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The Distributed Situational Centers System as an Instrument of State and Corporate Strategic Goal-Setting in the Digital Economy

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Abstract: The increasing complexity of corporate digital design, goal setting and management, for which the power of classical scientific approaches to management is insufficient in the digital economy, is noted. In the digital economy, the known principle of the impossibility to automate chaos is replaced by a need for situational control based on providing multi-level fully functional project management using artificial intelligence (AI) and artificial general intelligence (AGI). At the same time, the system of distributed situational centers can become an effective tool for supporting strategic goal-setting. Much that has been done in this field and in the field of AI is of profound significance, but the classical approach to AI cannot embrace the different levels of the subjects' emotions, consciousness, and the collective unconscious. The aspects of breakthrough and disruptive management urgently need to be developed. Attention must be focused on the issue of collective decision making under conditions of uncertainty causes and in unforeseen situations. Priority should be given to the socio-humanitarian and collective cognitive aspects of AI applications. Under these conditions, distributed situational centers system and some methods of AGI become the main cross-cutting digital technologies for ensuring corporate strategic goal-setting in the digital economy.

Keywords: Artificial general intelligence, semantics, self-organization, strategic planning, situational centers.

1. INTRODUCTION

The problem examined here lies in the sphere of the theory and practice of the state and corporate strategic planning during digital transformation (DT). The complexity of this problem is so great that it is not effectively solvable by classical methods. For example, in the registry of the Russian federal strategic planning system there are more than 130000 strategic planning documents, half of which are no longer relevant. And corporate management should take these documents into account during strategic planning.

In these documents of strategic planning, there are 11 national projects, 43 state programs and more than 70 federal projects, and many more regional and municipal projects are being overseen. The processing of these data cannot be synchronized by conventional logical and probabilistic approaches. This can be seen in the digitalization of the economy with the involvement of advanced methods of using the system of distributed situational centers (SDSC), artificial intelligence (AI) and artificial general intelligence (AGI) (Raikov, 2019).

In this case the well-known principle of the impossibility to automate chaos is replaced by a need for control the situation under chaotic conditions; sustainable multi-level project management is required; acceleration of collective processes of the development of strategic goals should be ensured, etc. In this type of situation, and taking into account the poor predictability of the socio-economic and market behavior, it is advisable to use the concept of the breakthrough situational management (Lepskiy, et al, 2018). This approach is designed to work under unpredictable conditions. To ensure robustness, proactive (reflexive) models and modern mechanisms are used, which are based on the methods of AI, strategic analysis, convergent control (Raikov, 2008; Raikov, 2018), quantum semantics (Dalela, 2012), cognitive modeling and natural computation. This ensures stability in the behavior of control systems in cases of unexpected and unintended changes in the environment. At the same time, the formalized semantics of AI have to be complemented by non-

formalized cognitive semantics that emulate the processes of thinking, emotions, meditation, and the collective unconscious.

The leading toolkit in this situation is AI, which can restore order to state and corporate strategic planning and management. However, the development of the methodological core of traditional AI mainly relies on logical data processing, which limits the possibility of applying one in unpredictable situations. The AI methods cannot encompass the total power of the non-formalized cognitive semantics that determine the mental phenomena and behavior of collective strategic actors.

The capabilities of AI are expanding and deepening. This approach is penetrating deeper into the secrets of the sensual and emotional layers of human consciousness, and the collective unconscious. The next generation of AI is represented by AGI (Raikov, 2019), which offers intelligence that is greatly superior to the human mind in almost all areas, including scientific creativity, wisdom and social skills (Bostrom, 2014). However, with the advent of AGI, it is necessary to ensure that its danger to society is not overlooked.

To make the collective strategic goal-setting processes in a network environment purposeful and sustainable, this paper addresses the issue of using SDSC (Fig. 1).

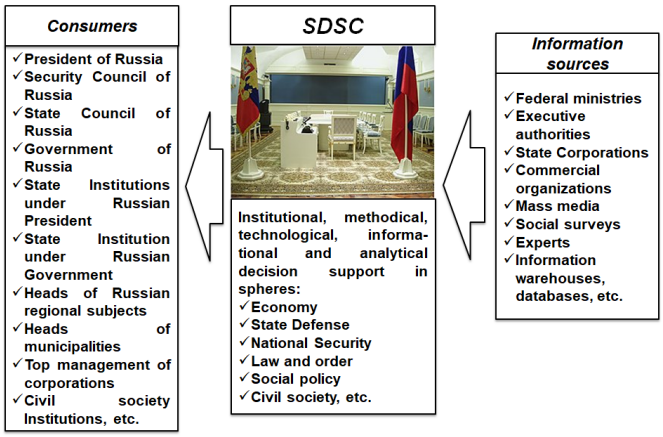

Fig. 1. The main SDSC components

The SDSC is the institutional, software and hardware complex. It helps to overcome the divergence of distributed collective decision-making processes (Gubanov, et al, 2014; Raikov, 2008). Wherein, the special authors' convergent approach for making a choice of the adequate strategic goal-setting methodology was applied.

2. THE DIGITAL CONDITIONS

In Digital Economy new features of the methodological, institutional and technological bases of goal-setting are as follows (Lepskiy, et al, 2018; Lepskiy, 2018; Umpleby, 2019; Raikov, 2018):

- A lack of a subject-oriented technology platform;
- The inability to handle the sudden appearance of break points in management;
- Civil participation in state strategic planning;
- A lack of mechanisms for consolidating power structures and society;
- The hybrid nature of reality (subject, digital, physical);
- The chaotic situation in the field of national strategic planning;
- Unpredictable changes in the characteristics of consumer markets;
- The introduction of qualitative (non-formalizable) information into the modeling process by subjects during inverse problem solving;
- The need to take into account not so much the logic of the model itself, as its formalized and non-formalized (cognitive) semantics;
- The possibility of changing the state of the computer models in a stepwise (quantized) manner;
- The possibility of synchronizing the behaviour of the factors of computer models with the state of the external subject or object, the location and function of which are unknown (quantum non-locality);
- The unpredictability of the external influence on the development of the situation, etc.

These features cannot be provided by classical methods of strategic planning. Currently, about ten schools of strategic planning (Mintzberg, 2001), more than fifty styles of strategic thinking (Krogerus, 2008), at least one hundred methods of knowledge engineering, a number of specialized standards for project and quality management are highlighted. However, despite the presence of a large number of strategic methods and approaches, the genesis of problems in the designing of large information systems and DT can be represented in the form of a completely visible causal relationship. The relationship of causes and effects can decline the success of state and corporate DT, as it is shown in Fig. 2.

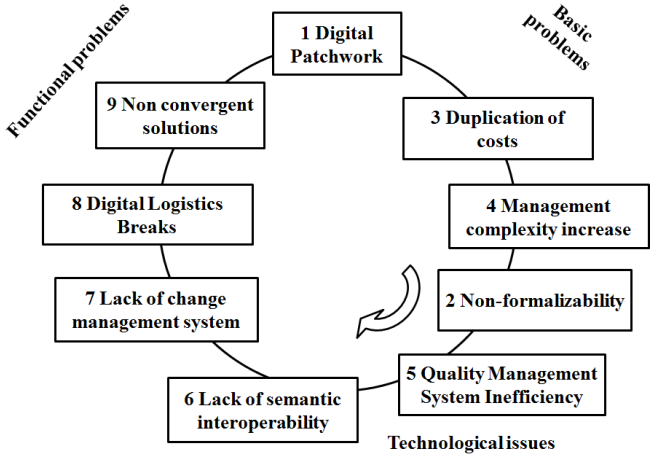

Fig. 2. The reasons of lack of DT success

Analysis of this relationship allows choosing the most suitable approaches and methods to ensure DT and create the required digital platform for the SDSC. The chosen method should break this connection and transform negative effects in positive ones. It is necessary to do this in the context of the

strategic goals-setting, external environment and a competitive global market behavior.

In order to break the negative feedback chain shown in Fig. 2 the following approaches and methods can be used:

- The architectural approach to system design;
- The strategic analysis and planning;
- Project and quality management;
- Flexible design technologies such as Agile, Lean, Scrum, Kanban;
- Ontological method;
- The convergent approach (Raikov, 2008), etc.

These approaches and methods have proved themselves in the global practice of strategic planning and implementation of DT. This list is not limited. For example, to analyse global changes in trade policy in world and domestic practice, to assess the unrealized potential of trade, to analyse the elasticities of import demand and substitution elasticities between importers, different models can be used (Francois, 2002; Shoven, 1992; Hertel, 2003): the Global equilibrium model, the Constant Model substitution elasticity (Constant Elasticity of Substitution), general equilibrium model (Computable General Equilibrium), gravity models, the model for segmentation and prioritization of export products. The partial equilibrium model (Francois, 2002) can be used, where the number of factors reduced relative to the Global equilibrium model.

3. CONVERGENT REFLEXIVE-ACTIVE METHODOLOGY

In order to solve the problem discussed here, the convergent methodology (Raikov, 2008) was developed taking into account the self-developing reflexive-active environments (Lepskiy, et al, 2018; Lepskiy, 2018; Umpleby, 2019), AI and AGI (Raikov, 2019). The methodology helps to increase the level of corporate social responsibility of all participants, and allows ensuring the inclusion of society and consumers in strategic goal-setting.

The dual circuit control has to be developed (Lepskiy, et al, 2018). The first circuit is the established administration system, while the second one represents society (market, consumers). The second circuit is leading in solving the tasks of strategic goal-setting and strategic auditing. It interacts with the first one at all levels of control hierarchy. The ontologies and principles that can help to create the dual circuit control system were suggested in (Avdeeva, et al, 2018). This system consists of several ontologies, as follows: ‘development’, ‘support’, ‘accompaniment’, ‘construction’, ‘implementation’ and ‘innovation’.

A subject-oriented digital platform that can help to take into consideration the self-developing reflexive-active market has to be developed as a basis for creating the post-non-classical scientific rationality technologies (Lepskiy, 2018; Umpleby, 2019). The conceptual structure of the state digital platform is illustrated in Fig. 3.

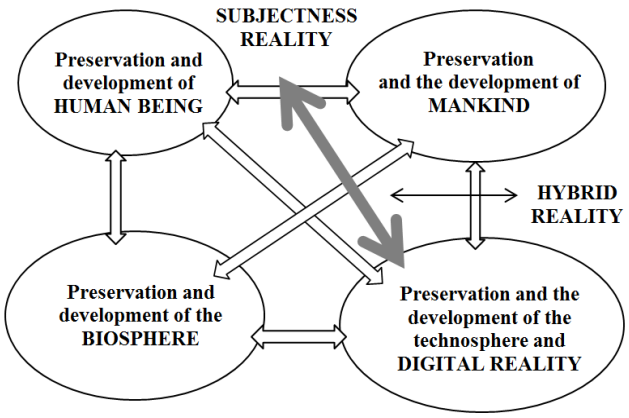

Fig. 3. The state subject-oriented digital platform

The main purposes of this platform are as follows:

- Laying the groundwork for obtaining agreement of the members of collective subjects and for searching adequate mechanisms for the assembly of strategic subjects of development;
- Establishing the foundations for organizing the joint development of subjects;
- Stimulating “project identification” processes for the collective subjects created in the self-developing environment (market);
- Identifying and monitoring challenges, threats and proposals for subject development;
- Developing mechanisms for using "soft power" in the interest of collective subject development;
- Overcoming “economic reductionism” and the selfishness of participants in integration processes, etc.

It is necessary to create new, correct scientific and applied areas of interdisciplinary knowledge in order to improve state and corporate strategic goal setting. The necessary conditions must be created to obtain the desired emergent effect in goal setting. To ensure these conditions the category theory and the theory of topology was applied, and the concept of the “the convergent monad $\aleph$” was introduced as follow (Raikov et al, 2019a):

- *D:* ***Top*** $\rightarrow$ ***Top***; the number of elements in the system of sets ***Top*** (topology) is infinite, and the maps of these objects are maps with a closed graph;
- $\wp$ is a compact space, or a non-empty finite subcover of $\aleph$;
- Any two points of $\aleph$ have disjointed neighbourhoods (*Hausdorff space*).

In the field of philosophy, the emphasis should be placed on its phenomenological and informational branches, while in the field of psychology more attention should be paid to the cognitive and conflicting aspects. In the field of sociology it has to take into account that the traditional methods of sociological and marketing researches are losing their reliability. Cultural studies prioritize ethical issues, and natural sciences are increasingly turning to mechanisms for

building cyber-physical systems, including the collective strategic subject in the problem-solving (Bonci, 2018).

In problem situations of making managerial decisions, in addition to the need to take into account many heterogeneous factors, it is necessary to take into consideration various aspects, as follows: a) the goals and interests, which often determine the system of stakeholders' priorities; b) the decisions that affect both the situation as a whole and impact on those who hold primary knowledge about the problem area; c) knowledge holders about goals, intentions, motivations, etc., which determine preferences during influencing a controlled situation.

In these conditions, the cognitive maps and the decision-making methods that are connected with them may be useful. Cognitive map is a formalised model of a situation, reflecting the knowledge of subjects about causal effects between its significant factors (Avdeeva, et al., 2018).

Proactive (reflexive) monitoring and control methods were introduced together with the technologies of networked expertise (Gubanov, et al, 2014). Since these processes are non-formalizable, the construction of support mechanisms for situational control forces to turn to a combination of methods: the creation of ontologies for self-developing reflexive-active media (Lepskiy, et al, 2018; Lepskiy, 2018; Umpleby, 2019), quantum semantics (Dalela, 2012; Atmanspacher, 2017), category theory, inverse problem solving on topological spaces and controlled thermodynamics (Raikov, 2008), cognitive modelling and networked expertise (Gubanov, et al, 2014), AI and AGI (Bostrom, 2014; Raikov, 2019).

The methodology allows dividing the hard problem into some visible parts, and then assembling them into a single whole, that makes the collective process transparent and well managed.

4. PROACTIVE AND DISRUPTIVE MANAGEMENT

Traditional proactive management is able to assess future scenarios and can generate adequate solutions to prevent undesirable events in the future. The essence of proactive management is that both the object and the subject of management are oriented towards the external environment and try to capture the trends that arise within it, and to include them in the vector of input effects taken into account during collective decision-making.

A control action is projected, based on an analysis of these trends, with the aim of making changes in the initial conditions of functioning of the object. This requires the development of a new management method, referred to here as proactive management. This involves the inclusion in the management system of an additional unit that implements the forecasting function. The key principles of building technologies and systems for proactive management of complex objects include the following:

- An object-oriented approach to the description of the subject area under study;
- Service-oriented technologies for building systems for collecting, processing and analyzing information and distributing knowledge;
- Organizational, informational and functional unity within the framework of the developed information space, and a unified software platform based on an integrated model of data, information and knowledge;
- Technologies for distributed development and the direct participation of experts (analysts) and knowledge engineers in the conceptual and logical design of ontology-oriented knowledge bases, which involves building scenarios of intellectual operational-analytical processing of information and decision-making based on the principle of "programming without programming";
- A simulation-analytical complex with a wide range of models for decision support;
- An open source approach, a lack of royalties to foreign manufacturers and cross-platform support.

At the time of writing, proactive management has been comprehensively implemented in the financial sector, production management and complex technical systems, economics, business and other areas of activity. In the conditions of DT main attention is focused on the issues of collective strategic decision-making caused by the distribution of participants and in the uncertainty of the problem situation.

Priority is given to socio-humanitarian aspects and cognitive components in modeling. The complexity of the cognitive semantics of the models is tens of times higher than the complexity of traditional logical-formalised semantics. In these conditions the methods of AI are becoming the main cross-cutting technology for decision-making and breakthrough meetings.

The new quality appears in the theory and practice of situational management. The foundations of classic approach to situational management were based on the ideas of AI, especially the experts systems. The emphasis was made mainly on the representation of knowledge management on the level of logical–linguistic models, using deductive inference for building different solutions.

The DT is concentrating efforts on the processes of generating a qualitatively new synergy effects. The values of the arising effects from traditional digitalization are more linear than polynomial, and the expected changes towards improving the decision-making processes in this case not as high as expected.

The current management and collective decision-making requirements imply the need for a fundamental changing in the rules of the game. The priority should be given, first of all, to institutional, social, humanitarian and cognitive aspects in management, as well as the aspects of collective, civil and expert participation (Avdeeva, et al., 2018; Gubanov, et al, 2014). The challenges that determine the need to change the paradigm of situational management require taking into consideration:

- The subjective factor in the situational management and decision-making;
- The possibility of people makes a correct but unreasonable decision and getting insight;

- The person's ability to make non-alternative solutions without applying the traditional multi-criteria choice;
- The need to realize the inverse decision process;
- Divergent analysis gives way to convergent synthesis that has to be ensured by its integrity, completeness and stability;
- The need to support cognitive aspects in the processes of self-organization of groups of people;
- The need to use ethical regulators in the processes of collective behavior and collective decision-making.

The new problems have to be solved within the framework of advanced AI, which operates with non-formalized layers of consciousness. A special place in the disruptive situational management and AI is held by non-formalized cognitive semantics. It increases the complexity of the problems that have to be solved. In particular, in creating AI instruments the atomic components of the human brain, such as quarks or microtubules, have to be considered. The important attention in such a study is payed to quantum-mechanical effects. This approach makes the subject of modeling fundamentally depart from its logical and linguistic interpretation.

This study shows that the classical approach to AI is characterized by the limitations that do not allow to solve the problems of very high complexity (Raikov, 2018; Raikov, 2019). For such problems, the infinite dimensionality of the spaces with taking into account the cognitive semantics has to be used. The power of these spaces is tens of orders of magnitude more complicated than the traditional paradigm of situational management and AI requires. The question is the creation of a new philosophy, psychology, mathematics, and cross-cutting technologies of much higher complexity.

5. CIVILIAN PARTICIPATION

The time is gone when the management of a large project, such as putting a human being into space or creating a nuclear industry, could be implemented by a relatively small group of eminent scientists and practitioners establishing appropriate tasks for institutes and production associations. Today, huge national or international projects can be implemented only with the involvement of a large number of specialists who have the right to make certain decisions within their powers, as well as civil society.

One of the problems with the implementation of huge projects in the modern era is that the organization of work technologies is changing faster than the objectives of the projects can be achieved. New principles for managing huge projects under conditions of intensive manipulation of public consciousness are required, involving a completely new approach to monitoring the implementation of such projects.

In recent years, the possibility of using crowdsourcing technology to monitor sustainable development goals has been increasingly discussed, but so far this has been mainly limited to environmental projects in practice. However, crowdsourcing technologies can only reveal the consequences of problems, but not the problems themselves, and cannot be directly used to identify problems which require execution of complex projects.

Civilian control over the implementation of the large projects must be organized on the basis of digital collective intelligence technologies (CIT). Wherein, crowdsourcing technologies should be limited only in terms of confirming the needs and results of the projects, and monitoring the accuracy of execution of work distribution algorithms. Citizen control using CIT will allow the project management system be flexible, efficient and tailored to changing socio-political and market conditions.

The processes of civilian control tend to be very divergent, since a very large number of people are involved with many different opinions. A abovementioned convergent approach must therefore be exploited. This approach provides the necessary conditions for structuring the discussion of information to accelerate networked group decision processes and to make them more sustainable and purposeful.

The SDSC created in Russia aims to be acquired new qualities in order to ensure a prompt response to emerging situations. This is based on the in-depth monitoring of conditions and the development of comprehensively sound recommendations for decision making using AI and AGI technologies. At the same time, SDSC are transforming into a system of distributed situational centers of development (SCD), which differ from SDSC in significantly stronger consideration of the socio-humanitarian factor. SCD are becoming the form of a highly efficient tool in the system of state decision-making and this transforming appears to be logical and timely (Lepskiy, et al, 2018; Avdeeva, et al, 2018).

At present time, the level of consumer readiness of the government, business and society is still too low for introducing and using of the SCD. Under these conditions, the problem of prioritizing the development of information science and education, which aims to ensure the formation of a new intellectual and ideological culture of state management, is objectively brought to the forefront.

Promising research is being conducted in the fields of information philosophy and the philosophical problems of computer science, in Russia, USA, China, and the countries of Western Europe. As a result, new scientific directions such as "informational cultural studies", "informational anthropology", "informational ethics" and "informational aesthetics" have begun to emerge. The further development and integration of information philosophy with other areas of science may become the basis for the formation of a more holistic picture of the world and scientific elite of intellectual leaders who are adequate for this.

6. CONCLUSION

Post-non-classical approach and tools, including AI and AGI, to support goal-setting in self-developing reflexive-active environments can significantly speed up collective decision support processes, as was shown in practical experience. In this way, an advanced network expert procedure allows several dozen strategic conversations and focus groups to be conducted at the same time, facilitating the development of a draft strategy for a branch of industry in just a few hours. At the same time, the danger to society due to the development of such technologies, especially AI and AGI, is relatively

high and is growing, which requires particular attention from the standpoint of moral and ethical principles.

Due to the high variability of the technological environment and the instability in socio-political discourse, the implementation of state strategic goal-setting and management is impossible without involving civil society in their control. This control should not be limited to crowdsourcing, which cannot be used as a rating, and requires networking technologies involving collective intelligence. To make the collective strategic goal-setting processes purposeful and sustainable the SDSC has to be used as its institutional, software and hardware core.

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