The External and Internal Planet's Limits to Growth: Transdisciplinary Rethinking

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Abstract

In 1972, the club of Rome organized a comprehensive study of external planet's limits to growth. The study of the external limits was carried out using the classical model of the dynamic system. The image of the system, however, did not allow the exploration of the internal limits to growth. In this case, we are talking about the behavior and actions of people, about a possible gradual change in their consciousness and mind. These changes can have a significant impact on the sustainable development of human society. The results of systems transdisciplinary modeling of the development of modern humankind after 2015 were presented in this paper. The need for regular broadening of the horizons of the scientific worldview is shown. A probable scenario of negative events in the society, possibly to take place in the immediate future due to insufficient education of people, is also described.

Keywords: Systems worldview, system, systems approach, transdisciplinarity, systems transdisciplinary approach, limits to growth, Club of Rome.

1. Introduction

The first president of the Club of Rome, A. Peccei, was convinced that the reason for complex multifactor social, economic, and environmental problems is reflected in the statement that nobody is or seems to feel actually responsible for the state of the world. Nobody is in charge of the world and hence nobody is prepared to do more than anybody else for it. Equally, no group of people is concerned with the totality of the contemporary problem. This holistic global approach will need not only to delineate the individual facets of the problematic, but will also explore their interactions on each other. In addition, the total system is a neglected task which requires effort to understand. Therefore, all the activities of the Club of Rome were based from the outset on the desire to understand the global problematic (Peccei, 1980).

Some questions were raised, which follow the withdrawal of the founders of the Club of Rome. Had the Club achieved its main objectives? Had the Club fulfilled its catalytic role in accelerating people's fundamental awareness of the reasons for the complex multifactor problems of humankind? Was a global science approach created?

2. Modern View on the Activities of the Club of Rome

A. Peccei was the first club president to understand that the solution to complex multifactor problems requires concurrent study of the external limits to growth that restrain the possibilities of our earthly home, as well as the internal limits to growth related to the human biophysical and psychophysiological abilities.

The complexity of studying these limits lies in the fact that the dependence of the observed phenomena on the context of interconnections structure, penetrating the world, is of great importance for many natural processes. The quality of the complex processes development can significantly change this context. Consequently, some disciplinary factors which previously determined the momentum of the process tend to fade in terms of importance. Other factors, which were previously considered insignificant, have come to the fore. For example, some factors determine the dynamics of treatment in prescribing a clinically proven medicine. By contrast, completely different factors come to the fore, when a placebo is prescribed, which arouses the mystical powers of recovery in the body. The unpredictable behavior of the factors under natural conditions causes such confusion that even scholars deny the possibility of strict objective analysis of cause and effect relationship, and they give confidence only to subjective estimation of experts (Gvishiani, 1977).

D. Meadows, a leader of the research team, who has been requested by the Club of Rome to answer the questions concerning the external limits to growth, tried to solve the problem of the context from the perspective of the systems worldview. Meadows stressed the need to remember that any book or computer model is built on the worldview of its author as much as on objective evidence or analysis. The most important component of our perception of the world is a view of the world as a dynamic system. Such a system is a composition of interrelated tangible and intangible time-dependent elements. They all influence the behavior of the system in the future and the measures we can take to change it (Meadows & Randers, 2007). This worldview has allowed the team to improve the mathematical model WORLD-2 developed by Professor D. Forrester of the Massachusetts Institute of Technology to the model WORLD-3. In the introduction to the last part of their trilogy which is timed to coincide with the 30th anniversary of the limits to growth, Meadows and Randers announced that they plan to publish the next book by the 40th anniversary – 40 years after the limits to growth. However, Meadows noted that there was no sense in describing the scenarios of the future again; this is because under all reasonable assumptions, these are scenarios of collapse (Danilov-Daniljan & Rejf, 2015).

An honorary member of the Club of Rome, E. Pestel, was more adamant in his systems worldview. He claimed that the world is a really complex system. It is comprised of the interconnections of subsystems, each of which is an object-oriented system possessing autonomy and existing by itself. The concept of common system means nothing. It manifests itself only through the interaction with the behavior at the level of subsystems developed for the limits to growth (Pestel, 1988).

The systems worldview of D. Forrester, E. Pestel, D. Meadows, as well as the mathematical forecasting technique of the external limits to growth, has the right to exist. However, it is more effective in designing technical objects. Due to this systems worldview, cars move on roads, space stations are built, computers are assembled, etc. However, this worldview gives rise to two fundamental restrictions in the field of systems planning and forecasting. First, it is impossible to solve a systems problem while being inside the system or being a part of it. Second, it is impossible to solve a complex multifactor problem while being at the same level of thinking at which this problem has arisen.

It is worth noting that not all the proposals of the members of the Club of Rome were limited to the preparation of reports concerning the catastrophic future of our planet and humankind. An important role in understanding and studying the external and internal limits to growth was played by the proposals with regard to the creation of a global scientific approach. According to some members of the club, the approach gave rise to a fundamental synthesis of disciplinary knowledge and various initial data. However, this became a material reason which prevented the formation of a comprehensive view of the world.

Calls for the creation of such an approach immediately preceded the establishment of the Club of Rome. The final declaration of the academic conference on the issue of Long-term Planning and Forecasting was held under the auspices of the Organization for Economic Cooperation and Development (Bellagio, 1968; Jantsch, 1969). The founders of the Club of Rome, E. Jantsch, A. King, D. Gabor, D. Forrester and others, participated in this conference. After two years, J. Piaget and E. Jantsch touched upon a question of transdisciplinarity. The latter suggested that transdisciplinarity, as a new branch of knowledge, should certainly be a super or a hyper discipline. E. Jantsch wrote that transdisciplinarity should be a coordinator of all disciplinary and interdisciplinary teaching systems and innovations based on a common axiomatic approach (Jantsch, 1972).

3. Current State of Transdisciplinarity

For a long time, monodisciplinary experts tried to determine the essence of transdisciplinarity. They insisted that it should not predominate in the scientific society, but should allow all disciplines to unite beyond their own frontiers (Nicolescu, 1994). However, this was an impossible dream. Some researchers believe that the identification features of monodisciplinary knowledge is guarded by ten kinds of borders: syntactic boundaries, semantic boundaries, pragmatic boundaries, experiential boundaries, methodological boundaries, spatial-temporal boundaries, technological boundaries, institutional and organizational boundaries, social and interpersonal boundaries, political and ethical boundaries(Misr & Lotrecchiano, 2018). Therefore, there is nothing that unites between the scientific disciplines beyond the frontiers of each one. There are knowledge and local views of the world by other scientific disciplines. Under these circumstances, it was impossible to move beyond the scientific discipline without a special scientific approach. However, an interdisciplinary cooperation was possible. This interdisciplinary cooperation makes sense only if one of the disciplines still dominates or plays the role of a leading discipline. The results of the interdisciplinary project are always interpreted from the perspective of this discipline.

Under these circumstances, the incipient transdisciplinarity was forced back to the use of the synthesis of linear logic inherent in disciplinary approaches and interdisciplinary techniques. Subsequently, the idea of a transdisciplinary approach, such as a meta-discipline, broke up into several types of transdisciplinary approaches (Brenner, 2014).

These approaches are clearly manifested in the interdisciplinary interaction of scientists as the followers of the scientific disciplines think. Also, they admit to a subjective interpretation of disciplinary knowledge and the results of the practical use of disciplinary techniques. Such transdisciplinarity stands in as a weak transdisciplinarity. De facto its methodology came close to the methodology of interdisciplinary and multidisciplinary scientific studies (Max-Neef, 2005).

A profound change in transdisciplinarity occurred at the end of the 20th century. The participants of the International Transdisciplinarity Conference, held under the auspices of UNESCO in Royaumont Abbey (Paris, France) in May 1998, adopted a resolution concerning the need for the existence of strong transdisciplinarity (transdisciplinary science) in science and education (Kim, 1998). A scientific approach, which represented the strong transdisciplinarity, was found in the classification of the systems approach types. This is regarded as the systems transdisciplinary approach (Mokiy, 2019b).

4. Systems Transdisciplinary Approach: Unicentrism

The systems transdisciplinary approach is based on the philosophic principles of unicentrism. In a broad sense, unicentrism is a position in philosophy and in science that is based on the problem of the correlation between the single and its fragments. This position is based on the isomorphism of the universal order of the structure of fragments of space, the attributes of information and periods of time that determine the one and only of the world. In ontology, unicentrism is based on the principle: the world is represented as the sum of ordered fragments of space, attributes of information and periods of time. In turn, they determine the unity of goals and results of the development of phenomena and processes of reality. The epistemological principle of unicentrism states: the knowledge of the world must be preceded by the selection of appropriate models of spatial, informational, and temporal units of the universal order. In a narrower sense, unicentrism is understood as the philosophy of unity which is developed by the Russian philosopher, Vladimir Mokiy. Also, he introduced the term "unicentrism" in 2010 (Rimondi & Veronese, 2018).In the concept of unicentrism, the order which conditions the unity of the world and its object and process cannot be revealed in the course of scientific research, and it cannot be formed subjectively. It is postulated by the framework of the corresponding systems transdisciplinary model of the unit of order. Due to these models, a researcher is able to determine initially the required number and types of disciplinary knowledge of similar and dissimilar subject areas, as well as the nature of their interaction. In this case, it becomes possible to reveal the content of causative and functional factors, which form, ensemble, and justify the regulatory parameters of the development processes of any object at any level of reality (Mokiy & Lukyanova, 2017). This brings hope that such systems transdisciplinary models can become a reference point and a source of inspiration for new scientific discoveries. This is in the same way the Periodic Table of Chemical Elements used to be (Rousseau et al., 2016).

That is to say, within the framework of systems transdisciplinary models of the unit of order, disciplinary knowledge with regard to the world, various study objects, their similar and dissimilar subject areas, as well as functional ensemble of objects fit within one system without strict boundaries between disciplines (Piaget, 1974). The world in the form of vertical functional ensemble and the system in the form of the universal order, which makes condition for the unity of this ensemble, are close to the vision of L. Bertalanffy with respect to the general systems theory. He wrote: "The world (i.e., the total observable phenomena) shows a structural uniformity, manifesting itself by isomorphic traces of order in its different levels or realms" (Bertalanffy, 1969). It is the universal order which manifests itself in any object or any organized group of objects, and it can serve as the basis not only for a general theory, but also for a general systems methodology.

5. Systems Transdisciplinary Approach: The Models of Units of Universal Order

Human species, plants, animals, soil, air and water are not classified as independent systems. They are single cenosis: zoocenosis (animal communities), phytocenosis (plant communities), microbiocenosis (microorganism communities), biocenosis (biological communities), and finally biogeocenosis (living and nonliving components communities). In this case, organisms and their cenosis should be defined as the natural horizontal functional assemblies. An example of vertical functional ensemble is biogeocenosis. Planet Earth is a single vertical functional ensemble. The universal order acts as a system in such ensemble. This order, while justifying its name, defines the internal unity of each participant of the functional ensemble, manifests itself in their interactions, and contributes to the achievement of their common objectives and results. These circumstances stimulate the systems transdisciplinary approach to study the planetary vertical functional ensembles in this unity. Therefore, it reveals a large number of horizontal functional ensembles, and there are many biogeocenotic vertical functional ensembles in this unity. For this purpose, the spatial, temporal, and informational units of the universal order are used in the systems transdisciplinary approach.

The model of spatial unit of order provides ground for the physical and/or logical object boundaries and the nature of relations between elements within these boundaries. The model of informational unit of order provides ground for the necessary and sufficient amount of information on the object, and it also describes the overall condition of this object. The model of temporal unit of order allows the organization of potency conversion from the original volume to the results that will be used in the subsequent processes of its conversion (Mokiy, 2019a).

6. Systems Transdisciplinary Approach: The Model of Temporal Unit of Order

The basic model of temporal unit of order is represented as multiplex. Multiplex (lat, *complicated*) is a natural complex of waves, which logically fragments the process of development. In this case, multiplex serves as a harmonious structure of development of objects and functional ensembles of objects, which embraces actualization of goals and plans of nature. Multiplex consists of waves of different duration and can be depicted as a momentous picture of the stage, era or period - a certain unit of historical time. This picture actually shows all the combination of the periods of development and also demonstrates its general meaning (see Figure 1).

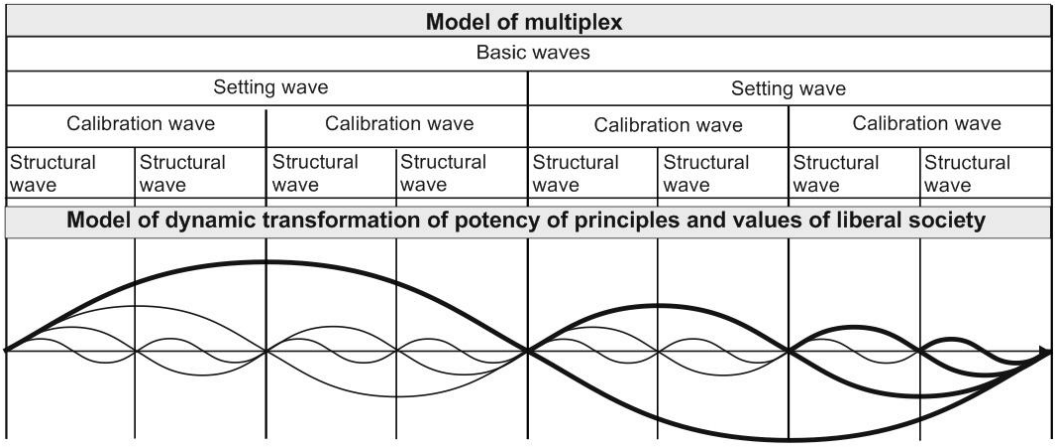

Figure 1. Structure of Multiplex (The Model of Temporal Unit of Order)

A multiplex wave is the natural sequence of periods of time characterized by one calendar duration. In comparison with its physical analogue, a multiplex wave identifies calendar duration of periods, but it does not identify the amplitude of oscillation. The processes in these periods occur when influenced by quantitative or qualitative transformations of object or functional ensembles of objects.

Waves of multiplex of development are divided into long and short ones. Long waves of multiplex are waves which have calendar duration and development of objects and functional ensembles with predetermined nature. Predetermination is shown by sequence of inevitable stages and results of the development of both the object and functional ensemble of objects.

Predetermination reassures that development will correspond to the certain meaning despite individual nature of the objects, the influence of external and internal factors upon them, and the results of their distant periods. This will allow other objects and functional ensembles of objects to use received results. In this case, long waves of multiplex play the role of a tough developmental program.

Short waves of multiplex are waves which have the calendar duration and development of objects and functional ensembles of objects with a predisposition to the achievement of certain results. Predisposition is different from predetermination since it allows objects and functional ensembles of objects to actualize their unique identity during development. The unique identity of object or functional ensemble is developed due to results of development, and it is being formed and influenced by external and internal factors and conditions. The external and internal factors, as well as the intensiveness of their influence may significantly vary during development. Objects and functional ensembles have a certain reaction to this influence. The individual results of their development may more or less approach the results predetermined by the nature of development. Therefore, current results of individual development of objects and functional ensembles of objects have to be periodically synchronized and orderly spread, according to the periods of short waves. Thus, they form obvious attributes of development. In this case, multiplex short waves play the role of a soft program of development. It is important to note that the nature of multiplex waves of development is close to attractors – a combination of external and internal conditions – which contribute to the choice of object of one of the variants of stable development; thus, it is one of the definitions of synergistic methodology (Kotelnikov, 2000).

Long waves of multiplex are close to so-called simple attractors. Trajectory of development of object and functional ensemble of objects within one attractor or long waves of multiplex is predicted. The nature of short waves of multiplex is close to strange attractors. However, in comparison with a strange attractor, there is an opportunity to predict the most possible activity. Possibility to predict is conditioned by the naturally ordered contribution of results of individual development within periodization which is stimulated by short multiplex waves.

The roles multiplex waves play in the general process of development are divided into the following groups:
Long multiplex waves include basic and setting waves:

- A basic multiplex wave is a depiction of complete calendar duration of development of objects or functional ensemble of objects.
- A setting multiplex wave is a depiction of calendar duration of inevitable stages of development of object or functional ensemble of objects.

Short multiplex waves include calibration and structural waves:

- A calibration multiplex wave is a depiction of calendar periods, which differentiates logical combination of basic stages (moments) of development of object or functional ensemble of objects.
- A structural multiplex wave is a depiction of calendar periods, which differentiates logical combination of current events of development of object or functional ensemble of objects.

In a case where there is a need to carry out a research of the events that occur within the waves and have a similar calendar duration but belong to different multiplexes of development, one can use a combination of multiplexes called as a multiplex cycle.

7. Internal Limit to Growth from the Perspective of the Philosophy of Unity

The founder of the theory of functional systems, physiologist P. Anokhin, in his work titled "Essays on the Physiology of Functional Systems" cites the American economist, Bross, who is one of the founders of the theory of utility. Economist Bross claimed: "When it comes to value, the court of the highest resort is not a brilliant verbal argument, not a substantial abstract principle, and it is not even a clear logic or mathematics since it is a result in the real world." (Anokhin, 1975).

In this case, while forecasting the external and internal limits to growth, it is necessary to correlate the current results of growth and development of functional assemblies with the requirements of the corresponding models of spatial, informational, and temporal units of order. Simply put, the systems transdisciplinary models unit of order defines the context that gives the quantitative and qualitative indicators of external and internal limits of growth as a status of standard indicators.

From the point of view of the systems transdisciplinary approach, the basis of global dynamics is an absolute requirement (Categorical Imperative) so that the ways and volumes of satisfaction of needs of any object do not violate the unity of horizontal and vertical functional assembliesof objects. In rethinking the global dynamics from the perspective of model of temporal unit of order, we can state that stepwise growth and development of the world, introduction of new objects, and new horizontal functional assemblies of the planetary nature occurs in the direction of a special horizontal functional ensemble. This ensemble is presented by a functional humankind ensemble. The participants of this functional ensemble should necessarily and timely understand the content of this absolute requirement and adjust their personal qualities in accordance with it (Mokiy, 2013). Furthermore, people will inevitably create social and economic relationships, which will fully meet this requirement. However, all this should happen at a certain stage of the development of awareness and understanding that will be achieved within certain time frames.

Such systems transdisciplinary meaning of global dynamics was originally laid down in the activities of the Club of Rome by the first president, A. Peccei. He said, and I would like to mention, that it would be a serious mistake to consider human needs as the reference point of new phase in the evolution of humankind. Any new human achievements, including what is usually meant as development, can be based only on the improvement of human qualities. This must be the focus if the aim is to achieve growth (Peccei, 1980).

Before humankind, the planetary matter was consistently and actively transformed by other biological and non-biological objects and their functional ensembles. These assemblies fitted into the planetary vertical functional ensemble. Using the rule of creation of model of temporary unit of an order (see Figure 1), it succeeded in constructing the scheme of transformation of the potency of cosmic and planetary matter. Every period of this scheme consists of 4 multiplexes. Each scheme consists of 32 multiplexes of a single accelerating multiplex cycle (see Figure 2).

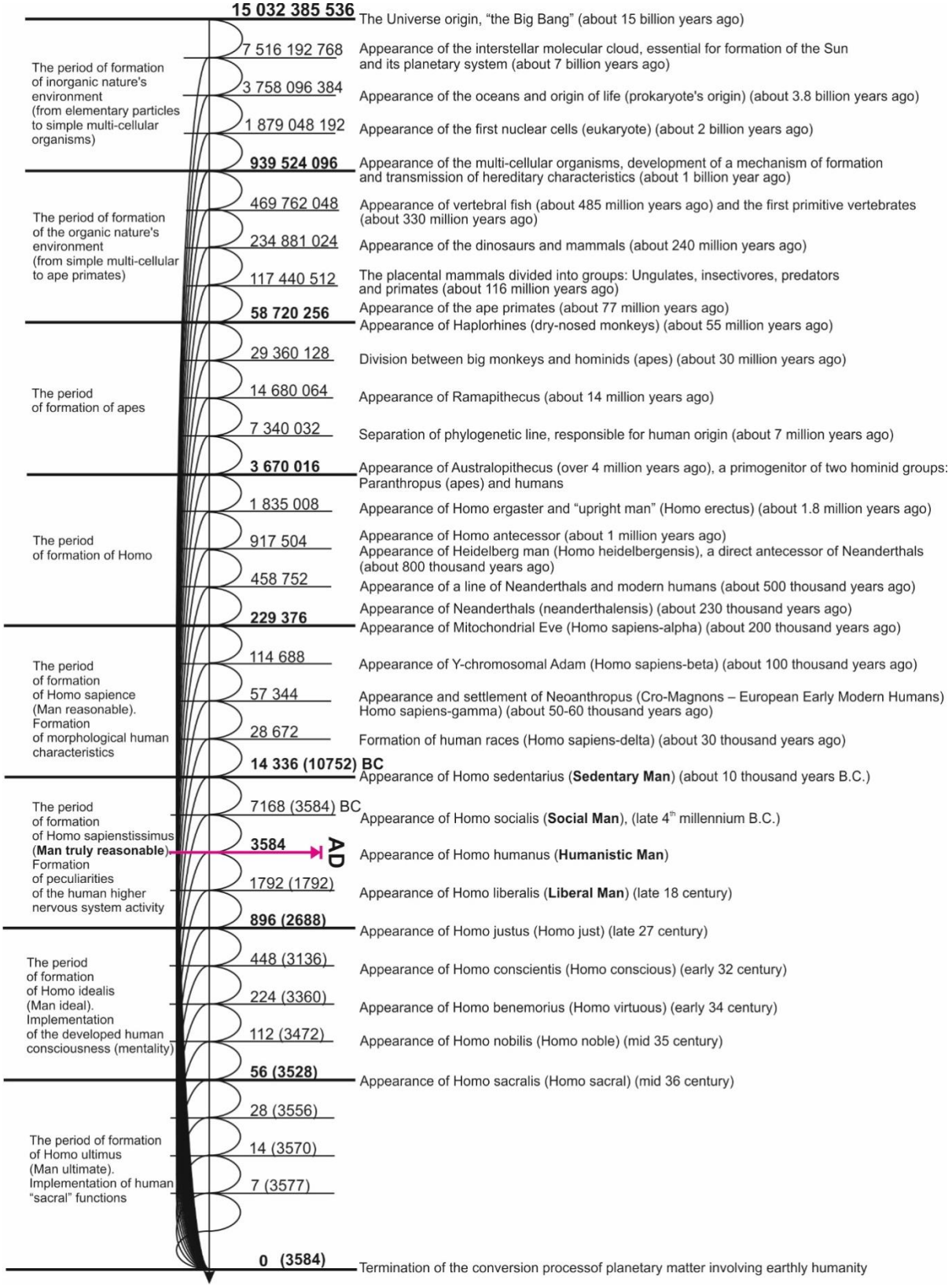

Figure 2. Scheme of Transformation of the Potency of Cosmic and Planetary Matter Involving Earthly Humanity in the Modern Terrestrial Chronology

Modern humankind is classified as Man truly reasonable or Homo sapiens sapiens (Deryagina, 2003). Perhaps it would be right to call Man truly reasonable by the name of Homo sapienstissimus. The appearance of this human species was caused by changes in the planetary nature.

This significantly intensified with the beginning of the Holocene Epoch and the interglacial period which has continued for the last 12-14 thousand years (the sixth period of the scheme). The appearance of Man truly reasonable marked the beginning of the historical development of human being and humankind. During this period, human biological patterns gave way to social patterns. The subspecies of Man truly reasonable then became distinct in the megastructure of connections between neurons in the brain and the content of substantive and status needs, benefits, values, and objectives. These are consistent with the megastructure and in the priority characteristics of economic relations. Higher nervous activity is associated with neurophysiological processes in the cerebral cortex and subcortex. Continuous development of higher nervous activity takes place in the course of learning (mastering of other people's experience). Consequently, a person acquires the ability to choose the best of all possible options, anticipate the results of its activity, change the surrounding conditions, and create material and spiritual values.

Fundamental changes in the cultural environment of humankind caused by the difference in the distinctive features of the higher nervous activity of Man truly reasonable subspecies are associated with revolutions in historical development (see Figure 3).

The Neolithic Revolution (around 10752 B.C.) has caused the transition from the appropriating economy to the producing economy contributing to the appearance of Sedentary Man or Homo sedentarius. Sedentary Man has deterministic substantive (vital) needs. The benefits are stable relations with the members of its family and kind, and a symbiotic relationship with natural objects. The values are close people, family, and natural objects. The objective is to attain the truth of what the needs, benefits, and values should be. The priority feature of economic relationships is interchanged.

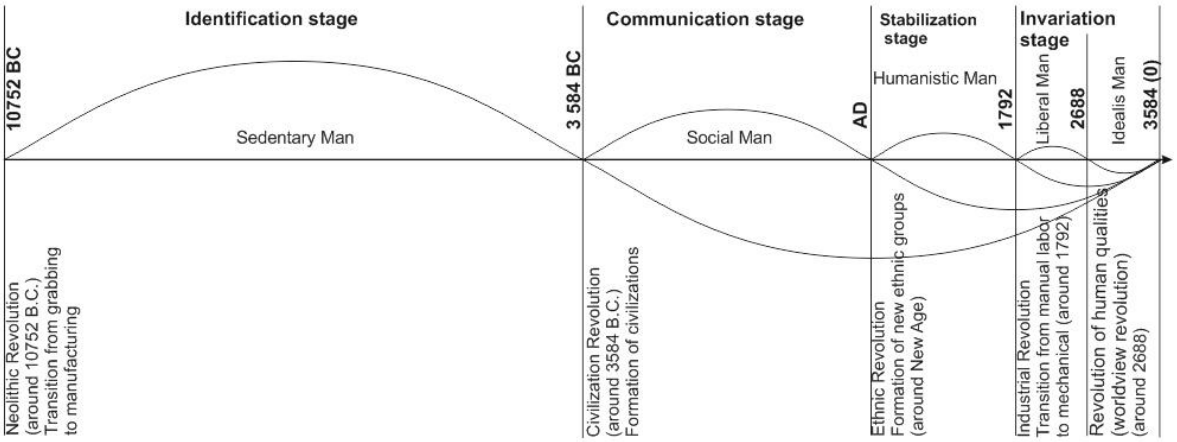

Figure 3.Model of Temporal Unit of Order Man Truly Reasonable Subspecies Development

The Civilization Revolution (around 3584 B.C.) has caused the formation of civilizations contributing to the appearance of Social ManorHomo socialis. Social Man has non-deterministic status needs. The benefits are products. The values involve individual and social prestige. The objective is to pursue wealth. The priority feature of economic relationships is production.

The Ethnic Revolution (beginning of a New Era) has caused the formation of new ethnic groups contributing to the emergence of Humanistic ManorHomo humanus. Humanistic Man has deterministic substantive needs. The benefits are relationships. The values are vertical functional ensemble and horizontal functional ensemble. The objective is to seek justice. The priority feature of economic relationships is distribution.

The Industrial Revolution (around 1792) has led to the transition from manual labour to machine-assisted labor contributing to the appearance of Liberal ManorHomo liberalis. Liberal Man has non-deterministic status needs. The benefits are services. The values consist of utility. The objective is to pursue maximum satisfaction, which is subjective evaluation of life quality. The priority feature of economic relationships is consumption.

Therefore, in order to understand complex and multifactor problems, it should be taken into account that modern society consists of four subspecies of Man truly reasonable. Each subspecies continues to develop the defining characteristics of the higher nervous activity. Allocation of these subspecies in general population determines the existence of four basic types of states:State ofthe sedentarytype,State ofthe socialtype,State ofthe humanistic type,State ofthe liberaltype.

Therefore, the population of these states can view nature and society in different ways due to external factors. Humans of these subspecies differ significantly in their understanding of demands and duties towards other people, as well as other vertical and horizontal functional ensembles.

This is why the arguments, statements, and forecasts with respect to the current state of nature and society is convincing for some people and states and inconclusive for others. Hence, the revolution of human qualities or worldview revolution will only take place upon completion of the development period of the features of Man truly reasonable higher nervous activity. In other words, it will take place as soon as people become really conscious and wise. This important evolutionary event will take place around 2688, and it will be initiated by Homo justus who is the first subspecies of Homo idealis (see Figures 2 & 3).

8. Conclusion

A long time ago, the morphological traits of the Homo Sapience subspecies were able to develop and adapt to the emerging geographic environment. The subspecies of Homo sapienstissimus(Man truly reasonable), to which modern humans belong, are able to develop and adapt to the geographic environment, including the distinctive features of higher nervous activity i.e., thinking, consciousness, and mind. As it turns out, the brain volume is not so important in this case. Much more important is the megastructure of connections between neurons in the brain. The models of evolutionary development of humankind show that there has been a period that completes the development of our distinctive features of higher nervous activity since 1792. It is likely that the objective underdevelopment of thinking, consciousness and mind is the main reason why majority of the population of our planet, world leaders, and economic unions do not recognize the obvious danger caused by the violation of the unity of the planetary vertical functional ensemble by human society.

Such conclusions might be considered simplistic. However, things can turn around if the human society is seen as a horizontal social functional ensemble which acts as a nature-transformative power. This ensemble is a segment of the planetary vertical functional ensemble. The planetary vertical functional ensemble, in its turn, is an element of the functional ensemble of the solar system. Thus, the emergence of each new kind of human being and the succession of its subspecies shows the fundamental changes which have already taken place, are taking place, or are going to take place in the planetary nature itself and in the near space. This means that the duration and the results of the formation and development of morphological features and features of the human higher nervous activity are defined by the terms, objectives, and results of the planetary matter transformation which is initiated by all human-sized functional assemblies. These functional assemblies include inorganic nature assemblies, such as the earth's core, mantle, crust, ocean water, subsoil, and soil. In other words, the reduction of the time period required for the development of Homo sapience and Homo sapienstissimus (Man truly reasonable)subspecies is associated with the acceleration of certain planetary geological, geochemical, and geophysical processes. Therefore, it is now necessary to pay special attention to the objectives and results of these processes.

A brief report on the most likely scenario of events, which accompany these processes, can be described below. The development of the Homo sapiens sapiens subspecies is influenced by the geographic environment. The geographic environment changes its chemical and physical characteristics largely under the influence of the state of the planetary vertical functional ensemble. The acceleration of the planetary geological, geochemical, and geophysical processes of the planetary vertical functional ensemble will be accompanied by the formation of new RNA molecules in the rock mass and on the mineral surfaces of the ocean floor and intracontinental sea floor. The change in direction during deceleration and acceleration of the movement of tectonic plates and takyrs of biogeocenosis will cause the change in the gravitational background. Transformation of this background will start the active process of filling biological cells with these new RNA molecules (Jahontova & Zvereva, 2000). These potential RNA molecules will embed into DNA molecules. DNA molecules will change the qualitative characteristics of cellular proteins. The renewed cells characteristics will enhance their own electric fields and the general electric field of the body. The central nervous system and the human brain will have to transmit and process the enhanced electrical signals. Neurotransmission in the brain and processing of the signals are accompanied by the release of neurotransmitters. It is widely known that the neurotransmitters potential is largely formed under the influence of an individual's worldview. The frontiers of this worldview depend, in particular, on the level and quality of education acquired by an individual in the course of his or her life. Therefore, the wider the horizons of the scientific worldview, the higher the protection degree of the human brain and the protection of a human being itself.

The logical reasoning of this scenario shows that a successive and accelerating change in the geographic environment requires the same successive and accelerating expansion of the boundaries of individual worldview, which takes place in the course of education. Expansion of the scientific worldview boundaries is ensured by educating people in the principles of systems thinking. The ability to implement in practice a new level of worldview is ensured by the methodology and technology of systems transdisciplinary approach based on the philosophy of unity.

Lack of systems thinking and deficiencies of the existing educational system makes it impossible to bring people to a new level of scientific worldview. This fact deprives individuals of the generalized protection. The absence of such protection can cause a specific mass extinction of Man truly reasonablesubspecies. The specific nature of this extinction can take place in a short time and be analogous to epidemy of acute dementia. The data obtained from free sources of World Health Organization can serve as a proof of this scenario. Thus, in 2015, there were more than 46 million people with dementia worldwide. In 2017, this number increased to 50 million people. Annually, 7.7 million new cases of dementia are recorded. This number is expected to increase to 131.5 million cases by 2050.

At the end of this paper, it should be mentioned that there have been recent significant changes in the world society, in which the Club of Rome had played a valuable role. In the higher education system, a special attention in training specialists is given to the interdisciplinary and transdisciplinary approaches. National schools using transdisciplinary teaching and centers for systems analysis have appeared. Therefore, the Club of Rome should continue its activities. It is necessary to proceed with reporting on the state of the global human problems. However, in deciding the solutions to these problems, it is necessary to correlate the parameters of the external limits to growth with the parameters of the internal limits to growth.When planning the parameters of the internal limits to growth, calendar time multiplex (1792-2688) must be considered(see Figure 4).

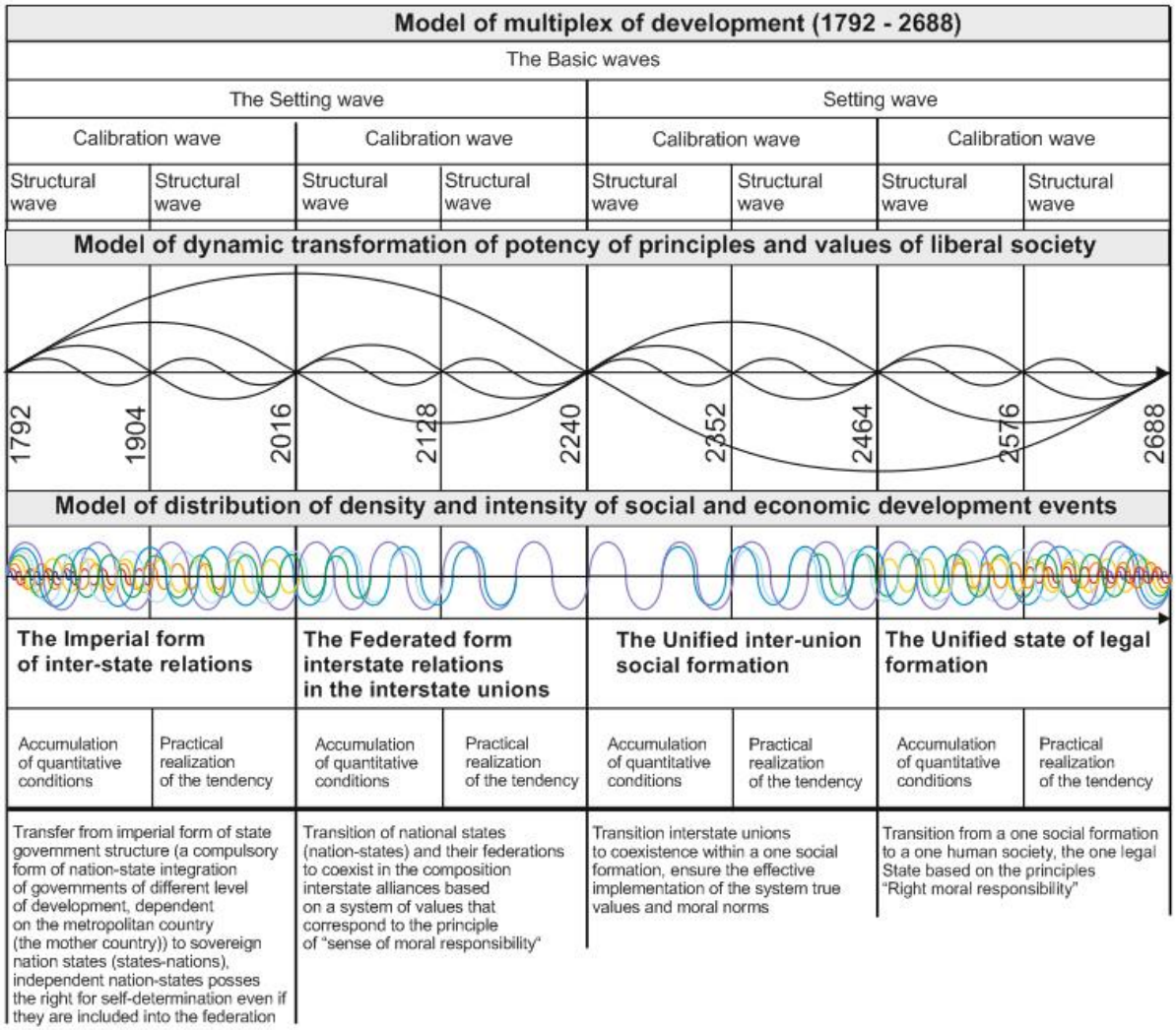

Figure 4.Model of Multiplex of the Development of Modern Society since 1792 to 2688

Under such conditions, the social sciences supported by the philosophy of unity and technique of the systems transdisciplinary approach should play a particular role.

It is reasonable to implement into the practice of the Club of Rome activities that consider issues related to the development of systems transdisciplinary method.

This should also include technologies that contribute to the resolution of the problems of sustainable development, problems of interstate relations, problems of global social, political and economic crises. There was an opportunity to propose new solutions to the main problems of humankind, such as development of the basis for a new model of the global social and economic order, problems of health, sustainable energy development, environment, hazardous waste disposal, etc. The important objective of such technologies in the present tensions between states should be their ability to act as a limiting factor as nuclear weapon used to be in the twentieth century.

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