Systems for Harmony and Sustainability: Establishing a Transdisciplinary Ministry for Peace

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Abstract: *The article presents the results of a transdisciplinary study on the nature of war and peace, conducted within the framework of the contemporary comprehension of sustainable development. The research was structured based on Allan AtKisson's algorithm, which served as a conceptual roadmap. Within this framework, the study employed systems thinking and adopted a transdisciplinary systems approach to achieve a profound and holistic understanding of the subject. The models developed within this framework have made it possible to identify and describe both the objective and subjective dimensions of war and peace, elucidate the causes underlying the cyclical nature of global conflicts, and provide a theoretical basis for integrating innovative mechanisms into existing state governance structures, which are capable of ensuring sustainable development of society within a long-term peace.*

Keywords: Transdisciplinarity, systems thinking, sustainable development, nature of war and peace.

1 Introduction

Is the alternation of war and peace a natural social phenomenon? To answer this question, it is necessary to rethink the inherent nature of war and peace within the framework of the concept of sustainable development. The frequently cited definition of sustainable development was coined in the report "Our Common Future". This report was prepared in 1987 by the members of the World Commission on Environment and Development (WCED). Given the lack of a rigorous scientific basis for the concept of sustainable development, the authors of the report defined "sustainable development" as a form of progress that satisfies the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland Commission, 1987).

Along with the many and diverse aspects of sustainable development, contemporary scholars have focused on several of its main aspects, specifically, economic development, environmental protection, and social equity (Purvis, Mao, & Robinson, 2019). Let us briefly review their content:

- economic sustainability denotes the capacity of a production system to meet the needs of contemporary society without compromising the ability of future generations to meet their own needs.
- ecological sustainability is the capacity of the environment to maintain people's living conditions, preventing the critical depletion of its natural fertility and regenerative potential.
- In recent years, compelling arguments have arisen in favor of expanding the traditional three aspects of sustainable development by introducing a fourth aspect, namely, cultural sustainability.
- cultural sustainability is the capacity of a society to preserve its moral and ethical values, as well as the behavioral patterns of people, which are shaped by a unique cultural code of a particular deep people.

Despite the recognition that these aspects are elements of a unified process of sustainable development, economists, ecologists, sociologists, and cultural scholars attempt to describe, substantiate, and investigate such development from the standpoint of the disciplinary worldviews, concepts, and methodologies of their respective scientific fields. As a result, this has led to the entrenched opinion that sustainable development belongs to the group of concepts whose idea can be outlined just in general, but cannot be described by a unified set of precise quantitative categories (Begun, 2012).

The influence of such an assertion has proven so evident that representatives of these disciplines have overlooked an important circumstance.

Three of the four fundamental aspects of sustainable development—economic, social, and cultural sustainability—are intrinsically linked to the human being, the state, and society. These aspects are subjectively grounded, as they are primarily explored by the social and human sciences. The intellectual framework of these disciplines accommodates a plurality of valid interpretations for particular event. In practical terms, this means that questions concerning the origins of states, the causes of economic crises, or the dynamics of war and peace may admit several equally justified explanations. Consequently, the patterns identified by the social sciences often exhibit a probabilistic rather than deterministic character.

Only one of the four aspects, namely, ecological sustainability, relates directly to the nature of the planet itself. Consequently, this aspect can be regarded as objectively grounded.

The ecological aspect of sustainable development is primarily explored within the natural sciences, disciplines that require clarity, precision, and the pursuit of a singular, objectively verifiable truth. Their methodologies are rooted in empirical experiment, mathematical modeling, and the application of universal laws, and thus presume to operate independently of human agency—seek to eliminate ambiguity. It is this very commitment to determinism that leads many natural scientists to regard the phrase "sustainable development" as an inherent oxymoron. From their perspective, genuine development is not a state of equilibrium but rather a dynamic process fueled by instability and disequilibrium within a system (Brown, 2015). The inefficacy of constructively merging the probabilistic forecasts of the social and humanitarian sciences with the precise forecasts of the natural sciences has bred considerable skepticism and disillusionment regarding the practical feasibility of the sustainable development paradigm (Williams & Millington, 2004).

These fundamental features of the social, humanitarian, and natural sciences have resulted in the modern concept of sustainable development becoming a conglomerate of disparate philosophical, ecological, socio-political, economic, technical, and other ideas, which do not aspire to unity. Researchers adhering to the sustainable development concept have discovered that the contemporary notion of this term unites 57 definitions, 19 principles, 12 criteria, 4 concepts, 9 strategies, and 28 lists of indicators (Ermakov, A., & Ermakov, D., 2012). The absolute predominance of subjectively justified aspects over objectively justified ones has contributed to the fact that contemporary understanding of sustainable development is associated with the term "sustainable economic growth", which is achieved, among other things, through the periodic

alternation of war and peace. In such a context, the ecological aspect (the planetary nature) is burdened with the responsibility of maintaining its fertility in order to satisfy the ever-increasing needs of humanity.

However, when a unified process encompasses both objective and subjective dimensions, it becomes essential to provide scientifically rigorous answers to the following questions:

- Which of the four aspects of sustainable development functions as its system-forming element?
- Is the alternation of war and peace an inherent and necessary attribute of sustainable human development, or merely a contingent, situational phenomenon?
- What methodological approach can overcome the barrier of direct interaction between the natural, social, and humanitarian sciences in the study of the natural essence of war and peace?
- Will such theoretical justification remain an abstract construct, or will it enable the formulation and practical implementation of real solutions to the complex, multifactorial challenges of conflict-free sustainable development?

2 Methodology

The selection of a research methodology for examining the nature of war and peace is largely contingent upon the general context. The efficacy of the study is directly shaped by a clear and coherent algorithm that elucidates the essence of this context. In this study, the general context was defined by the sustainable development algorithm proposed by AtKisson.

2.1 AtKisson's Algorithm for Achieving Sustainable Development

The final documents of international forums provide detailed accounts of the statements made by official speakers – authoritative representatives of the social and humanitarian sciences, as well as representatives of the natural sciences. However, as a rule, the opinions and proposals of the official advisers to such forums remain unpublished. This is because the status of an official adviser presupposes that such a specialist possesses a well-developed transdisciplinary or systems worldview, which enables them to confidently "look beyond the horizon" of disciplinary problems. Proposals formulated within such worldviews are not always accepted by scholars and specialists of academic scientific disciplines.

One of such transdisciplinary specialists is Allan AtKisson, a Swedish ecologist, publicist, and thinker, as well as an official advisor to the UN Commission on Sustainable Development. It was in his capacity as an official advisor that he proposed a logical and practically useful algorithm for achieving sustainable development (AtKisson, 2012). This algorithm consists of five key, interconnected steps, which form an iterative loop:

1. It is necessary to comprehend the general concept of the planetary nature as a system. A system is a set of interconnected elements. The system elements form a network of cause-and-effect relationships, resulting in a new system's quality—sustainability. Therefore, specialists in sustainable development need to develop systems thinking. Such thinking enables a specialist to see and comprehend the key interconnections between elements, their causes, and effects. First of all, one must realize that an ecosystem is a unified space in which complex relationships exist among people, animals, plants, microorganisms, and abiotic factors.

2. It is necessary to acknowledge that the concept of sustainable development is the ability of social and natural systems to function and develop together over a long period of time.

3. It is necessary to distinguish between the terms "development" and "growth." Development implies qualitative change, while growth refers to a quantitative increase in size over time. Growth is one form of development, but development is not merely growth. While sustainable systems often require

internal growth, continued development can sometimes demand reducing certain growth indicators or even halting growth.

4. It is necessary to systematize various disciplinary knowledge about the system we are trying to make more sustainable. It is important to comprehend the key trends associated with it, and to identify which internal elements, structures, and processes are fundamental for this system.

5. Understanding the system's internal principles is essential. This includes recognizing why and how both beneficial and "manic" cycles arise, cycles that can lead to challenges, threats, and conflicts. With this knowledge, individuals and social groups can identify effective intervention points and necessary changes.

6. It is necessary to identify the specific changes that will enhance the system's development and guide it onto a sustainable path. By understanding how the system operates, we can pinpoint areas for improvement and begin implementing the necessary modifications. Such changes are encompassed by the term "innovation", which can include new goals, projects, technologies, approaches, and even new ways of thinking and paradigms. The selection of innovations should be guided by a combination of criteria, including the anticipated systemic impact of the planned transformations, the likelihood of achieving success, and the feasibility of sustaining the changes over the long term.

7. It is essential to have a comprehensive understanding of how to effectively initiate and implement intended changes. This requires in-depth knowledge of the individuals, organizations, and physical and technical processes involved. It is necessary to identify which system elements are most receptive to change and where resistance to the proposed solutions is likely to emerge.

8. It is necessary to successfully implement the planned innovation program. This requires strategy, resources, leadership engagement, support from allies, skills, and the ability to adapt intended plans to changing circumstances. The most important element of success is flexibility and continuous learning. One must be prepared to change plans and adapt to evolving situations.

9. It is essential to continuously monitor the results, refine the relevant indicators, and improve the quality of the information received. This iterative process serves to deepen our understanding of the problem's essence. Such an approach enables us to determine the trajectory we are currently following, understand the rationale behind this direction, and identify the necessary changes or actions required to ensure sustained progress along the correct path. Furthermore, it provides a framework for assessing whether we are moving toward success in our endeavors.

This article presents the results of a practical implementation of AtKisson's algorithm. The development of this algorithm has contributed to a deeper understanding of the natural essence of war and peace.

2.2 Methodology of Contemporary Systems Research

AtKisson considers systems thinking to be the foundation for future activities capable of ensuring conflict-free sustainable development.

Systems thinking is a totality of methods and techniques underlying cognition, research, and construction of phenomena, objects, and processes as systems. It should be noted that the methodological tools of academic disciplines have a distinctly expressed analytical nature and are unsuitable for analyzing the wholeness, hierarchy, and organization inherent in a system. Therefore, within the framework of systems thinking, considerable intellectual effort has been devoted to modifying these methodological tools (Sadovsky, 1974). The results of such modification are demonstrated by the classification of systems approaches (see Figure 1).

The proposed classification rests upon five distinct systems approaches: pre-disciplinary, disciplinary, interdisciplinary, multidisciplinary, and transdisciplinary. This typology of systems approaches is widely

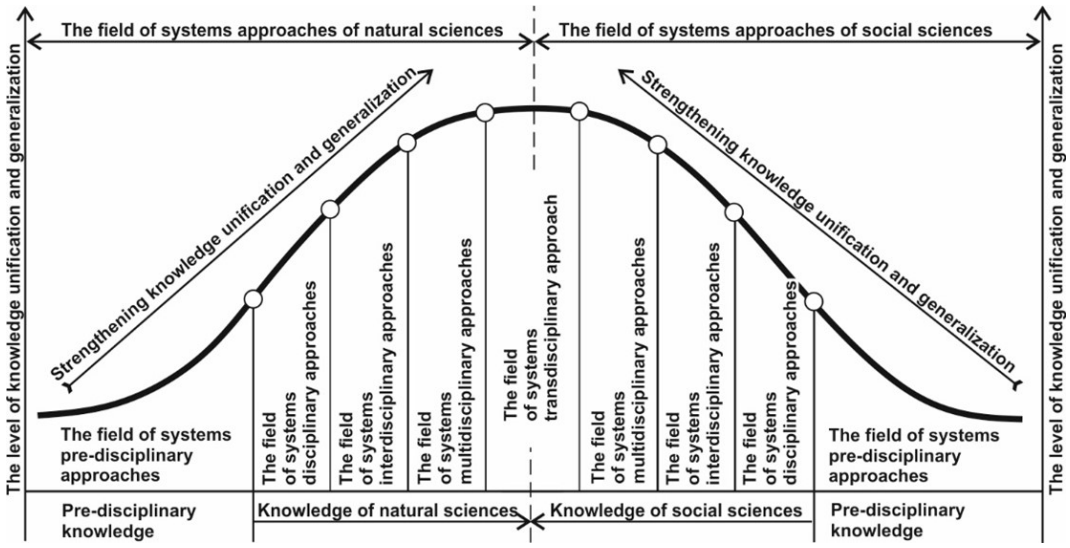

Figure 1: *Strengthening unification and generalization of disciplinary knowledge in natural and social sciences within systems approaches.*

applied in systems research across both the natural, social, and humanitarian sciences (Mokiy & Lukyanova, 2022a). Moving from the systems pre-disciplinary approach to the systems transdisciplinary approach entails a successive broadening of the scientific worldview horizon among systems specialists. In the course of this expansion, the image of the system transforms from a "collection of parts and their interactions" to a "general order manifesting in the space, time, and information of each object, i.e., a "fragment of a One Orderly Medium". At the same time, the strengthening of the integration of disciplinary knowledge, as is customary in the classification of academic scientific approaches, is changing to strengthen their unification and generalization.

To justify the choice of a systems approach from their classification, which will be required to substantiate the natural essence of war and peace, let us briefly review each of these approaches.

Systems pre-disciplinary approach is a method of intuitive, holistic perception and description of objects and processes in the surrounding world, achieved through systems' irrational knowledge that cannot be expressed in a strict, ordered form, and is not subject to logical justification. The system pre-disciplinary approach demonstrates the objective context of the unconscious perception of the unity of the world, a priori inherent in every human consciousness.

Systems disciplinary approach is a method of correctly identifying and modeling an object or problem as a local disciplinary system, enabling the application of an appropriate systems disciplinary methodology to its investigation. The systems disciplinary approaches demonstrate a special way of systematizing disciplinary knowledge during classical systems research, leading to positive results. Not all existing knowledge is admitted to the process of systematization, but only those which are specially selected by the researcher according to certain criteria when modeling the object as a system (a set of certain disciplinary knowledge and subject areas, parts or fragments of the object, or the objects themselves, which are in a natural relationship).

Systems interdisciplinary approach is a method of correctly identifying and modeling an object or problem as a local interdisciplinary system, which allows for the application of complementary systems disciplinary methodologies to their investigation and resolution. The systems interdisciplinary approaches demonstrate a way of generalizing disciplinary knowledge from similar subject areas of objects within the framework of modeling their relations as a system. As a result of such generalization, the logic and methodology of systems research become more complex, while the language of systems theories (empirical systems disciplines) becomes enriched.

Systems disciplinary and systems interdisciplinary approaches are most effective for the study of well-structured and formalized purposeful systems and their associated problems. However, issues such as the sustainable development of society, the objective causes of war and peace, and the cyclical nature of their alternation throughout human history are inherently ill-structured and lack formalization. Consequently, these systems approaches lack the necessary research potency to address such complex, multifactorial challenges.

Accordingly, the classification of systems approaches warrants particular attention to two distinct categories: the systems multidisciplinary approach and the systems transdisciplinary approach.

Systems multidisciplinary approach is a method of correctly identifying and modeling a complex object or a complex multifactorial problem as an integral multidisciplinary system, enabling the application of an appropriate set of systems disciplinary methodologies for its investigation and resolution.

Systems transdisciplinary approach is a method of correctly identifying and modeling a complex object or a complex multifactorial problem as a transdisciplinary system, which allows for the application of a universal systems transdisciplinary methodology to their investigation and solution.

A distinctive feature of these approaches is their reduced reliance on the empirical description of systems research procedure. However, they are more dependent on existing general philosophical solutions and on the image of the natural scientific picture of the world. These factors significantly influence both the ontological and epistemological aspects of systems research, as well as the evaluation of its future development prospects. In this context, the development of such systems is fundamentally shaped by the heuristic, systematizing, and worldview functions of the world picture, of which each exhibits an intrinsic systems organization. Equally significant are the concepts of space, time, and information, which are directly related to fundamental philosophical entities such as the world, the universe, the planet, and humanity.

It is important to note that within the framework of a multidisciplinary systems approach, "general philosophical" solutions are derived from the evident structure and function of the studied systems, as a non-formalized Whole. In the context of the Whole, whose role in our case is played by sustainable development, four of its aspects are distinguished and studied separately. At the same time, sustainable development itself is a system whose property does not depend on the properties of its constituent aspects (parts). In other words, the application of the systems multidisciplinary approach will not be able to move the solution to the problem of sustainable development, the investigation of its main aspects, and the nature of war and peace, from the state of uncertainty, in which they currently reside.

Within the framework of the systems transdisciplinary approach, general philosophical solutions are formed based on philosophical theories about the form and content of the object under study as a formalized one. In the context of such a general philosophical solution, sustainable development itself and its main aspects constitute the One Orderly Medium. In such a medium, the role of the system is played by general order. Consequently, sustainable development, its main aspects, and the phenomena accompanying it can be studied through universal models of spatial, informational, and temporal units of order. These models are used to maximize the unification and generalization of disciplinary knowledge (the model of information unit of order), as well as the structural and functional complexity of objects and processes (models of spatial and temporal units of order) (Mokiy & Lukyanova, 2019). At the same time, systems transdisciplinary unification and generalization do not destroy disciplinary classifications of knowledge and do not cancel their disciplinary criteria, indicators, and parameters. Rather, it allows for the interpretation of these criteria, indicators, and parameters from the perspective of the total isomorphism of universal order, which determines the unity of the world, i.e., unity of all that exists In this capacity, the systems transdisciplinary approach is capable of becoming the foundation for a general theory of systems as a scientific metadiscipline (Systems Transdisciplinarity) and thereby provide the necessary level of scientific rigor when rethinking and solving the complex multifactorial problem of sustainable development, the interaction of its main aspects, and the justification of the objective nature of war and peace (McGregor, 2024).

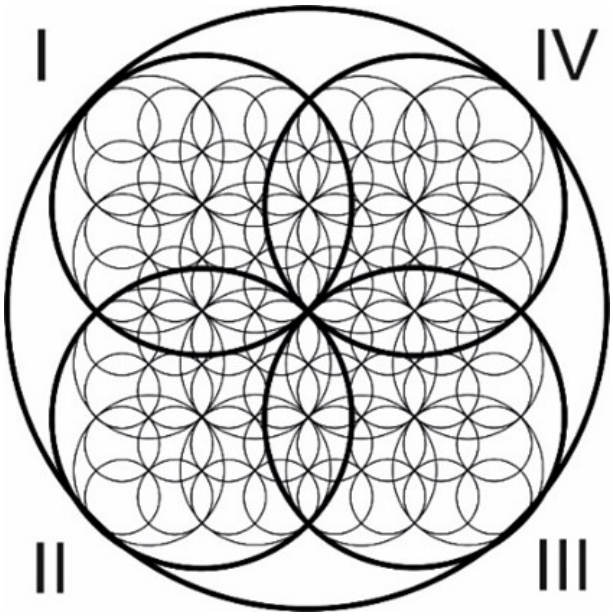

Figure 2: *Systems transdisciplinary model of the spatial unit of order.*

3 Results and Discussions

This research employed a transdisciplinary systems approach to ecosystem analysis, guided by AtKisson's algorithm. This research employed a transdisciplinary systems approach to ecosystem analysis, guided by AtKisson's algorithm.

3.1 Natural Planetary Mechanism of Ecosystem Formation

Medium potency. In turn, potency is a constructive force of general order, whose existence, manifestation, and transformation directly determine the prospective future of its One Orderly Medium. In this case, the systems transdisciplinary model of the spatial unit of order enables social science specialists to literally see space, as well as to identify the internal elements, structures, and processes that are fundamental to a given ecosystem, and to comprehend the internal principles of its functioning.

Systems transdisciplinary model of the spatial unit of order is a logically complete structure of spatial fragments, which enables substantiating the physical boundaries within which the potency of the one orderly medium exists, manifests itself purposefully, and undergoes transformations. The model of the spatial unit of order is shown in Figure 2.

The specifics of this model are discussed in detail in the relevant literature (Mokiy, 2019, 2020). For this article, it is important to demonstrate that space, as a form of potency existence, is an active participant in the expedient process of development of any system. This particular feature of space was first noted by microbiologists in the 18th century. Studying the process of embryo formation from a mosaic of self-differentiating parts, scientists explained this phenomenon by the presence of a "vital force" or vis essentialis (vital power). According to them, this force or energy, acting similarly to gravity or magnetism, organizes embryonic development (Gilbert, 1994, pp. 41–42).

The key phrase, "the vital force acting on the development of a biological object, similarly to gravity or magnetism", remained unnoticed by social sciences specialists. Unlike natural scientists, they were insufficiently aware of the conservatism of planetary nature. Having once created an effective mechanism for transforming planetary matter, the planet has never abandoned and does not abandon applying it in every suitable case. To identify some of these cases, it is necessary to clarify the concept of "ecosystem" as

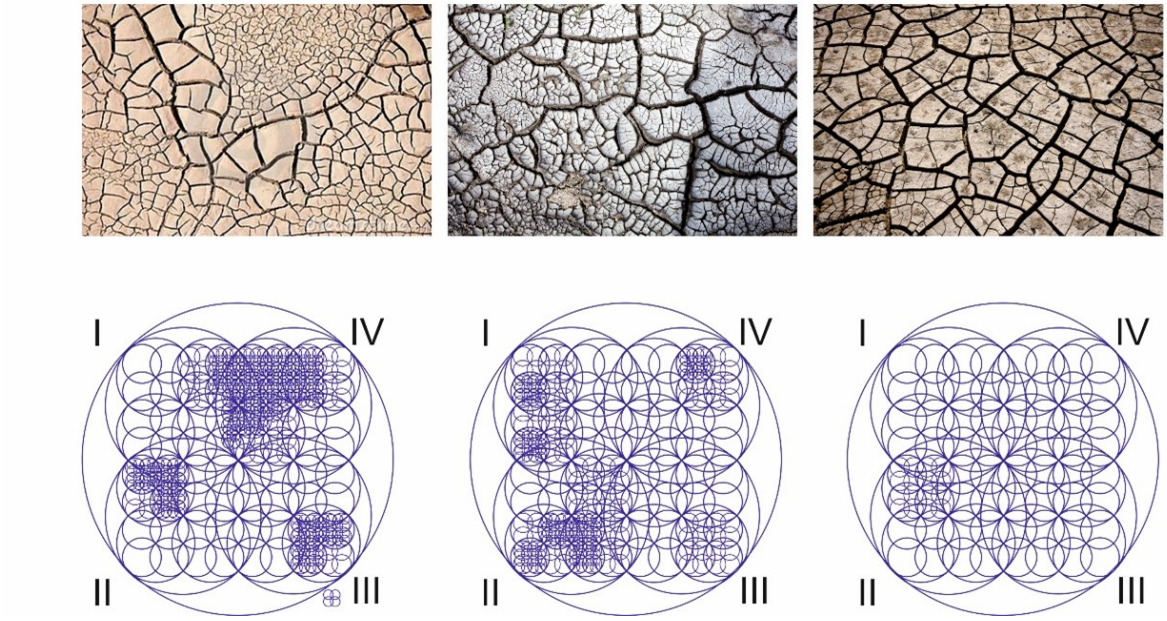

Figure 3: *Samples of the surface structure of dried soil and their correspondence to the systems transdisciplinary model of the spatial unit of order.*

discussed by AtKisson. In systems transdisciplinarity, the term "system" denotes a universal order that determines the unity of the environment. Therefore, the image of "ecosystem" is replaced by the more suitable term "geo-bio-socio-cenosis". A cenosis is a community of objects of one or several species that are in close interrelation in certain environmental conditions (Biocoenosis, 2006). Geo-bio-socio-cenosis is a stable aggregate of human, animal, plant, fungus, and microorganism communities inhabiting a space of a certain size (a plot of land or body of water) and interconnected with each other and the environment.

The distribution of the "constructive force of general order" is achieved by dividing the space of the geo-bio-socio-cenosis into fragments (takyrs). Takyrs are landforms forming the dry soil surface. As prescribed by the systems transdisciplinary model of the spatial unit of order, by decreasing and increasing twofold, the sizes of its fragments form a matrix of natural sizes. Each such fragment is a carrier of a certain portion of potency. This potency organizes and supports the expedient development of a certain cenosis, specifically, geocenosis, geo-bio-cenosis, and geo-bio-socio-cenosis. The structure of the dried soil surface allows seeing real examples of the structure of geo-bio-socio-cenosis space fragments (see Figure 3).

Expanding to the scale of continental surfaces, the corresponding spatial structure of the geo-bio-socio-cenosis is crucial in shaping the territories of states. To substantiate this claim, it suffices to compare the structure of geo-bio-cenosis spatial fragments with the world political map, which delineates state borders (see Figure 4).

The tendency of geo-bio-socio-cenoses (states) to adapt their territory to a spatial fragment of a certain size stems from the natural necessity to access the ≪constructive force of universal order≫, or, in other words, to secure an opportunity for purposeful development. In the language of the natural sciences, this ≪constructive force of universal order≫, acting in a manner analogous to gravity or magnetism, determines the characteristic features of the economic, social, and cultural dimensions of sustainable development for each state and society as a whole. This conclusion allows asserting that ecological sustainability is a system-forming element of sustainable development. This fact must be taken into account by scientists and specialists in the social sciences.

Figure 4: *Structural similarity of takyr soil surfaces and contemporary state borders.*

3.1.1 Distinctive Features of the Natural Restructuring of the Geo-bio-socio-cenosis Spatial Structure

Following AtKisson's algorithm, it is necessary to briefly address the process of developmental potency distribution in order to comprehend the key trends associated with the geo-bio-socio-cenosis, as well as to identify the internal elements, structures, and processes which are fundamental to this object. For the purposes of a systems transdisciplinary study, the term "geo-bio-socio-cenosis" is replaced by an analogous term, namely, "vertical functional ensemble". For example, a planetary vertical functional ensemble consists of horizontal functional ensembles, i.e. humans, animals, plants, fungi, and microorganisms. This conceptual clarification enables the application of systems models as a universal order, ensuring the unity of horizontal and vertical functional ensembles with the space of surrounding environment. As AtKisson asserted, "the constructive force of universal order", which plays the role of a natural developmental potency, is today often supplanted by "economic growth" (an obvious analogue of developmental potency). It should be noted that economic growth is determined by the economic sustainability of states and is supported by the needs of the population. The nature of these needs (essential or status-based) is defined and maintained by the social stability of the state. The nature of the population's benefits (limited or unlimited) is defined and maintained by the cultural sustainability of the state. Consequently, economic growth, as an indicator of high economic development of one or several states, significantly exceeding the growth rates of other states, contributes to the consistent violation of the natural global developmental process in which all states are involved.

Using the spatial unit of order model, the above example clarifies why and how cycles arise within the horizontal functional ensemble of human society, explaining both the emergence of beneficial cycles and those manic cycles that result in challenges, threats, and conflicts. This example essentially demonstrates various options for the natural distribution of the total volume of developmental potency. In the context of this example, the quantitative and qualitative characteristics and parameters of the four main aspects of sustainable development must be clearly defined and described in terms of the scientific disciplines within which these aspects are studied. Consequently, violations of these inherent characteristics and parameters of natural development will lead to the destruction of the established spatial structure of a territory. Each stage of this structural destruction corresponds to a specific negative phenomenon, namely global challenges, global threats, and global conflicts.

Global challenges are contemporary issues in interstate relations, stemming from divergences in their political, economic, environmental, and sociocultural objectives and the strategies employed to achieve them.

Global threats are problems in international relations between alliances of states that arise from differ-

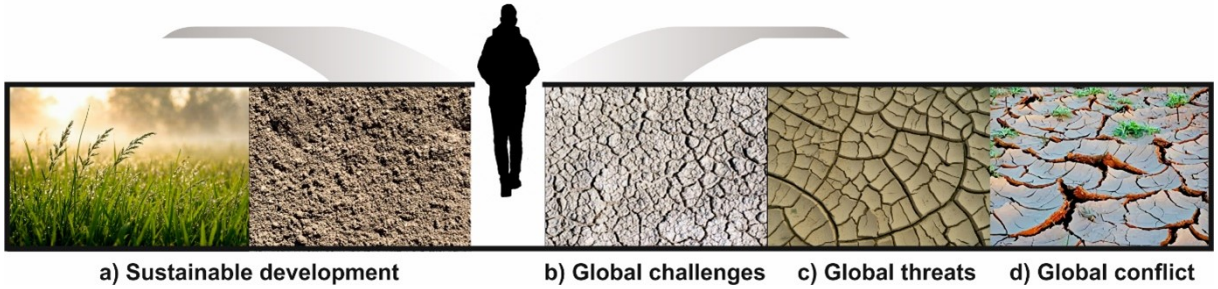

Figure 5: *Variants of structure and state of soil takyr surfaces associatively corresponding to challenges, threats, and conflicts.*

ences in interpreting political, economic, environmental, and sociocultural goals and methods for achieving them within the framework of the existing world order.

A global conflict is an attempt to resolve a global threat through armed confrontation between states and alliances, which typically results in the collapse of the existing order and the establishment of a new one.

The world order is defined as the totality of relations among states and state unions, grounded on a set of cultural models, ethical norms, legal rules, and restraining factors, which serve to prevent the emergence and/or mitigate the escalation of global challenges, threats, and conflicts within a specific historical period (Mokiy, 2024).

It is important to emphasize that the fragments of the spatial unit of order model (Fig. 2) do not require the establishment of rigid, clearly defined boundaries. Moreover, these fragments partially overlap one another, demonstrating the unity of space and the unity of the potency for purposeful development. Consequently, if the distribution of potency volumes and their inherent, predetermined characteristics of transformation are not disrupted by participants of horizontal functional ensembles, the surface of the territory will not exhibit takyrs (a state of non-manifest takyrization). Such a development trajectory should be termed "sustainable development" (see Figure 5a).

Violation of this law, including through the use of unevenly distributed potency of "economic growth", leads to the emergence of negative phenomena.

The process is initiated by an initial stage of partial takyrization, manifested by the emergence of barely discernible takyrs. This stage is associated with a condition of global challenges (see Figure 5b). Under such circumstances, states are compelled to prioritize the preservation and redistribution of existing resources, the defense of national interests, and the safeguarding of state sovereignty. The greater the intensity of these activities, the more distinctly the boundaries of both the takyrs and state borders are delineated.

While treating global challenges as inevitable phenomena, the process of partial takyrization gives way to total takyrization. In this case, well-defined takyrs and their conglomerates (groups of takyrs) form in the territory under consideration (see Figure 5c). While associating these takyrs with state territories, certain phenomena can be reflected, which are characteristic of the current international relations landscape. For example, every contemporary state is compelled to adopt additional measures to ensure its own economic, ecological, social, and cultural sustainability. As a result, state borders have become less accessible to migrants and residents of neighboring countries. This has also led to a trend toward the creation of state unions that pursue similar objectives, share a common understanding of the essence of economic growth and its prerequisites, the significance of moral and ethical values and guidelines, etc.

The ongoing process of total takyrization inevitably leads to destruction process resulting in the disruption or complete breakdown of the existing structure of the takyrs in a given territory. During this process, the edges of the takyrs bend upward to the maximum extent. Subsequently, the material from the edges of the takyrs crumbles and fills the voids around the former takyrs (see Figure 5d). This process of soil destruction can be associated with a state of global conflict. Figuratively speaking, the result of global conflict tends to bring the territory's space to the maximally possible state of non-manifest takyrization.

In doing so, conditions are created for the formation of a new world order.

3.2 Main Interpretations of the Nature of War and Peace

The manifestation of potency or constructive power of universal order can be found not only in every fragment of territorial space. The purposeful transformation of planetary matter leads to an increase in the complexity of chemical substances. Further transformation of such substances requires new biological life forms. Developing a theoretical justification for the unity of takyr territories and geo-bio-socio-cenoses, it is logical to suppose that the geo-bio-socio-cenosis of each takyr and the united group of takyrs within a certain territory will differ by specific types of biological life forms.

Summarizing biological knowledge, it can be stated that the main elements of all developing life forms are non-nucleated cells (prokaryotes) and nucleated cells (eukaryotes). In our case, it is necessary to focus on the formation of basic evolutionary institutional structures, which have resulted from the evolutionary development of these cells. Such institutional structures are three main multicellular life forms that are directly involved in the modern process of purposeful transformation of planetary matter. These forms are biological colonies, biological colonial organisms, and organisms as biological individuals.

- **Biological colonies** are typically aggregations of cells of the same species (representing a mode of cooperative survival for unicellular organisms). Their coexistence is based on a certain mutual benefit. Living in a colony enables them to survive in changing environments, for example, by forming an external protective layer of cells or extracellular secretions, as well as to respond more effectively to chemical signals secreted by their potential prey. In some cases, certain unicellular species, such as slime molds (a type of fungus), form colonies when it is necessary to overcome physical obstacles on the way to food resources. Colony growth and the uneven distribution of vital resources among cells can promote purposeful and sequential cell differentiation (the accumulation of differences between them) (Madigan, 2012).

- **Biological organism** is an elementary unit (individual) of a biological species, exhibiting all essential characteristics of life. These include metabolism, the ability to maintain the stability of its internal organization and to reproduce it in the reproduction processes, the ability to transmit hereditary traits to subsequent generations, and so on. An organism contains rigid connections of interdependent and hierarchically arranged components at the cellular, tissue, and organismal levels, as well as a constantly evolving mechanism of consciousness (Iordansky, 2017).

  To apply the proposed evolutionary institutional framework in the context of this study, it is assumed that states located in equatorial (climatically stable) zones correspond to prokaryotes (non-nucleated cells), whereas states situated in regions with harsher and more variable climates are analogous to eukaryotes (nucleated cells). The latter are characterized by the necessity to accumulate, preserve, and transmit unique survival experience across generations. Following this evolutionary institutional gradation, such states are expected to implement the individual characteristics of geo-bio-socio-cenoses both within the boundaries of each takyr and across unified groups of takyrs within a defined territory. These individual features are determined by a natural predisposition to exist within social formations that can be conceptually associated with biological colonies, colonial organisms, and multicellular organisms (i.e., organisms as biological individuals).

  This circumstance allows for an important and practically applicable conclusion: the purposeful transformation of planetary matter enables a conditional classification of all contemporary states and their alliances into three distinct groups:

  - states and their unions that exist and operate according to the principles of a “biological colony”;
  - states and their unions that exist and operate according to the principles of a “biological colonial organism”;

- states and their unions that exist and operate according to the principles of a "biological multicellular organism as individuals".

In accordance with this division, each state will determine the content of the economic, ecological, social, and cultural aspects of sustainable development, formulate national interests, and build international relations in line with its own special "biological code". Consequently, for each particular state, the surrounding world will represent either global colony, or a global colonial organism, or a global multicellular organism (individual). In this case, the concepts of global challenges, global threats, and global conflicts, as well as the directly related concepts of state of peace and state of war, have entirely different life-affirming interpretations.

In states and unions of states—**colonies,** in which the main principle of existence is fierce struggle for possession of resources (food, water, energy, and material), challenges, threats, and global conflict (war) are permanent elements of political and economic life. In this case, the term ≪peace≫ is perceived in such states as a phase of cold war. The term ≪war≫ is perceived as one of the main conditions for their economic growth and prosperity. At the same time, world order is interpreted as the ≪order of the strong≫.

In states and unions of states—**colonial organisms,** in which the main principle of existence is the striving for a more rational social organization that allows for the effective use of available resources (food, water, energy, and material), challenges, threats, and global conflicts (war) are periodic elements of political and economic life. Therefore, the term ≪peace≫ is used to denote the period between global conflicts. In this case, peace plays the role of a more or less successful business project, in which the formation, development, and obsolescence of social organization forms occur, based on the current comprehension of the main aspects of sustainable development. At the same time, world order is interpreted as a framework of political agreements and economic deals.

In states and unions of states—**organisms,** in which the main principle of coexistence is the dytriving for the formation of a common favorable geographical environment (a comfortable and resource-provided environment), challenges, threats, and global conflict (war) are unacceptable phenomena of political life. The term "war" in an organism is remotely associated with the term "manifestation of cellular, tissue, and general immunity". In this case, "peace" is a fundamental basis for sustainable development. Moreover, the term "peace" denotes a unified meaning to which the content of the main aspects of sustainable development should correspond. At the same time, world order is interpreted as an order based on just international law.

This circumstance allows speaking about the legitimate existence of at least three interpretations of the nature of war and peace within intrastate contexts. Each such interpretation will serve as a conscious or unconscious basis for international relations, the creation of international unions, the principles of alternating world orders, unbridled desires to unleash "hot and cold" wars, and the striving for peaceful coexistence. This complex situation refers us to step six of AtKisson's algorithm.

3.3 Innovations in the Structure of International Relations of Contemporary States

The sixth step of AtKisson's algorithm involves identifying specific changes that will enhance the development of the system and guide it toward a sustainable path. According to AtKisson, such changes may include new goals, projects, technologies, and approaches, as well as new types of thinking or paradigms. The selection of innovations should be determined by a combination of criteria, specifically, the expected systems consequences of the proposed transformations, the probability of achieving success, and the possibility of preserving the results of these changes in the long-term horizon.

To substantiate the choice of innovations, the following circumstances should be considered. Each state has a structure of public administration bodies. The foundation of this structure consists of sectoral ministries (departments, secretariats, and bureaus). It is worth noting that the employees of these ministries are specialists who have acquired higher education in their respective fields at universities. For instance, the Ministry of Foreign Affairs employs diplomats, the Ministry of Health is staffed by medical doctors, the Ministry of Finance—by financiers, the Ministry of Economic Development is staffed by economists, and the Ministry of Defense (or War)— by military personnel.

Any modern state can be classified as a colony-state, a colonial-organism state, or an organism-state. It is reasonable to assume that the political leadership, elites, civil servants, and the majority of the population are likely to adhere to a worldview shaped by one of the aforementioned ≪biological codes≫. This worldview underpins a unique understanding of the economic, social, cultural, and ecological dimensions of sustainable development, as well as a distinct perception of the essence of war and peace and the methods for their attainment. Today, this circumstance is often regarded as an ≪objective≫ phenomenon that hinders the establishment and maintenance of peace in international relations. In reality, however, this is not an objectively grounded but a subjectively constructed phenomenon. It is a consequence of the absence of an appropriate element in the structure of public administration—namely, a Ministry for Peace—and a shortage of specially trained, university-educated systems transdisciplinary generalists who should become employees of such a ministry.

3.3.1 3.3.1 Structure of the Ministry for Peace

The establishment of a Ministry for Peace does not disrupt the coordinated functioning of existing ministries and government bodies. Rather, it fills a critical gap in state activity, an area that currently lacks designated agencies and responsible leadership for its outcomes. Today, many institutions are engaged in the "struggle for peace"—from the Ministries of Defense and Foreign Affairs to various public, cultural, and religious organizations. However, it is logically inconsistent to fight for peace. Instead, what is required is the deliberate and continuous creation and maintenance of conditions for the uninterrupted existence of the peace. In this context, the Ministry for Peace must be tasked with the effective prevention of global challenges, the successful mitigation of global threats, and the guaranteed prevention of local, regional, and global conflicts. Like other ministries, the Ministry for Peace should employ appropriate disciplinary technologies, namely, "escalation deterrence technologies" in both intrastate and international relations, as constructive tools for fostering stability, rather than coercive "peace enforcement technologies".

Given the unique nature of its mission, the proposed structure of the Ministry for Peace should include the following main departments and specialized agencies.

Department for conceptual and methodological support of the world order:

- agency for philosophical and conceptual support of world order.

Department for international coordination of non-coercive "peace enforcement" and "escalation deterrence" technologies in international relations:

- agency for the development of non-coercive technologies for enforcement of the requirements of world order in the economic, ecological, social, and cultural aspects of sustainable development;
- agency for the development of non-coercive technologies for enforcement to peace within the context of existing world order requirements;
- agency for the development of non-coercive technologies for deterrence of escalation in international relations within the context of existing world order requirements.

Department of international relations:

- agency for coordination of the ecological aspect of international sustainable development;
- agency for coordination of the economic aspect of international sustainable development;
- agency for coordination of the social aspect of international sustainable development;
- agency for coordination of the cultural aspect of international sustainable development.

Department for intrastate sustainable development:

- agency for coordination of the ecological aspect of intrastate sustainable development;
- agency for coordination of the economic aspect of intrastate sustainable development;

- agency for coordination of the social aspect of intrastate sustainable development;
- agency for coordination of the cultural aspect of intrastate sustainable development;

As follows from this proposed structure, the Ministry for Peace must conduct both international and intrastate activities.

The international role of the Ministry for Peace of a given state, which encompasses collaboration with analogous ministries in other countries, is oriented towards contributing to the development of the concept of conflict-free sustainable development for contemporary society, while taking national interests into account. Both intrastate and international activities are to be conducted within the framework of preserving a unified functional ensemble of the planet (the global organism). It is within this context that a concept of world order and principles for its non-coercive enforcement by all states will be formulated, irrespective of their intrastate worldview or national interests.

Intrastate activity of the Ministry for Peace assumes forming and practically implementing a concept of sustainable national development and its state interests, as well as their practical implementation involving disciplinary specialists from relevant ministries.

3.3.2 Departmental Staff of the Ministry for Peace

The idea of a Ministry for Peace is bound to become utopian if its officials are narrow specialists—ecologists, economists, sociologists, and cultural experts. Although these specialists possess disciplinary worldviews, core disciplinary knowledge, and disciplinary methodologies, it is precisely this fact that prevents them from solving the complex, ill-structured problems of contemporary society. However, to successfully perform their duties, employees of the Ministry for Peace must not only have disciplinary knowledge. As mentioned above, they must also have developed systems thinking, a clearly defined systems worldview (world picture), and the methodology of a systems transdisciplinary approach. All these qualities must be acquired by future employees of the Ministry for Peace at the university.

Candidates for the positions of officials at the Ministry for Peace (masters, doctoral students) can acquire such education at departments of systems transdisciplinarity or through two-year courses in the field of "systems transdisciplinary generalist specialist". These departments or courses are to be established at universities in countries interested in preparing such experts. A significant obstacle to organizing education for systems transdisciplinary generalist specialists is the absence of an appropriate textbook that would meet all requirements for such educational literature. This obstacle was overcome in 2026. The textbook entitled "Methodology of Scientific Research. Systems transdisciplinarity" was developed during 2023–2026 and was published in 2026 by a group of transdisciplinarity specialists within the International Project "Forming Systems Transdisciplinary Worldview in the Field of Higher Education (2023–2026) (Passport of the International Project 2023–2026). This textbook conceptualizes systems transdisciplinarity as a metadiscipline that embodies all essential attributes of scientific rigor. These include a philosophical foundation, a theoretical framework, a comprehensive methodology with corresponding methodological tools, and a specialized language, as well as the capacity to create unique technologies and conduct risk analyses for both nature and society. Such analyses are crucial in addressing potential challenges arising from proposed solutions aimed at war prevention, peace preservation, and the achievement of conflict-free, sustainable development of the state and society (Mokiy & Lukyanova, 2026).

The textbook is dedicated to the history of the transdisciplinary and contemporary systems movements, providing a critical analysis of the final documents from key conferences and symposia held between 1968 and 2025. It offers an in-depth examination of the prospects, limitations, and future development trajectories of these movements. This comprehensive understanding equips generalist specialists with the ability to consider both the theoretical foundations and the practical implications resulting from the parallel evolution of academic and systems science. This expertise will render generalist specialists highly sought-after, not only within Ministries for Peace but also as consultants and facilitators in traditional governmental ministries. Their role will be crucial when there is a need to integrate and synthesize knowledge from diverse disciplines in order to develop effective strategies for international and intrastate relations.

In the final step of his algorithm, AtKisson underscores the necessity of continuously monitoring the results of implemented actions, improving signal quality, and enriching acquired information to achieve a more profound comprehension of the problem's essence. This will allow us to determine: where are we currently headed? Why? What should we change or do to ensure movement in the right direction over the long term? And how will we know if we are succeeding on this path?

This step of the algorithm can be practically implemented employing the systems transdisciplinary model of the temporal unit of order (Mokiy, 2021). The advantage of this model is its ability to demonstrate a set of calendar periods, which describes the duration and internal organization of the process under study. Each of these periods sequentially brings the process closer to the targeted result. This allows for retrospective and prospective study of the process based on the logical compatibility of results from its past and upcoming periods. A large-scale systems transdisciplinary study of the development process of various stages of human society was completed in 2022 (Mokiy & Lukyanova, 2022b).

The format of the article made it possible to briefly recall the results of this study and answer the question: Where are we currently heading?

- The period of the existing world order in modern society had ended by 2015.
- From 2016 to 2023, this fact was actively recognized and processed by political elites.
- Between 2023 and 2030, society is persistently engaged in resolving the issue of shaping a new world order following the results of a global armed conflict.

Systems transdisciplinary modeling has identified a pivotal shift in the global order. By 2015, the previous world order scenario had concluded, and the dominant paradigm of the ≪imperial form and style≫ in international relations, prevalent since 1792, had been fundamentally transformed. By 2015, global society had literally "matured". Since 2016, international development has entered a new phase, characterized by the ongoing transformation of the "federal form in interstate relations". The success of this long-term process hinges on the ability of states to coexist within novel political unions of an interstate nature. Drawing an analogy to biological organization, where states can be categorized as analogous to colonies, colonial organisms, and individual organisms, these new unions are expected to implement their foundational principles within this emerging framework. It is this very circumstance that will underpin the formation of a multipolar system in international relations.

Consequently, contemporary society finds itself in a state that necessitates the re-evaluation and timely implementation of institutional innovations. As AtKisson has posited, these innovations must encompass new goals, projects, technologies, and approaches, as well as fundamentally new types of thinking and paradigms. The execution of such innovations entails a considerable volume of intricate work for systems-oriented transdisciplinary generalist specialists operating within the framework of Ministries for Peace.

4 Conclusion

To address the fundamental questions regarding the nature of war and peace raised at the outset of this article, AtKisson's algorithm was employed. An algorithm, in this context, refers to a structured sequence of logical instructions designed to achieve a specific outcome. By applying this algorithm, the study was able to integrate systems thinking and the models of the transdisciplinary systems approach, thereby significantly enhancing the analytical and prognostic capacity of the social sciences.

First and foremost, it is demonstrated that ecological sustainability constitutes a fundamental, system-forming element of sustainable development. The mechanism underpinning this objectively grounded element establishes a framework for the fragmentation of territory into discrete units (referred to as takyr), each of a specific size. The uneven distribution of material and other resources, whether caused by objective or subjective factors, renders the external boundaries of these takyr (state borders) difficult to overcome. In the absence of methods and technologies capable of countering the escalating process of total takyrization, global challenges and threats will inevitably culminate in global conflict. This situation is

intrinsically linked to the self-adaptation processes of large social systems. To mitigate these global negative phenomena, a wide range of actors is engaged, including the armed forces, a vast number of disciplinary specialists, various public organizations, and groups of public activists. This collective "army" draws upon historical experience in the *struggle* for peace, the *struggle* against war, the *struggle* for sustainable economic growth, and the *struggle* against the problems preventing sustainable development. In short, the thesis that "life is struggle" is understood as a fundamental principle underlying the alternation of periods of war and peace.

Furthermore, it turned out that the term "large social systems" conceals states and their unions, which differ by their biological code (colony, colonial organism, and organism). In each such state and their unions, the nature of war and peace is interpreted differently—from recognizing the objective nature of the alternation between war and peace to justifying the inadmissibility of forming global challenges, threats, and conflicts in a state of total peace. Such a profound opposition in comprehending the nature of war and peace does not satisfy scientists and specialists with systems thinking and a systems approach. They dare to doubt that, with regard to large social systems, the principle of "competitive struggle", which determines the alternation of war and peace, is primary and fundamental.

Participants of the OECD Working Symposium on Long-Range Forecasting and Planning (held in Bellagio, Italy on 1968) have stated that simply changing politics that have already proven inadequate will not lead to what is right. Currently, disciplinary approaches in planning are frequently employed in a manner that exacerbates pre-existing problems making bad situations even worse. A deeper understanding of the factors involved is essential for the holistic planning and intentional intervention in the structural design of social systems to ensure their more effective functioning. As large social systems grow in complexity, they develop a capacity for self-adaptation. However, when this adaptation occurs spontaneously rather than being deliberately guided, it can readily lead to significant social disruptions (Jantsch, 1968).

Therefore, this article demonstrates that the challenge of ≪self-adaptation of large social systems≫ to achieve conflict-free sustainable development is a non-trivial task. This issue has emerged at the intersection of two distinct stages of civilizational evolution. Consequently, the self-adaptation of a large social system, such as society, cannot be left to chance; it must be a deliberately planned and managed process. Following the approach proposed by AtKisson, the selection of innovations should be guided by a combination of criteria. These include the anticipated systems consequences of the planned transformations, the probability of achieving successful outcomes, and the long-term sustainability of the implemented changes.

The key innovations essential for establishing a new world order that ensures conflict-free sustainable development are as follows:

- The systems transdisciplinary approach, formalized as a metadiscipline.
- University education through dedicated departments or specialized courses for systems transdisciplinary generalists.
- The establishment of a dedicated Ministry for Peace, whose operations should be managed by such generalist specialists.

The research findings presented in this article suggest that societal demand for such specialists will emerge by 2030. Consequently, accounting for a two-year training period, university education programs should be initiated no later than 2027–2028. The concept of establishing Ministries for Peace, staffed by systems transdisciplinary generalists, can be actively discussed in the public sphere up to 2030. The timely implementation of these innovations will enable the problem of "preserving peace and ensuring conflict-free sustainable development of society" to evolve into an independent domain of intellectual and practical public activity. The establishment of a Ministry for Peace in every state, irrespective of its economic, social, cultural peculiarities, or biological code, would facilitate the creation of a genuine "world government" within a relatively short time-frame. Functioning as a logical alternative to the UN, such a global governance structure would eliminate the subjective causes of global challenges, threats, and conflicts, ensuring conflict-free sustainable development grounded in the objective laws governing geo-bio-socio-cenoses. However, as AtKisson emphasizes, the successful implementation of a planned innovation

program requires adequate resources, active leadership engagement, and robust ally support. In this context, it is worth recalling the optimistic notion that "you can stop an army, but you cannot stop an idea whose time has come".

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