Anthropogenic activity: risks and protection safety of human life

Mikhail V. Beilin[1], Lidiia M. Gazniuk[1], Andrei V. Kuznetsov[1], Mihail V. Struchaev[1], Dmitrij K. Manohin[1], Ekaterina Yu. Chistyakova[1]
1 Belgorod National Research University, Russia, 308015, Belgorod, Pobedy st., 85, info@ores.su

Abstract. The article substantiates the rational management of threats and risks associated with the development and application of nanotechnology. The article is based on an interdisciplinary approach with the leading role of socio-humanitarian disciplines, taking into account the complex nature and polysubjectiveness of social and humanitarian expertise. The result of the research work has been the formed concept of ensuring human life safety in a risk situation. Application of the research results is possible with the solution of the tension associated with technological threats and capabilities of the nanotechnologies control which necessarily requires the management of nanosafety. The conditions for ensuring the safety of anthropogenic activity have been specified, and an algorithm and an activity tool for relatively unpredictable objects have been developed.

Keywords: Anthropogenic activity, risks, nanotechnologies, security, rational threat management, human comprehension reality.

Received 13/05/2018
Approved 26/06/2018

Introduction. Attempts are currently being made to develop methods for the formation and selection of evaluation criteria that would allow, at least in part, to identify, at least in part, threats of unpredictable consequences of human activity in technology, including convergent ones. These techniques take into account the fact that the regimes of the development of technological processes, their nature in the considered period of time – deceleration or acceleration, stabilization or destabilization – serve as indicators of stability / instability of the system as a whole [1]. The stable flow of the process is never replaced by a sudden "explosive", extreme and uncontrolled regime. This is usually preceded by a period of destabilization, "dynamic chaos," etc. The key principle of the new methodology of scientific forecasting is the principle of "self-organizing critique", which expresses the main feature of complex nonlinear systems that evolving around the state of chaos. In an era when human actions are capable of launching avalanche-like processes and globally changing the world, the future of the world becomes unpredictable [2; 3; 4]. The security mentioned in this methodology is to diagnose timely and stabilize the synergy of natural, techno-natural and social-humanitarian processes through purposely targeted material-energy, organizational or informational impacts.

Materials and Methods. The methodological basis for work with unpredictable, but predictable activity in principle can be the theoretical variation of models of situations or evaluation criteria, which allows to transfer the previously unconsidered consequences into predictable, and then to manage the impact in a timely manner. If we remember the well-known metaphor of Carl Popper, it is advisable to vary the "theoretical grid", whereby experts in different ways "capture the world".

The modern risk analysis, in addition to the traditional assessment by experts, should include the consideration of the opinions of all individuals and communities being at risk of danger, as indicated by, for example, D. Barben. In connection with the development of high technologies, including those presented in the NBIC-tetrahedron (convergence of nano-, bio-, info- and cogno), and the emergence of new threats associated with them, attempts are being made to create an integrated approach that provides the basic principles for modeling and measuring the links between threats and risks, as well as socio-economic, sociopolitical, moral consequences and social reaction on them. As noted in the material of the World Commission on the Ethics of Scientific Knowledge and Technology "Nanotechnology and Ethics, politics and areas of activity, the risk analysis and standardization questions require in-depth ethical, but not just purely scientific consideration [5, p. 8; 6].

Results and Discussion. The assertion that a person lives in a world of diverse dangers looks a truism. It is also clear that the dangers are unlikely to disappear from the being of the creatures of

Received 13/05/2018
Approved 26/06/2018

the earthly world, even when they can travel far from Earth, in completely different worlds. The assertion that dangers and threats are inevitable and even necessary are less apparent, since they have acted and act as powerful incentives for the self-development of human civilization. At the same time, their redundancy can create obstacles on the path of self-development and the existence of individual human beings or communities – up to fatal ones. Understanding the non-eliminability of these opposites determines the problem of optimization – the rational management of threats and risks or, briefly, safety. One of the most recent manifestations of this common problem is the management of nanotechnology's security.

What is it security? How to manage threats and risks in order to ensure security? Full security is the absence of any danger. But this is not possible in the real world. Therefore, it is assumed that security is the protection of vital interests of an object from various hazards. Acceptable or necessary level of security is achieved, in particular, through the timely detection, prevention and neutralization of real or possible threats. In this research, the objects of security are considered to be man and citizen, a group of people and society, state and interstate association, humanity as a whole, the biosphere, etc. (all listed objects are taken in their various essential properties, relations, actions of change, connections, therefore it is possible to speak about safety of a person's life activity or functioning of technology, implementation of technological process). All elements of this multitude can also act as subjects of a security. For example, a citizen is subject to the security of his state, which is threatened by another state, a terrorist organization, and so on; in turn, the state is by definition the subject of ensuring the safety of its citizens, etc. It is important to note that all of the listed objects and subjects of security or are human beings, or have anthropogenic or, if using the neologism of V.S. Styopin, "human-dimensional" nature [7].

The Charter of European Security, adopted in November 1999 at the Istanbul Summit of the Heads of State of the Organization for Security and Cooperation in Europe reaffirmed, that respect for human rights and fundamental freedoms, democracy and the rule of law was central factor for the comprehensive security concept adopted by the OSCE [8, p. 6]. Today, in a civilized world, man remains a central reality and the value of a broad "security field".

The "Field of Security" covers the whole "human-dimensional" reality, determined by its complex dynamic structure. In this integrity, material security and spiritual security can be singled out, which are specified in the political, economic, social, military, environmental, scientific and technological, information and other spheres. Each of them has certain priorities determined by "place and time", according to which, for example, state policy is being built. Thus, an important direction

Received 13/05/2018
Approved 26/06/2018

of state policy is to strengthen state support for the development of the priority areas of science and technology as the basis for creating high technologies and ensuring the transition of the economy to an innovative model of development, the formation of an effective system of innovation activity.

The Charter of European Security implies the following vision of the "security field" in accordance with the principles of equal partnership, solidarity and transparency. The security of each State party is inextricably linked with the security of all others. We will consider human, economic and military-political or, to be precise, political and military measuring of security as an integral whole [8, p. 3]. As it can be seen, firstly, in this Charter, the emphasis is on the inextricable link of security of all OSCE member states, and in this sense it is indeed common to them. Secondly, it is a comprehensive integrity, in which three interrelated dimensions are distinguished. It is clear that this allows further detailing.

Some of the dangers of the security object here-and-now are real threats, however others are not. The threat is the nature of a conditional rather than unconditional connection directed from a specific danger to a particular security object. Threats are divided into actual, already existing here-and-now, and potentially possible in certain conditions in the future (immediate, medium-term, long-term).

Threat is either realized or not. The feasibility of a real threat is commonly called risk. This measure is expressed qualitatively or quantitatively. So, we can say that the risk of a cobra bite for an experienced snake-tamer is small, for a beginner pupil it is higher.

Sometimes the concept of risk refers to a certain activity of the security object, for example, speaking about the risk of investment. This makes sense inasmuch as the action of the security object actualizes one or more threats with a high risk of feasibility, increases the risk of committing a real threat, and so on.

The original concept of risk was proposed by a modern researcher Daniel Barben. He suggests three interrelated aspects: 1) perception of risk; 2) communication of risk; 3) public understanding of science and technology [9]. Environmental risks, health risks, risks associated with the development of converged technologies create doubts in the society about the qualifications of specialists, the honesty of the worker, the objectivity of their positions, etc.: the perception of risk can be one or the other. The concept of D. Barben's risk is not universally accepted, but the selection of the mentioned three aspects is important and fruitful.

Realizing a real threat is usually damaging to the "vital interests" of the object of security up to its destruction. In order to prevent this, the threat should be timely identified, understood and

Received 13/05/2018
Approved 26/06/2018

evaluated, attempted to be prevented or neutralized. All this is part of the subject, in particular, the feasibility of threats and risk management. According to the above mentioned, it is necessary to understand safety as a state of an object in which the dangers and threats to its existence or normal functioning are determined, and the risks of their realization are reduced, if not to zero, but to the level acceptable in a concrete situation. At the same time, security is understood as a process of planning and implementing the necessary measures for this purpose. Security control – this is a rational neutralization of threats and minimization of the risks of their implementation in order to ensure, within limited resources, an acceptable level of protection of the vital interests of the security object.

As the corresponding member of the Russian Academy of Sciences B. G. Yudin notes, any social or scientific and technological innovation can be considered as a source of negative consequences, risks, threats to human potential, while the opposite is not proven to the contrary. Secondly, these threats, risks and negative consequences are often unpredictable not because of the impossibility of predicting them, but simply because of the fact that at the preceding or initial stages of their implementation the necessary special efforts were not undertaken [10].

The obstacle on the path to universal security may be not only sectored -specific, but also the presence of representatives of various "groups of interests" in the "security field". For example, in the security field of NBIC-technologies, the representatives of the techno-scientific community (which is internally differentiated), customers of new products (industrialists, bankers, traders, etc.), consumers, the state, civil society, religious institutes, media, etc. actively act, guided by their interests. The harmonization of the interests of these subjects, representing both conscious and spontaneous orders, is not a trivial task [11, 12].

An interesting approach to the solution of this kind of nano-security tasks is offered by the Swiss researcher Ronald Scholz (Federal Institute of Technology, Zurich). He developed a number of methods of "transdisciplinary management", aimed at organizing, regulating and mediating various interests [13]. As it is supposed, this will reveal the conditions for using various methodological constructions of transdisciplinarity in solving the economic, environmental, social, humanitarian and other problems caused by the development of nanotechnologies [14, 15].

Transdisciplinary management involves the collaboration of researchers, developers, government and business, as well as the main types of research strategies, research centers or universities as "carriers of change." This opens up the possibilities for integrating the achievements of technology and approaches to ensuring nanosecurity into an entire system of transdisciplinary

Received 13/05/2018
Approved 26/06/2018

education. It can lead to more effective approaches to solving a number of global problems of the present [13, p.375; 16]. Such approaches are consistent with the broad interpretation of the principle of transdisciplinarity. Moreover, in spirit they correspond to the desire expressed in the European Security Charter for a truly universal security.

Most of its history technogenic civilization developed without proper consideration of environmental challenges, limited to either short-term forecasts, or a solution to "pressing problems" that particularly increased in the twentieth century. Managing a situation based on common sense has already run out. It is necessary, among other things, to consistently solve the problems of legal regulation of technological and environmental security, the creation of instruments for managing [17] the technological and environmental safety subsystem in the national security system, and the formation of the goals of the new state technological and environmental policy – these are the main priorities of modern state policy in the field of nanotechnology. However, domestic or international legal regulation of the development of converging technologies and the use of their results is necessary but not sufficient: in itself, it is not capable of solving the problems of the nanosecurity management [18, 19, 20]. Therefore, it should be supplemented by other kinds of regulation, provided, above all, by the reasonable participation of independent experts and competent representatives of civil society.

Conclusion. Security is important in any field of human activity. But in practice, a situation often occurs when narrow specialists make efforts to ensure security in their area, ignoring its connection with others. Such a sectored -specific approach involves a systemic limitation of the effectiveness of security efforts as it creates inconsistency of activities at the level of individual sectors, ranging from theoretical concepts to practical security methods. As a result of the recommendations developed for security, there is a lack of completeness and efficiency. The transition from a sectored approach to the use of the concept of a single cross-sectored security system allows for the use of reserves, which consist in the effect of harmonization, the purposeful formation of synergy in various fields, departments, etc.

The most important conditions for ensuring the safety of anthropogenic activity are:

– analysis of existing threats and risks, forecasting conditions or consequences of activity, including those that create threats to the actual security object;

– identification of a sufficiently complete set of unpredictable consequences of activity;

– transfer of unpredictable consequences into predicted complex;

Received 13/05/2018
Approved 26/06/2018

– the development of algorithms and instruments of activity that do not lead to dangerous effects of techno-natural processes on the human life activity, and the corresponding reorganization of traditional methods of activity;

– organization of life through acceptable safe algorithms and using safe tools;

– the development and implementation of measures that at least to the necessary extent protect the security object against threats.

References

1. Karpenko, V. Ye., 2014. Achievements and drawbacks of innovative education in technointellectual society. Strategii na obrazovatelnata i nauchnata politika, Godina XXII, knizhka, 4: 391-400 (In Ukraine).
2. Luk'yanec, V. S., 2010. Nauka novogo veka: smena osnovanij industrii nauchnogo prognoza. Praktichna filosofiya, 3 (37): 11-19 (In Ukraine).
3. Bejlin, M. V., 2014. Nanotekhnologiya kak proryv v postneklassicheskoj nauke. Har'kov, Oberig, 480 p.(In Ukraine).
4. Bejlin, M. V., 2015. Cennostnye osnovaniya nauchnyh issledovanij v konstellyaciyah postneklassiki. Nauchnyj rezul'tat. Ser.Social'nye i gumanitarnye issledovaniya, 1 (3) (In Russian).
5. Nanotechnologies and ethics: policies and actions. Policies and Actions. COMEST Policy Recommendations, 2007. UNESCO, Paris. Date Views 12.12.2017 http://unesdoc.unesco.org/images/0015/001521/152146e.pdf.
6. Lipich, T.I., 2015. Estetika i sociokul'turnye problemy sovremennosti / O.V. Koval'chuk, A.V. Kuznecova, T.I. Lipich. – Belgorod: Politerra, 154 p. (In Russian)
7. Postneklassika: filosofiya, nauka, kul'tura, 2009. SPb.: Izdatel'skij dom «Mir"», 672 p. (In Russian)
8. Hartiya evropejskoj bezopasnosti, 1999. Organizaciya po bezopasnosti i sotrudnichestvu v Evrope. Stambul'skij dokument 1999 goda, Stambul : 1-47. (In Russian)
9. Barben, D., 2010. Analyzing Acceptance Politics: Towards an Epistemological Shift in the Public Understanding of Science and Technology. Public Understand of Science, 19(3): 274-292.
10. Yudin, B. G., 2007. Sotvorenie transcheloveka. Vestnik Rossijskoj akademii nauk, 77 (6): 520-527 (In Russian).
11. Cameron, N. M. d. S., 2006. Nanotechnology and the Human Future. Annals of the New York Academy of Sciences, 1093: 280-300.

Received 13/05/2018
Approved 26/06/2018

12. Y Cao, MJ Esfahani, H Akbari, A Foroughi (2016). Detailed modeling study of low-velocity combustion of crude oil at different moisture content, Petroleum Science and Technology 34 (24), 1978-1983
13. Scholz, R. W., 2011. Environmental Literacy in Science and Society: From Knowledge to Decision. Cambridge University Press, 656 p..
14. Mikeshina, L. A., 2017. Sovremennye tendencii razvitiya social'no-gumanitarnyh nauk v kontekste mezhdisciplinarnosti. Nauchnyj rezul'tat. Ser. Social'nye i gumanitarnye issledovaniya, 3(1) (In Russian).
15. Beilin, M., 2017. Epistemological grounds of nanotechnologies. In Development and modernization of social sciences: experience of Poland and prospects of Ukraine. Lublin: Izdevnieciba “Baltija Publishing”: 20-37.
16. I Najafi, M Kamyar, A Kamyar, M Tahmassebpour (2017). Investigation of the correlation between trust and reputation in B2C e-commerce using Alexa ranking, IEEE Access 5 (1), 12286-12292
17. Deibert, R., Zuckerman, E., Dingledine, R., 2011. Circumvention Tools. Date Views 12.12.2017 http://archive.flossmanuals.net/_booki/bypassing-censorship/bypassing-censorship.pdf.
18. Drexler, E. K., 2007. Letter from the Author: Engine of Creation 2.0: The Coming Era of Nanotechnology. WOWIO Books,: 646. Date Views 12.12.2017 http://www.wowio.com/users/product.asp?bookid=503.
19. Roco, M. C., Bainbridge, W. S., Huettner, C. H., 2003. Converging Technologies for Improving Human Performance: Nanotechnology, Biotechnology, Information Technology and Cognitive Science, Eds., Roco, M. C. and W. S. Bainbridge. – Dordrecht: Kluwer Academic Publishers, 467 p…
20. Mehdi Mafi, “A Hierarchical Model of ICT in Digital Society to Access Information,” Canadian Journal on Electrical and Electronics Engineering, vol. 3, issue 7, 2012, pp. 366-374.

Received 13/05/2018
Approved 26/06/2018