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## Techno-science in information society

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### Abstract

Science is a potential that provides intelligent and productive power of society. Therefore, it is important to study the changes and transformations taking place in science and scientific knowledge, thus, the study of such phenomenon as techno-science is vital. The paper deals with the development of techno-science that indicates a change in the epistemological scheme of modern scientific knowledge. The key element of these changes are associated with the following characteristics such as the interdisciplinary techno-science, externalism, constructivism and purely pragmatic orientation implemented on the basis of technology platforms in the unity of university, business and the state. It is established that in the information society techno-science expands the range of community initiatives contributing to the formation and development of civil society as well as optimization and comfort of everyday life.

*Keywords:* Techno-science, information society, applied science, interdisciplinarity, NBIC-convergence, STS.

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### 1. Introduction

Today, the role of science technology has become particularly evident because it is actively manifested in the transformation of modern science, a new paradigm of science is formed in terms of interdisciplinarity and transdisciplinarity. Modern science is being developed in the "knowledge society". "Knowledge society" is characterized by profound changes in the society where new scientific knowledge and technologies have become a key element and observed as a social basis. Moreover, one of the peculiar qualities of modern science is the diversity of new technologies and their implementation causes the process of society technologisation. A prerequisite for the process of society technologisation is the development of techno-science.

### 2. Discussion

The term "techno-science" was first used by a Belgian philosopher, Zh. Hottua in the late 70s of the last century; however, the scientific community didn't use it last two decades of the XX century. The study of techno-science specificity was carried out by many researchers: the curator of the Smithsonian Washington University; the director of the National Museum of American Science, P.Forman; a doctoral student of the Faculty of Literature and Human Sciences at the University of Sao Paulo in Brazil. M. Karamez Kariotto; a scientist, a sociologist working at the University of Edinburgh, A. Pikiring; a sociologist, a philosopher, a vice president of the Center of organizational sociology in Paris, B. Latur and Russian scientists V.S. Shvyrev, V.G. Gorohov, V.A. Lektorsky, B.I. Pruzhinin, A.L. Nikiforov, and others. [7] In particular, an expert in the field of science and technology philosophy, V.G.Gorohov, quoting the German philosopher, Alfred Norman, writes that "techno-science has a hybrid form. In particular, if earlier science was a theoretical presentation of eternal and immutable nature and technology desired to control the world and to transform the "natural" events with the help of technical interventions; the hybrid form of techno-science has not only a theoretical presentation but also technical control and transformation. The techno-scientific study theoretical presentation can not be separated from material conditions of knowledge production." [3]

B. Latour who argues that the current convergence of science and technology has transferred the dominant value from rhetoric to practice supports this viewpoint. The idea of "shifting attention from discourse to knowledge practice" is developed by Professor of History, Bernadette Bensaude Vincent, from University of the Sorbonne, who states that techno-science tend has a constructivist origin and is a "weapon" in the struggle against rhetoric and forms values based on technology and science. Analyzing the modern trend of "scientific and technological convergence", Bernadette Bensaude Vincent believes that the "convergence" process of nano-, bio-, info- and cognitive sciences is based on the synergy that combines these sciences. Techno-science, according to Bensaude Vincent, can be observed in reports, programs and projects that need in the level of knowledge based on interdisciplinarity, multidisciplinary and transdisciplinarity. The same conclusion is done by Russian researchers who emphasize that transdisciplinary research is characterized by the shift of cognitive ideas from one discipline to another and the development of joint research projects. These joint projects demonstrate the interdisciplinary nature of techno-science and are a response to the needs and challenges of the global society. [7]

It should be noted that the convergence of high technology is associated with the development of information and communication technologies. Initially, computers development paradigm is associated with the collection, collation and analysis of information, but there was an integration with media and communication technologies in 1990. This convergence had special scientific convergence characteristics. If the latter one involves the process of interdisciplinary encounters and convergences in various fields of sciences and humanities, not having an absolute convergent similarity; the technological convergence of the end of XX - beginning of XXI century, on the contrary, had interpenetration without boundaries between the individual technologies creating the final product at various fields of science and technology. This mutual penetration of Sciences formed the basis for the popular NBIC-convergence, built on the principle of a synergistic combination of four scientific and technological areas that are developing rapidly: «N - nanotechnology and nanoscience, B - biotechnology and biomedicine, including genetic engineering, I - information technology, including advanced computing and new means of communication, C - cognitive science, including cognitive neuroscience . [1, 2]

American experts, M. Roko and U. Beynbridzhem, in a report prepared for the World Technology Assessment Center (WTAC) firstly used the term NBIC-convergence in 2002. Revealing the specifics of technological convergence, US researchers clarify that the final product is not necessarily the interpenetration of all four NBIC-convergences. Sometimes it is quite enough to have two or three technologies for interaction, as they are also engaged in a comprehensive interdisciplinary research and development. However, apart from the mentioned areas of scientific convergence, many modern philosophers, including domestic researchers (D.I. Dubrovsky, V.A. Lektorsky) believe in the need to include the fifth element «S» - Social Technologies (NBICS- convergence) into the traditional NBIC-education, as it should become an organic part of this dynamic system and be an essential, integral factor in its development. [1] The structure of NBICS-convergence was the basis for Kurchatov Center of nano-, bio-, info-, cognitive and social sciences and humanities and technology, created in 2009 based on SRC Kurchatov Institute and it did not have complete analogues in the world. Its unique research and technological base, in particular, the protein department, where physics, mathematics, chemistry and biology combine, allows us to identify bioorganic matter and turn it into the crystal in order to decipher the structure of the protein using the synchrotron, to calculate it on a supercomputer and present, for example, a medicine.[4]

Speaking about today's achievements and future projects of NBIC-technologies, many researchers, due to V.I. Arshinova, consider that these areas of human activities, as a unit of evolutionary practices of knowledge, invention and design, have reached the level of development when they should be engaged in intense synergy. The result of which will be the formation of a qualitatively new super-nano-techno-science that opens new horizons of evolution for man and humanity [2]

The mechanism of scientific convergence always attracts the attention of scientists and B. Latour, has already formulated the idea of STS, or Science and Technology Studies. STS is an interdisciplinary approach to the study of science and technology in a social context where basic thesis is that scientific knowledge and technology are developed participating in social world, being formed by it and simultaneously forming it. In his book "Science in Action" B. Latour emphasizes social features of science and technology and the STS-investigator should pay attention on it. Latour considers that only social networks are able to keep the production process of scientific knowledge, as scientists represent only the tip of the "iceberg"; to make their work possible, a lot of other people outside laboratories are needed[5]. Therefore, it is not surprising that the initiators of science and technology study are natural scientists, but the humanities and social scientists - philosophers, historians, sociologists, who try to show how scientists work, what everyday practices and circumstances, as well as cultural artifacts are hidden behind the phrase "scientists have proved that ...". [9]

However, not only small social groups can influence on the production of scientific knowledge, but also the whole society in general. The specific needs and challenges of society stimulate modern scientists in laboratories, created by the industrial sector to generate technologies as well as to increase the productivity of people and to improve their livelihoods. Today industries and the federal government spend, according to the statistics presented by B. Latour, 9 times more money on applied studies and inventions than on fundamental ones. Thus, engineering developments are beginning to play a greater role in the world of science. [5]

The Russian philosopher, V.G. Yudin, notes that the specificity of techno-science is explained by the fact that the picture of the world, where techno-science exists, is beyond object representations, it affects the human world, and the society appealing to science requires new efficient technologies, but not an explanation of the world. As a result, due to V.G Yudin, two-way communication between the laboratory that produces new technologies, and individuals that act as their consumers is established [10] Laboratories and consumers should cooperate. It should be noted that laboratories that should present research works and inventions, can act as independent laboratories, research centers and institutes, and laboratories in universities and industrial enterprises. One of the most important elements of techno-science is the business because it gives funds to laboratories, providing the possibility of creating new technologies. A consumer, paying for technological innovation, allows businesses not only to reimburse the costs, but also to make a profit. [10] Finally, the link between the state, the laboratory and the business is media and its main task is to inform consumers about new technologies.

### **3. Conclusion**

Thus, techno-science development takes place in the information society, analyzing relationships between techno-science and a human factor. It was first mentioned in the United States and Germany that a socially responsible engineer must take into account the socio-cultural impacts and evaluate the limits of science - technical interference on the environment, cultural monuments, the life of society and the individual. [6, 8] The dialogue between researchers and citizens should be through some forms, including consultations, conducting surveys, focus groups, consensus conferences and online conversations. [10] To serve the interests of people, science needs in researches where a person acts as a test person. However, participation in such studies has risks.

Thus, it is necessary to create organizations that can predict the risks and neutralize them. Such organizations may be ethics committees, consumers' associations, institutions that support ethical researches, etc., which, on the one hand, protect the rights, life and health of test persons and, on the other hand, exercise an ethical control over researches and inventions. Developing a new paradigm of scientific knowledge it is necessary to understand innovation processes that occur in society from the viewpoint of the humanities and human interests. It is a prerequisite for relationships between socio-humanitarian, natural-scientific and technical knowledge. A man is needed for progress and innovations.

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