Virtual Worlds as an Environment of Agent-Digital Configuration of Collaborative Formats of Functional Processes in Scientific, Technical and Educational Spheres

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Abstract: The article considers the increase in efficiency of scientific, technical and educational activity processes with the elements of new digital ways of interaction between people - innovative agents within the identified matrix of information interests. The authors propose the transformation of research, educational, design and development, consulting, etc. processes based on introducing target models of virtual worlds as an environment of agent-digital configuration of collaborative formats of functional processes. The article offers the possibility of computational optimization of schemes of intellectual communications of people - participants with reliance on their autonomous digital "doubles" using agent-adapted services of support for target communications with elements of artificial intelligence. The authors substantiate the necessity of introducing target models of virtual worlds - meta universes combining physical, virtual and augmented reality, for digital "immersion" of a person [realizing - in the digital space of information transactions - the creative component of the service process (work, services)], in the virtual environment with the computational configuration of the schemes of communication of people - participants.

1 INTRODUCTION

The mechanism of agent-oriented organization of intellectual communications of people in research structures in interaction with federal, regional and municipal governments in the system providing tools for joint work in the virtual environment, demanded on the national scale, is absent at the present time (Bahtizin, Bortalevich, Loginov, et. al., 2019).

It becomes obvious the need to improve the efficiency of research, educational, design and development, consulting, etc. processes based on target models of virtual worlds - meta-universes that combine physical, virtual and augmented reality. On this basis, we can implement computational optimization [within the identified matrix of information interests] of intelligent communication schemes using analysis and modeling algorithms that produce a direct effect, determining the efficiency of management of a set of organizational systems, considering the digital transformation of the processes under consideration (Balandin, Shkuta, Boyko, 2020; Boiko, Balandin, Ivanovskij, 2020).

2 MATERIALS AND METHODS

The basis of the study is the materials of the Ministry of Education and Science of Russia, as well as scientific research of scientists of Lomonosov

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Moscow State University, CEMI RAS on the problems of management of scientific and technological activity. We also analyzed the materials of other universities and research institutes and publications of experts and scientists on the issue under consideration (Bortalevich, Chinaliev, Loginov, et al., 2019; Bugaev, Grabchak, Grigoriev, 2021; Bugaev., Raikov, Saraev, 2009; Grabchak, 2021).

The main research method was the system-structural approach (method), with the identification of key trends in the digitalization of functional processes in scientific, technical and educational spheres as the basis for solving the management problem of increasing the efficiency of intellectual products and services. We propose options for the development of information-analytical tools for the computational optimization [within the framework of the identified matrix of information interests] of schemes of intellectual communications in scientific, technical and educational spheres with reliance on autonomous digital "doubles" of people using agent-adapted services to support targeted communications with elements of artificial intelligence.

3 RESULTS

Virtualization of subject activity factors in the system of intellectual products and services under digitalization, which provides tools for collaborative work in a virtual environment, determined the form and mechanisms for the development of research, educational, design and development, consulting, etc. processes and new ways of work and earnings of people - innovative agents.

The struggle to improve the efficiency of scientific, technical and educational activities actualizes the search for new approaches to support the interaction of people - innovative agents based on introducing target models of virtual worlds as an environment of agent-digital configuration of collaborative formats of functional processes in the digital space of information transactions within the identified matrix of information interests of these people. The key approach is the optimization of intelligent communication schemes using agent-adapted services to support targeted communications with elements of artificial intelligence within the framework of building a digital economy within the Russian Federation.

The following factors complicate the situation:
- the need for purposeful creation and use of digital services with the ability to analyze the personal characteristics of people themselves - innovative agents, their knowledge and competencies, available knowledge bases (including information materials), to calculate the options for interaction in the digital space of information transactions with reliance on autonomous digital "twins" of people using agent-adapted services to support targeted communications with elements of artificial intelligence;
- the need to develop management tools based on a unified ontology of the complex digital super-system being operated interactively in real time;
- the difficulty of coordination of research structures and federal, regional and municipal bodies of management of scientific and technical activity.

The key factor in the digital transformation of processes and procedures in scientific, technical and educational spheres, considering the trend of building a digital economy in the Russian Federation, is the use of network digital formats of research, educational, design, consulting, etc. processes. Here we should develop digital formats based on target models of virtual worlds - meta universes that combine physical, virtual and augmented reality. On this basis, we get the possibility of computational optimization [within the framework of the identified matrix of information interests] of schemes of intellectual communications of people - innovative agents at agent interaction of participants. Optimization of schemes of intellectual communications requires an appropriate infrastructure of agent-based management of interaction of people - innovative agents with other users through their avatars.

Introducing virtual worlds influences the conditions of transition to digital infrastructure for building a polycentric control loop with agent-digital structuring of interaction between people - innovative agents in the transition from traditional to information and, further, to a digitalized environment. The latter provides tools for collaborative work in a virtual environment.

The mastering of new formats of functional processes in scientific, technical and educational spheres occurs in connection with the successful development of the digital environment. The vectors of these formats are digitization of information materials, establishment of interactive human-machine interaction processes - in the digital space of information transactions - of participating real and virtual (artificial) subjects, computational communicating of people - innovative agents on allocated information interests in the sphere of new knowledge and competences as digital assets (databases, knowledge bases, etc.). The development

of the digital environment is a necessary condition for the creation of a post-industrial complex of science and technology by the Russian Federation. It ensures the expansion of the share of Russian products and services in the markets of system-forming innovations.

4 DISCUSSION

To ensure the system-structural efficiency of the digital economy in the Russian Federation, it is necessary to optimize the work of human-machine elements of virtual worlds as an environment of agent-digital configuration of collaborative formats of functional processes in the digital space of information transactions with the ability to create and adapt electronic content for different scientific and technical tasks (Loginov, 2022; Loginov, Bortalevich, Sorokin, 2019). We can realize the optimization of human-machine elements of virtual worlds by forming digital shells for any information content as a basis for increasing the activity of communications of people - innovative agents in scientific, technical and educational spheres.

We propose the introduction of digitized collaborative formats of functional processes based on digital shells for any information content with the support of interactive services both in traditional organizational systems and in virtual reality systems. It is especially important to form a monitoring unit with the analysis of various influencing factors within the network and hierarchical interactions of participants of functional processes in scientific, technical and educational spheres with elements of new ways of work and earnings of people - innovative agents with the reliance on introducing artificial intelligence technologies.

It is necessary to identify new opportunities for increasing the efficiency of functional processes where innovative agents communicate in order to get professional knowledge and competencies, as well as to realize new ways of work and earnings with the help of digital intellectual platforms. The basis for this is the transition to digital-network shells of research, educational, design and development, consulting, etc. processes, digitization of both information materials and communication procedures, as well as procedures for managing the entire complex of scientific, technical and educational activities. To optimize the network and hierarchical interactions of participants of functional processes, we propose the introduction of automated services of multi-parametric assessments of people - innovative agents, which are superimposed on the reactions of these people to different categories of information materials based on a digital "double" of a person who implements - in the digital space of information transactions - the creative component of the service process (work, service).

We propose to integrate automated services of multi-parameter assessments of people - innovative agents into virtual worlds - meta-universes, combining physical, virtual and augmented reality. Increasing the observability of people - innovative agents allows us to configure the schemes of intellectual communications within the framework of agent-digital configuration of collaborative formats of functional processes in the digital space of information transactions with reliance on the polycentric contour of management of scientific and technological activities with integrating any digital management platforms (Loginov, Raikov, 2015).

It is necessary to form a new paradigm of integration of any digital management platforms with the possibility of embedding modern digital "twins" (as a described and analyzed agent) of people - innovative agents within the framework of agent-based models of organization of generation and use of digital assets (databases, knowledge bases, etc.).

We consider it necessary to transition to the systematic formation of agent-based model tools to support the processes of generating digital assets (databases, knowledge bases, etc.), considering the peculiarities of the markets of system-forming innovations. The key factor here is the possibility of automating the procedures of formation of network digital formats of research, educational, design, consulting, etc. processes in scientific, technical and educational spheres with integrating any digital management platforms necessary for the systemic efficiency of management of building a digital super-system.

An important activity is the debugging of human-machine interaction processes in the digital space of information transactions involved in scientific, technical and educational activities of real and virtual (artificial) subjects, considering the need to synchronize individual and group trajectories of development of communicative capabilities of virtual nature. The formation of network digital formats of research, educational, design and development, consulting, etc. processes based on target models of virtual worlds should be standardized in the Russian Federation with the translation of positive effects of standardization and unification to other EAEU member countries.

From the point of view of building a post-industrial complex of science and technology, it is important to transform research, educational, design, consulting, etc. processes based on digital "immersion" of a person who realizes the creative component of the service process (work, service) in the digital space of information transactions in the virtual environment. It is necessary to develop and implement an appropriate agent-based model to support both traditional organizational systems and systems of extended virtual reality and virtual universes, including services of service, educational and entertainment nature. Finding a computational solution here is the basis for overcoming organizational and informational barriers to integrating processes in the scientific, technical and educational spheres with reliance on digital services to support digital shells for any information content at all levels of the hierarchy of public administration and in relation to network nodes within the digital super-system.

Maintaining an agent-structured process of generating and using digital assets (databases, knowledge bases, etc.) relies on the digital portrait (digital "double" as a described and analyzed agent) of a person who realizes - in the digital space of information transactions - the creative component of the service process (work, service) within the digital super-system (Raikov, 2018; Sorokin, Bortalevich, 2019).

We consider it necessary to create convenient shells of digital "twins" of people - innovative agents within the framework of agent-based models of organization of functional processes in scientific, technical and educational spheres. The accumulation of information in digital form is the basis for transferring research, educational, design, consulting, etc. processes to the digital environment with the convergence of the real and virtual worlds. The digital format makes it possible to compare the results of the use of all forms of functional activities with the financial resources spent on them. Computing capacities need to be increased for digital support of more effective interactions between real and virtual (artificial) subjects within digital platforms in order to speed up the trends of convergence of human participation and artificial intelligence technologies in the emerging digital economy in the Russian Federation.

5 CONCLUSION

Success in science and technology comes from the efficiency of research, education, design, development, consulting, etc. processes. Digital platforms play an important role here. They allow to form a digital portrait (digital "twin" as a described and analyzed agent) of a person realizing in the digital space of information transactions, the creative component of the service process (work, service) within the digital super-system. Optimization of schemes of intellectual communications in scientific, technical and educational spheres based on calculations of the characteristics of digital "twins" toward the identified matrix of information interests of agent interaction of people - participants, expands the opportunities for them to implement the creative component of the service process (work, service). We propose a targeted strategy of digital restructuring in scientific, technical and educational spheres based on the priorities of convergence of traditional and digital management to establish interactive human-machine interaction processes in the digital space of information transactions. This strategy considers the analysis of various influencing factors and the calculation of options for interaction between people - innovative agents in the digital space of information transactions with the reliance on the formation of digital shells for any information content using agent-adapted services to support targeted communications with elements of artificial intelligence with the output of recommendations for optimizing this process.

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