matter is inconceivable outside its structural properties, as it is inconceivable outside the space, outside the time, outside its development, change.*

One of the main requirements of dialectical logic, of the dialectical thinking method is the haecceity of truth. Dialectical logic requires specification of the matter (objective reality) properties when analyzing a particular phenomenon or process. Taking into account structural properties as those inherent in the objective reality, the haecceity of truth requires specification of the structural level, in relation to which a certain phenomenon or a certain process is considered,, that is, reasoning about objective reality outside structural levels, outside structural properties can be considered as inconsistent with the dialectical method of knowledge, as incorrect and uncertain.

Above mentioned, along with the extrapolation of the structural properties into the subjective reality, gives us reason to accept the following as the second basic axiom of the energoinformational picture of the world:

Structurality is a universal inseparable basic property of actual reality
(an axiom of structural properties)

Next, we will view the world as a hierarchical system of interrelated and interdependent structural levels of its organization. The world around us is inconceivable outside the structural levels, as it is inconceivable outsidethe space, outside time, outside development and movement.

As a part of the axiomatic approach, this provision is accepted as one of the starting points for further general scientific constructions and does not require any detailed substantiation of its truth. The criterion of truth will be practice itself, the correlation of the conclusions made in the context of the theory, which is built on the database of axioms, with the actual processes in the surrounding

world, its heuristic and prognostic abilities to serve as a matrix of scientific search for fundamentally new properties, phenomena, processes, theories and applied innovative technologies.

1.6 Mathematics and Objective reality

What is knowledge? It is useful to recall the statements of V.I. Lenin, written by him about the doctrine of the concept in Hegel's "Science of Logic": "Knowledge is a reflection of nature by man. But it is not simple, not direct, not integral reflection, but a process of a number of abstractions, formation, genesis of concepts, laws, and such concepts, laws (thinking, science = 'logical idea') encompass conventionally, approximately, the universal pattern of the evermoving and developing nature" (29, 164).In the same place, "*abstractions reflect nature more deeply, or rather, in the more integral way. From living contemplation to abstract thinking and then from it to practice – this is the dialectical way of the truth cognition…"* (29, 152). Abstract thinking, the creation of a theory, study of the properties of concepts do not tear knowledge away from the real world, but allows, if they are correct, to know it more profoundly, constitutes the necessary step of any knowledge.

According to the basic principles of dialectics, all processes and phenomena of actual reality are deeply correlated with each other (the principle of interconnection), besides, these are dynamic relations, according to the principle of development, change. The essence of the process of knowledge can be defined as the revealing, defining of these dynamic connections, as well as reflecting of the universal laws of the ever-moving and evolving nature. At the same time, one of the universal methods of cognition is the modeling of relations using a certain set of abstract model elements (for example, numbers or other signs), further, the transformation of these model structures in accordance with the laws of transformation that preserve the connections integral, obtaining new abstract structures, new sets of connections and the correlation of these new connections with objective reality.

Mathematics serves as one of the means of abstract modeling using the set of symbols and the rules for combining them. *Mathematics is much more than science, because it is,* according to N. Bor, *the language of science* (7). The defining characteristic of each specific mathematical discipline is a certain formal method, potentially allowing the existence of various material representations and consequently, practical applications. Whether this or that object, this or that phenomenon of the real world can be investigated using this mathematical method – this question is not solved by the nature of the given object or phenomenon, but by their *formal structural properties* (20).

What is the subject of mathematics research? According to F. Engels, *"pure mathematics has as its object spatial forms and quantitative relations of the real world"* (30-XX, 37). N. Bourbaki argue that "*mathematical structures, strictly speaking, become the only mathematical objects*" (9, 251). One can agree with this group of French mathematicians. However, where do these structures come from and how do they relate to the world of reality?

If these are abstractions of some sides of the real world, then the position of Bourbaki is quite consistent with the point of view of F. Engels. N. Bourbaki themselves wrote "…the main problem lies in the interaction of the experimental world and the mathematical one. *The fact that there is a close connection between material phenomena and mathematical structures is what seems to be completely unexpectedly confirmed by recent discoveries of modern physics,* but the profound reasons for this are completely unknown to us, and perhaps we will never know them" (9, 258). This is a pessimistic conclusion, and, according to academician B. V. Gnedenko, it means only that N. Bourbaki only superficially touched the most important question: what is the object of the mathematical study (17). They did not attempt to reveal the process of the basic concepts and basic tasks of mathematics formation in the historical aspect.

Such questions cannot arise in connection with the definition of F. Engels, since it already contains the statement that *mathematical concepts are only abstractions derived from certain relations and forms of the real world, they are taken from the real world and therefore are naturally associated with it.* In essence, this explains the amazing applicability of the results of mathematics to the phenomena of the world around us, explains the success of the process that we are now witnessing and

which is called the "mathematization" of knowledge. A number of examples is known when abstractly created mathematical theories were far ahead of the discovery of the corresponding real physical processes in the field of natural science. *"The amazing, incomprehensible efficiency of mathematics in natural science, the fact that its modern models often describe quite well the complex processes of material reality, evidence of the fact that that mathematics reflects not only the quantitative, but also to some extent qualitative aspect of the objective reality phenomena, and that was noticed yet by Kant and Hegel"* (20, 16).

1.7 Hypothesis of "associative analogy"

If we analyze the state of modern mathematics as a field of science, as a language of science in a historical aspect, and reveal the process of the basic concepts formation, it becomes obvious that *modern mathematics has a logical internal structure*, elements of which are, in turn, the same mathematical structures, amazing applicability of which is so surprising (*"the principle of hierarchy of structures"* by N. Bourbaki).

But if *mathematical concepts are abstractions of relations and forms of the real world, are taken from the real world and are naturally associated with it*, then the question arises – *whether the internal structure of modern mathematics, formed in the process of historical abstraction of forms and relations of the real world, can reflect the underlying fundamental structure of the real the world?* Isn't the internal structure of mathematics a model of the real world? If this is so, then there is a unique opportunity to look at objective reality through the prism of the internal structure of modern mathematics. So, what is the basis of modern mathematics?

In accordance with the research of the N. Bourbaki school, *the set theory is the foundation of modern mathematical knowledge*. "It is possible to derive almost all modern mathematics," Bourbaki write, "from a single source, the theory of sets" (43, 26). The theory of sets, as it is well known, is based on two concepts – the concept of ***"set"*** and the concept of ***"relation".*** *"Set"* is a collection of elements. The element of the set is the main structural unit in the simulation of objective reality by the means of mathematics. The concept of *"relationship"* reflects the presence of connections between elements of a set. The combination of the elements of a set and connections, relations between them form a specific *mathematical structure* (43). Thus, the *concepts of* **"set"** *and* **"relation"** *can be considered as the foundation of the logical structure of mathematics.*

Consider some *"set of elements"*. The relation (the law of composition) between the proper elements of this set is defined as internal (unary, binary, ternary – depending on the number of elements). The simplest mathematical structure – the *groupoid*

Конец ознакомительного фрагмента.