From Engineering and Technological Process to Post-Cultural Technology

Vadim Rozin

Doctor of Philosophical Sciences, Professor, Institute of Philosophy of the Russian Academy of Sciences (Moscow, Russia)
E-mail: rozinvm@gmail.com
https://orcid.org/0000-0002-4025-2734

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The article discusses the dilemma of "technology or technologies," as well as the nature of the Internet as one of the types of technology of the future ("post-culture"). Reflections lead the author to the thesis about not one, but many technologies. The ideas of engineering and technological process and two different understandings of technology – as an activity of the creation of technical products and formation of technical environment essentially defining human life are differentiated. According to the author, the technological process's formation was promoted by the activity inflection point and the inflection point, which was later associated with management. The article ends with a discussion of the Internet as a new type of technology.

Keywords: technology, engineering, technological process, culture, evolution, development, environment, activity, nature, person

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Introduction

Every year, more and more research appears devoted to technology, but it seems that they contribute little to understanding the essence of technology. In various technology philosophies, researchers offer different technology explanations, concepts and definitions. Perhaps for psychology, such a situation is normal if we assume that there are different types of people in different types of socialization and communities. Therefore, the variety of psychological schools and explanations of mentality specializing in theoretical comprehension of various types of the European person (Rozin, 2019) which is actually observed is explainable. After all, technology is not an anthropological phenomenon (or nevertheless an anthropological to a certain extent?). Is not it uniform in the culture? Maybe, it is worth speaking not about technology in the singular, and about different technologies, for example, is it possible to find something in common between stone tools and the Internet? By the way, the author entitled one of his books “Technology and technological process: from stone tools to the Internet and robots” (Rozin, 2016).

Difficulties in understanding technology are manifested in the choice of one of the elements of the said opposition (technology or technologies) and the solution of other problems. For example, when the technology appeared? One of the widespread points of view is that it appeared along with the man who distinguished himself from fauna due to tools’ production. However, why then the technology in the sensed characteristic for modern culture was perceived not earlier than in the 18th century? It was then that people began discussing what the technology represented, and the concept of technological process appeared.

Apropos, how does technology differ from the technological process? If one researcher equates these concepts, the others differentiate them. “This discrepancy, D.P. Grant writes, is found in the title of the essay on this subject belonging to our greatest modern thinker, Martin Heidegger. Heidegger’s work is entitled “Die Frage nach der Technik.” English translation of the title is “The Question Concerning Technology” ... Already the fact that it is a neologism makes think of the unprecedented novelty of what it designates... The fact that expansion of sciences will continue turning into the conquest of human and extra-human nature – the essence of all this process may be called technological process – in general, may be predicted. However, it is impossible to predict what in particular will be revealed during such expansion... “Technological process” is not so many machines and tools, but the idea of the world which directs our perception of all existing <…> In each moment of wakefulness or dream lived by us we may be righteously called now carriers of technological civilization and we will increasingly live in the contracting ring of its power everywhere” (Grant, 1986).

One more, very important problem is how to explain the rapid development of technology (a real “explosion of technical creativity”), starting from the 18th century)? Maybe the sources of “technogenic civilization” are there? If yes, then by what, they were conditioned? According to F. Braudel, approximately to the middle of the 18th century — beginning of the 19th century used as power sources were, firstly, domestic animals (bulls and horses), secondly, wind and water-mills, sailing vessels, wood. “In France on the eve of the Revolution, Lavoisier estimated 3 million bulls and 1780 thousand horses, including 1560 thousand horses engaged in agriculture … And this is only for France with its 25 million inhabitants. At equal proportions, Europe should have 14 million horses and 24 million bulls <…> “Trade in firewood became a business for all inhabitants in the Vosges, everyone cuts as much as possible, and shortly the woods will be totally eliminated.” It was from this crisis — for England latent from the 16th century — that coal revolution eventually was born” (Braudel, 1986: 373, 381, 391).

However, already in two years, machines burning coal and gasoline started to be widely used in Europe; the era of technology based on engineering begins. The second half of the 18th century — the first half of the 19th century marked by understanding technology- may be considered a boundary here. “Domination of technology and machines, N. Berdyaev writes, is, first of all, a transition from organic life to an organized life, from vegetation to constructability. From the point of view of organic life, technology means excarnation, a rupture in organic bodies of the history, a disconnection of the flesh and spirit <…> While the technology in its form, which triumphs since the end of the 18th century, destroys this belief in the eternal order of nature and destroys it in a much deeper sense than the evolutionism does” (Berdyaev, 1933: 10-11).

It is unlikely that the said explosion of technical creativity may be explained by the needs of the becoming man of Modern times. After all, the task of mastering the nature is not a need ("Let, Francis Bacon writes, the human race only possesses the right to the nature assigned to it by the divine favour, and let it be given power" (Bacon, 1935: 192-193)), it is rather a cultural scenario conditioned by humanistic claims of the man who considered himself "the second god" (N. Kuzansky).

The author, analyzing technology in previous years, proceeded from the assumption that it is a uniform phenomenon. He distinguished in the reconstruction of the genesis of technology four main stages: 1) creation of tools and elementary products in prehistoric times, 2) "technology as magic," characteristic of the culture of the Ancient World (perceived in a sacral way, and developed by trial and error), 3) "engineering stage" of development of technology in which natural sciences acquire a leading role, 4) formation and development of technological process (Rozin, 2016; Rozin, 2018). To explain the unity of all these forms of technology, he characterized technology by attributing it to an ideal object. The following characteristics creation of an ideal object of a studied phenomenon is a necessary condition of its theoretical description (Rozin, 2006)).

1. Technology represents an artifact, i.e., products created by the man (tools, mechanisms, machines, structures, artificial environment).
2. Technology operates using effects of nature which are induced by the specific activity of the man (for example, operation of an elementary level and the most sophisticated missile implies, on the one hand, the use of the laws of nature, and on the other, the workmanship of the person creating these products and using them).
3. Understanding (conceptualization) of technology is included in its concept, substantially defining the nature of the technical art and specific features of the development of technology (thus, in the ancient world the technology was understood as a synergy of efforts of spirits (gods) and people and was developed empirically (Rozin, 2006: 76-81); in modern times the technology is understood rationally, as an action of forces of nature consciously induced and organized by the man that results in an explosion of technical creativity).
4. Development of technology is conditioned by two major factors – practical needs and, to a far greater degree, by cultural processes (for example, by the need to demonstrate natural, material existence of meanings and cultural concepts; thus, the author showed that the Egyptian pyramids allowed the Ancient Egyptian society to understand what is a Pharaoh's death – since he is not only a man but also an immortal god – to make sure personally of his double being (Rozin, 2018: 166-179).
5. In terms of use, the technology may be interpreted as "a social body" of the man, making it possible to solve problems that could not be solved at a certain stage of development (for example, before the 20th century, people could only dream of flying like a bird, but today it is a common technical reality, and even in the space);

Technology may be understood as a condition and one of the sociality mechanisms (Kh. Skolimovski using the example of the car's invention and operation, shows that technology significantly influences social reality, changing it drastically) (Rozin, 2006: 64-69).

What are these characteristics of technology? Technology invariant with respect to its development, i.e., it is supposed that at different stages of evolution of technology within the culture, it is set by these characteristics. It should be noted that these characteristics of technology were received simultaneously with the analysis of specific types and features of technology at specific stages of its development (technology in prehistoric times, in the Ancient world culture, the engineering stage of development of technology, development of technological process). The question is whether it is possible to obtain these specific stages of development of technology as an implementation of the invariant set here? I think no. Though in each of the specified stages of development of technology, it is possible to identify some characteristics of its invariant (or all of them together), in general, in reality, these characteristics do not allow to represent technology theoretically at separate stages of its development. The invariant of technology is some kind of methodological program of study of technology as a complex cultural, evolving entity. When studying modern technology, this invariant sets research areas and partly allows formulating the first hypotheses of its structure and processes.

Thus, identification of invariant of technology does not solve the dilemma: technology or technologies: it is possible to say that the said technologies at various historical stages are just different conditions of the uniform evolving technology, but with the same success, it is possible to claim that at these stages new types of technologies (new technologies) developed. To make progress in this question's solution, let us consider technology in its two modern states.

The essence of an engineering way of creation of technical products consists in the development of an engineering design (implying implementation of certain laws of nature, definition on the basis of these laws, and physical experiments of conditions of behaviour of the processes of the nature necessary to the engineer, calculation of these processes and the design) which make it possible to trigger the processes of the nature the man is interested in and to control them. For example, to build a clock allowing to measure precisely time, C. Huygens, who created the first model of engineering activity, used the free-fall law discovered by Galileo. Besides, he described and calculated other processes characterizing the swinging of the clock pendulum. In particular, he showed that a clock measures time precisely if its pendulum falls along a cycloid. He then defined and calculated conditions that ensure the pendulum's falling along a cycloid (it was a cycloid development).

At last, he managed to embody all these processes in the clock design. "A simple pendulum, Huygens writes, cannot be considered as a reliable and uniform time measuring instrument as the time of its oscillation depends on the swing: bigger swings demand more time, than small ones… To study its (pendulum's) nature, I had to do researches about the center of swing" (Huygens, 1951: 10). Having demonstrated "that development of a cycloid is also a cycloid," Huygens suspended a pendulum from a thread and placed from both its sides cycloidal and bent straps (sidepieces) so that "when swinging, the thread shall adjoin curved surfaces from both sides. Then the pendulum really escribed a cycloid" and measured time very precisely for that time (Huygens, 1951: 12-13, 79, 91).

Thus, the engineering way of creation of technical devices implied preliminary studying in natural sciences of processes of nature and discovering the possibility of their practical application. Like many processes (various movements, thermal, magnetic, electromagnetic, optical, and other processes), existentialism explains the explosion of technical creativity since the second half of the 18th century only partially. The nature mastering project put forward by F. Bacon was of no less importance. "Let, he writes, the human race only possesses the right to the nature assigned to it by the divine favour, and let it be given power <…> correctly found axioms entail whole sets of practical applications" <…> (the purpose of the science – *V.R.*) "cannot be other than endowing human life with new discoveries and benefits" (Bacon, 1935: 192-193).

This project still incentivises scientists and engineers to study nature, look for possibilities of practical use of the processes studied, and create new engineering structures on this basis. V. Rachkov perfectly describes social institutions (of industry and technical education) and the system of modern scientific and technical values as a "technocratic discourse" phenomenon (Rachkov, 1991; Rozin, 2018: 135-140) also played a considerable role. For example, according to Rachkov, authorities "attribute to technology extraordinary qualities bringing only benefits to the man: overcoming crises and stagnation, elimination of all problems and difficulties, the approach of the era of general welfare, abundance, happiness and freedom. The state finds a legitimate relationship with science and technology, promoting in every possible way scientific and technical progress... the state acts as an accelerator of advance of the science and technology, relying on positive consequences of economic development and multiplication of own forces" (Rachkov, 1991: 101-102).

The explosion of technical creativity throughout almost the whole century and production based on engineering brought about two very important consequences: first, a technical environment was created, which started having an impact on all aspects of the life of a modern man (not only beneficial, envisaged by the man, but also negative, which the man did not want to put up with), secondly. As a result, the understanding of technology changed cardinally. From then onward, by technology, two things (though interconnected, but different) were meant: on the one hand, creation of technical products (tools, mechanisms, machines, structures), and on the other, technical environment of the man. Nikolay Berdyaev and Martin Heidegger acted as pioneers in terms of understanding a new essence of technology. The formerly paid attention to the fact that technology cannot be reduced neither to nature, nor to products of the activity of the man, that now it is our destiny, new reality, and the latter, that technology as "enframing" (Gestell) (here Heidegger partly gave an environmental interpretation of technology) defines not only transformation of nature but also starts dictating to the man.

"Domination of technology and machine, N. Berdyaev reflects, opens a new step of reality which is not stipulated yet by classification of sciences, the reality which is not similar to mechanical, physical and chemical reality <…> A new reality is open here. However, this reality connected with technology, drastically changing the attitude towards space and time, creates man's spirit, reason and will be bringing in its expediency. This reality is superphysical, not spiritual and not mental, but exactly superphysical <…> It is amazing that the philosophy of technology and machine has not been created yet though many books were written on this subject. Many things have already been prepared for creating such philosophy, but the most important has not been made: machine and technology have not been realized as a spiritual issue, as a destiny of the man. The machine is considered only from the outside, only in a social projection. But from inside, it is a subject of philosophy of human existence (Existenzphilosophie)" (Berdyaev, 1933: 14-15, 16).

"Not technology as such is dangerous, Heidegger notes. There is no demonism of technology, but there is a secret of its essence. The essence of technology as a mission of disclosure of closedness is a risk. The meaning of the word "enframing" (Gestell) changed by us, will perhaps become a little closer to us if we now think of "enframing" as being sent by the beingness. In terms of danger <…> If the essence of technology, "enframing" as a risk sent by the beingness is beingness itself, the man will never manage to take technology under control by simple strong-willed effort, be it positive or negative. Technology, the essence of which is beingness, will never allow man to overcome itself. It would have meant that the man became the governor of life" (Heidegger, 1993: 234, 253).

It turns out that here it is also necessary to distinguish: technology as engineering is one thing, and as a technical environment, another one. Of course, the latter is formed on the basis of engineering activity, but also via implementation of the nature mastering project, development of natural sciences, work of modern industry, transformation of nature, ever-growing impact on man. Now, about the technological process.

The analysis of the first ideologists of the technological process — Johann Beckmann, Charles Babbage, Frederik Taylor, shows that they solved not engineering problems, they were interested in a rational, scientific organization of production (in particular technical, therefore *techno*logical process) activity, enabling businessmen to have a competitive edge under capitalism. From there, an interest in the division of labour, economy, quality of products, standardization, management, and at the suggestion of Taylor, in research, optimization, and reorganization of production activity. The formation of the technological process was promoted by the *activity* inflection point and the inflection point, which was later associated with *management*, including research and rational reorganization of activity by experts trained for solving such tasks.

In the second half of the 20th century, the understanding of the technological process significantly changes. First, the technological process is thought of as organization (research and reorganization) of technical activity and any activity, for example, in education, economy, service, and health care. Secondly, though the context of competition remains, the *sociocultural* context comes to the forefront (it becomes especially obvious after the implementation of the nuclear technological project). Thirdly, it is gradually realized that big technological projects (for example, nuclear, defensive, flight on the Moon, reforming of economy, creation of mobile communication or Internet, today — a vaccine against coronavirus epidemic) are at the same time social projects. In this regard, the sense of statements of Berdyaev and Heidegger about "technology in a broad sense" as about our destiny clears up. Norman Wig writes about the same. The technological process is "a new discipline based on technology philosophy, which emerged only in the last decades. Its basic prerequisite is that the technological process began to play the central role in our existence and the way of life and therefore has to be studied as a fundamental human characteristic… The technological process may refer to any of the following things: (a) body (set) of technical knowledge, rules, and concepts; (b) practice of engineering and other technological professions, including certain professional positions, standards and prerequisites relating to the application of technical knowledge; (c) hardware, tools or artefacts resulting from this practice; (d) organization and integration of technical personnel and processes into large-scale systems and institutions (industrial, military, medical, communication, transport, etc.); and (e) "technological conditions," or nature and quality of social life as a result of the accumulation of technological activity" (Wig, 1988: 8, 10).

The last circumstance, namely that big technological projects are also social ones, is very important. It explains the scale and depth of our civilization's crisis: rapid development of new technologies causes social changes and vice versa, social innovations prompt the development of technologies. In their turn, both said transformations change conditions and the environment of human life, as a rule, uncontrollably and unexpectedly. One of the last unpleasant surprises is the coronavirus pandemic (Tang & Qiu, 2020). Researches show that it was caused by the rapid development of modern technologies in the field of transport, economy, tourism, food, biological experiments, etc. (Możgin, 2020). Therefore, under conditions of limitation of Earth as an ecological organism and enormous scale of technological activity of the man there was an interpenetration of techno- and biosphere (He, 2011). With the same success under these conditions, coronaviruses of animals could pass easily to the man, and the man could create similar viruses in "the zone of immediate technological development" (about the zone of immediate technological development see (Rozin, 2018: 213).

If we now compare engineering, technical environment, and technological process, shall not we state that they are three different integrities, three different technologies, but not stages of evolution of one technology? Nevertheless, for some reason, we call them all "technology." I think there are grounds for this. Links between different technologies are found not directly in ontology, and they can be seen in technology's genesis. For example, cannot effects of the nature that man spotted and took advantage of in the prehistoric era and in the Ancient world be found in engineering? The same applies to the technical art (so, when inventing the clock, Huygens calculated not all components of its mechanism, he devised some of them, for example, anchor fork). Certainly, both said moments take place also in engineering, only there they are invoked intentionally and are organized on the basis of natural-science knowledge and laws.

In other words, when forming engineering, certain elements of technologies developed in previous cultures were assimilated. Similarly, the technological process: it incorporated elements of engineering activity changed in new integrity and conditions. Thus, the evolution of technology represents not the transformation and development of uniform technology but the formation of various technologies that assimilated and transformed other technologies' elements.

There are no doubts that currently a new technology is being developed. The Internet suggests this idea. This is simultaneously a supersophisticated technical system (environment), a new form of sociality, and something reminding a live planetary organism (Rozin, 2016: 235-247). On the one hand, the Internet's elements and subsystems are designed and developed as ordinary engineering devices and technologies. On the other, some processes (for example, batch data transmission, cloud storage, harmful viruses, and bots fighting these viruses) behave as live organisms. Then again, people pursuing different aims develop the Internet. On the Internet, they solve different problems and act differently. Internet users are on different ends of Earth and in various states.

Let us take, for example, batch data transmission. Unlike channel modes, when a reliable (channel) P2P connection between the client and the base station is built, a batch mode uses a virtual channel based on free channels now. To form a virtual channel and to transfer data, networks use *channel switching* and *packet switching* schemes. In case of channel switching, at first, communication between the initiator and the addressee is established, and only then data exchange starts (or conversation in case of a telephone connection). The channel may be realized by means of copper wires, optical fibers, or radio. Actual switchboards have many hundreds and even thousands of input/output channels. When data is received in a large number of channels simultaneously, the switchboard may fail to cope with such a situation. In the case of package switching, the same channel can be used by many users at the same time. Here an overload is a rule rather than an exception. Modern systems often combine channel switching and package switching methods.

A package represents a sequence of zeroes and ones. It should be noted that all networks have to handle identifying the beginning and the end of packages. As a rule, unique sequences of bits or unique codes are used for this purpose. In some way or other, almost all networks solve data *multiplexing* problems (as a rule, it is determined by the algorithm of access to the network environment).

The principle of operation of networks using batch mode is roughly the following. A formed package "finds" a free channel and is sent to the network. On the basis of special codes, programs and algorithms, the system identifies the package and sends it to the addressee. Interestingly, at the development of such codes, programs, and algorithms, various biological and psychological analogies are used.

In certain respects, a package may be compared to a live organism. The Internet, to a complex environment/organism with a myriad of similar package organisms, some kind of man-made Solaris. Data storage in a cloud also implies packet transmission. Unlike the data storage model on known servers, cloud data storage normally is not visible to the client. The information is stored and processed in the so-called cloud, which represents, from the point of view of the client, one big virtual server. However, physically such servers may be located far off from each other geographically, even on different continents.

The Internet's vital essence is even more obvious if we look at it from the point of view of arrangement and life of programs and especially viruses. Programs like live organisms have to be reproduced (you especially understand it when for some reason or other your programs cease to work), they have some kind of life cycle — from installation until removal, they feed (on electricity), can reproduce in the form of viruses (or antiviruses) and "eat" other programs, can scan other programs and transfer information about them, have their niches, move in the networks. As we know, on the Internet, there is a real war of live electronic organisms: some look for weak points in other programs and eat (destroy) those, the others protect their territory against these "electronic predators", and it is clear that the final victory of one of the parties in this Internet war is unlikely.

Of course, it is interesting to understand how the Internet turned from a complex technical system into a live organism, or, more precisely, remaining a technology, also becomes a live organism. Well, we already specified one of the prerequisites: it is an electric basis of the Internet. Sources of electricity give to the Internet life and power, electric networks and radio channels (for example, Wi-Fi) create ways and zones of the Internet life. In general, computers and computer programs operate on an electric basis. Electricity is a *substrate* basis of the Internet life (but obviously, the Internet substrate is not reduced to this. The computer and server hardware, communication cables, and satellites also form it).

The second prerequisite may be called "genomic." Researches showed how the human genome is arranged: DNA contains the information necessary for building cellular structures of an organism, and inherited genes comprised in DNA control all chemical reactions in the organism, determining the structure and functions of our body. In a computer and on the Internet, programs are arranged according to similar principles: *one program operates others; the latter operate processors creating texts and images*. However, the role of "genes designers" is carried out here not by nature, but by the man armed with science and technology. However, in creating programs, he acts not randomly but is conditioned by the culture since, when developing computer programs, he responds to the challenges of his time and has to meet production requirements; besides, the man follows tradition, reproducing former achievements to take the following step of development on their basis. It turns out that computer programs' creation and functioning reproduce — not literally but logically — life processes. These processes are not biological, but social since creators and developers of computer programs work towards available reproduction (imitation) of actions and effects of language, thinking, conditions for communication, and other social structures rather than towards the creation of biological organisms. Another thing is that in their creativity, they quite often use biological analogies.

The third prerequisite is a social one. Though the first Internet networks were closed (in the military area), very quickly, the Internet began to develop as an open system to which any users had access. Moreover, they could be anonymous, acting under their "nicknames" or "avatars." As a result, the Internet turns into a global platform reminding the Greek agora. Any man or group territorially located in any place of the globe may gain access and communicate there. In an ideal case, they can speak freely without being afraid to be ostracized or punished. In her research, Hannah Arendt shows that political life arose in Greece. Citizens free from the need to provide for their life (since they were property owners and owned slaves) could express their opinions on the agora, communicate, and convince each other, participate in decision-making concerning polis life. The Internet somewhat allowed to renew political life at different territorial levels (city, district, region, country) up to the global one. Even though this political life is still limited, but the beginning is important.

The open, free, and partly anonymous nature of Internet access provided the opportunity of its use by absolutely different subjects and for different purposes: one solved production or creative tasks, others communicated, the third stole or destroyed, the fourth had a good time and played, the fifth urged to live in peace and friendship, the sixth, as Islamic fundamentalists, on the contrary, demand killing disbelievers and Americans, the seventh, the eighth, etc. No artificial technical system could satisfy these various and opposite aspirations and actions, only a live organism that developed on the substrate technical basis of the Internet managed to do that.

It is possible to specify one more factor promoting the formation of the Internet as a global organism. It is the crisis of technogenic civilization, which conditioned a transitional character of our civilization and time. We live in a situation of disintegration of social structures while new social structures meeting modern challenges have not developed yet. How, then, in a transition situation (it is not known where so far) sociality and communities remain? On the one hand, they also undergo tension and transformations, but on the other, they live nevertheless. The question arises, at the expense of what? As always in these cases (since in history there were already transitions from one culture and sociality to another: from the culture of ancient kingdoms — to antiquity, from antiquity — to the Middle Ages, from the Middle Ages — to the modern times) through *communication and fighting*, as well as *attainment of a new "social and technical body."* For example, the transition to modern times' culture was accompanied by the change of Christian perception of the world for a rational one (when realities of a person and nature are brought to the forefront instead of God). Such change occurs amidst fighting and social polemic (religious, ideological, and economic wars). Secondly, natural sciences, engineering, industrial production, the market, and a number of new social institutions (bourgeois, liberal and democratic) develop, supporting the expansion of man with respect to nature and himself (the Enlightenment). Gradually a technogenic civilization develops, the said practices and institutions acting as its social and technical body.

Is not the Internet a similar planetary social and technical body enabling people in the situation of modern crisis and transition to keep and renew social and political life? I think that, yes, after all, this is on the Internet that we can continue to work, communicate, fight, propose solutions, do acts, *despite crash and paralysis of the main social norms and regulating factors* (rights, morals, moral, authority, etc.). This body is quite paradoxical: simultaneously a complex technical system, an environment of our dwelling, and a live organism.

If the Internet is technology, then obviously unusual, new, and obviously it will influence the development of the man and culture differently than engineering and technological process. It is also clear that studying this technology will be a very difficult task. However, the Internet is only one of the types of new technology. The future technology will be formed not on its own, but within a new conceptual project, one of the main tasks: the organization of efforts to "rescue our civilization," implying a gradual change of the nature of development, values, and representations. Not mastering the nature, a strong state and power, not comfort and entertainments, not obtaining advantages over others, but confidence in the preservation of life on the Earth, understanding what happens, in particular, a need of restriction of some of fundamental personal desires and purposes, cultivation of values of a healthy life, love, help to others, opposition to the evil and egoism.

Suppose most countries approve such a project and its implementation begins (which is not at all evident though eventually the man will be nevertheless compelled to follow this way). In that case, it will be necessary to solve many new problems and tasks, including those relating to the creation of new technology. What it will be, the future will show, but tentatively it is possible to make some observations. Obviously, the role of engineering will fade into the background even more as the main problems will lie not in the plane of mastering the first nature (besides it is being replaced more and more by "technonature" (Rozin, 2016: 128-129), but in a conscious and rational organization of own activity of the man. The latter will surely entail a cardinal change of human life on Earth. One may even expect with a big degree of probability that the formation of a new culture (post-culture) will begin. As a result, the role of "technologies in a broad sense" will increase even more. Unlike "technological process in a narrow sense" (as a sequence of operations and conditions in industrial production), a technological process in a broad sense is a modern form of development and integration of various types of activity and practices conditioned by sociocultural factors (Rozin, 2016: 116-127).

The type of development and the nature of technology will also depend on the decision of mankind, whether to direct considerable efforts for ensuring space safety (mastering the solar system, protection against casual asteroids, climate changes, catastrophic eruptions of volcanoes, exhaustion of the Earth resources, life-threatening transformations of the Earth magnetic field, maintaining the biosphere, etc.), or not to spend forces and resources for these purposes since the effect of these efforts is insignificant or will be perceptible only in a very long term.

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