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INTRODUCTION

The tutorial on philosophy and science methodology contains a necessary material for preparation for examination of a candidate minimum on philosophy and science methodology. The tutorial includes the manual, recommendations about a writing of abstracts, the information on the basic stages of preparation for examination of a candidate minimum, methodical recommendations about use of the additional educational literature, work with primary sources.

The program of candidate examination in philosophy and science methodology is developed proceeding from specificity of social and economic and technical experts. It consists of three sections. In the first section the questions which are in the centre of attention of modern philosophy are studied. In the second section from a methodology position key aspects of research activity are considered. In the third section the questions concerning methodology of the disciplinary-focused science and engineering activity are stated.

The methodical complex solves a problem of the organisation of independent work post graduate students. Preparation for examination demands the reference to manuals to which the philosophy and science methodology is presented in the full volume corresponding to requirements of the program on philosophy and methodology of a science, confirmed by Order HAK from 30.12.2004 № 179.

The philosophy and science methodology solves a problem of acquaintance of the future experts with features of research and innovative activity. Completeness of objective knowledge of the world, the person is the necessary basis for comprehension by the future experts of the valuable status of a reality with which they will deal. Koevolution, the society sustainable development, safety, tolerance, modernisation, identity and mobility become key concepts of the methodological approach to activity.

The tutorial on philosophy and science methodology includes the typical curriculum, plans of seminar employment for post graduate students, competitors, the manual, recommendations about independent work on the abstract, the list of the recommended literature for independent preparation for examination.

Chapter 1

PHILOSOPHY AND VALUES OF MODERN CIVILIZATION

Keywords: philosophy, outlook, a modern epoch, values, the person, a society, globalisation, coevolution, identity, a sustainable development, safety.

§1 Philosophy: subject, purposes, problems

The philosophy studies universal laws of functioning and development natural and social systems taking into account active presence at them the person. It has the disciplinary structure presented ontology, anthropology, gnoseology, epistemology, science philosophy, methodology of a science, social philosophy, history philosophy.

Ontology systematises scientific knowledge of the universe c the account of researches in the mathematician, the physicist, astronomy, biology, geology, ecology on the basis of dialectics and synergetics achievements. The scientific picture of life is supplemented with a scientific picture of the nature in which frameworks the key role is played by concepts of biosphere and a noosphere.

The anthropology generalises knowledge biological, humanitarian, social sciences about the person. Key categories of a life, death, meaning of the life, existence, consciousness, life of the person, антропоциогенеза are analyzed.

Gnoseology and epistemology are accented on knowledge and their role in various fields of activity of modern mankind.

The science philosophy studies a phenomenon of a science from the point of view of history, the status in a modern society, functions, structure, interaction with economy, engineering activity, a policy, art, religion.

The science methodology studies the tool aspects of research activity connected with scientific researches, workings out, methods, forms of representation of scientific results, levels of researches, stages.

The social philosophy systematises knowledge of humanitarian and economic sciences of a society from the point of view of a role in it of is material-industrial, legal, moral, spiritual, aesthetic basis. The history philosophy studies a society in dynamics, in development, from the point of view of historical time, historical consciousness, historical memory, the future. The futurology is closely connected with it.

The philosophy correlates all time, its developed concepts with a concrete historical reality, chronologically fixing it and designating. Beginning XXI of a century contacts an epoch of modernisation of a modern society. For a designation of this epoch the term "postmodern" is used. For the first time it was used by R.Panvits in 1917. Considering the changes occurring during a postmodern epoch, R.Bart, Z.Derrida, M.Fuko, C.Dzhenks, Z.Bodrijar, Z.Delyoz, F.Gvattari, U.Eko, Z.Lakan, I.Prigozhin, J.Habermas, P.Kozlovski, M.Bakhtin, S.Hantington have started to solve a problem of updating of philosophy with reference to present conditions. The philosophy status is defined by its interdisciplinary feature, that it forms scientific outlook, bases of scientific researches, private world of the person systematises, gives answers to questions interesting the modern person.

The mission of philosophy in a society life is concluded in a substantiation of effective ways of development of economy, the state, the person. In Belarus philosophy problems are concentrated on methodology of innovative activity, problems of national safety.

§2 Comparative analysis of East and West philosophical traditions

Belarus is included in strategy of global development of mankind. Within the limits of this strategy the most powerful economic systems of the West and the East co-operate. The multivector orientation экспортноориентированной the Belarus economy assumes knowledge of features, both the East, and the West.

Among philosophical sciences exclusively important role is carried out by discipline to which the name «philosophical comparativity» was fixed. Within the limits of this discipline comparative studying of various currents of thought of the East and the West is carried out, ways and ways of their rapproche-

ment in world process are searched. The comparativity study philosophical cultures of great civilizations and the problems connected with revealing of similarity and distinctions between them.

In historical development comparativity it is accepted to allocate some stages. Most considerable of them: 1) a stage 20-60 of last century on which updating is necessary, expansion of base and expansion philosophical comparativity; 2) a stage 70-80 – its time clearings of base concepts and transition to complete tematiko-problem personal comparisons of east and western philosophy; 3) a stage about 90 of the XX-th century and to this day – time of revision of the settled schemes philosophical comparativity, that directly is connected with a postmodernism, dialogue of cultures, tolerance problems, globality, etc., and also with search of reference points in comprehension of world philosophy.

On the first of these stages two world centres comparativity researches at the Hawaiian University (USA) and New Delhi (India) are created. From the end of 30th years of the XX-th century conferences of philosophers of the East and the West start to be spent to Honolulu. Further they become regular and time in ten years is spent approximately. Tracing evolution philosophical comparativity, it is necessary to pay attention that in it for approximately last seven decades some approaches faced: West centrism, Ostcentrism and, at last, the tendency to the East western synthesis by means of adjustment of dialogue of cultures of the East and the West.

§3 Nonclassical and postclassical philosophy

The Belarus philosophy is integrated into the European and Russian intellectual spaces which are characterised under the influence of globalisation by the general problematics of schools. Among them we can allocate existentialism, phenomenology, positivism, персонализм, structuralism, герменевтику.

The existentialism is a philosophical school close to problems of the person and modern culture. It studies private world of the person from the point of view of boundary situations. These situations create extremeness for the individual in the form of a choice between a life and death, harm and good, belief and meanness. Dane S.Kerkegor and Russian F.A.Dostoevsky were ancestors of existentialism. Most of all representatives of existentialism are in Russia, France and Germany. In Belarus the existentialism is presented in the form of a literary genre in products of the writers devoted to the Great Patriotic War. In these products hard years of struggle against fascism, difficult situations of a choice between a life, death and rescue of lives of other people reveal. Courage contrastly is present at products with meanness, treachery, uncertainty. Patriotism dominates at heroes of our time - cadets, students, workers of the organisations and the enterprises. Traitors appear in minority. Their victories carry a temporality.

The phenomenology is a philosophical school which does by a studying subject the sensual reality which is in daily forms of activity. At such approach to activity the power is not so important for knowing, that occurs from the point of view of physical, chemical processes in an industrial copper, it is enough to it to have the information on an input and a system exit. The basic ideas connected with phenomenology, E.Gusserl has formulated. Methodological use of these ideas is traced in phenomenological thermodynamics, cultural science, social philosophy, information technologies. Special interest in technical experts is caused by visualisation of images, work with object of modelling in a mode of a virtual reality. Precisely also technical experts in the course of the visual supervision connected with their professional work, distinguish maintained system from the parties not were in sight of the designer. Philosophers of Germany, France, were engaged in phenomenology. In Belarus the phenomenology is used in methodological function in the course of teaching of technical and humanitarian disciplines.

Personalizm is the philosophical school close to theology. In it problems of a life and death of the person, meaning of the life, are considered proceeding from belief in the God. Value of the person is defined by that it is creation. In this fact the sense of freedom, creativity is covered. The ancestor персонализма is N.Berdjaev who has formulated the basic ideas of school. Under the influence of its sights the French national school personalizm was generated. Ideas personalizm are claimed in Latin America and in the USA. In Belarus personalizm K.Turovskogo and E.Polotskoj which have found harmony between belief and freedom, creativity and become by great educators of the Belarus people was most brightly showed in the images. These traditions develop modern Christian culture of Belarus.

Positivism is the philosophical school placing emphasis for a role of a science, language, logic in modern culture. The ancestor is O.Kont. The school is popular in France, Germany, Austria, Poland and Hungary. After the Second World War its representatives have located in the Great Britain. In the USA updating close to positivism is developed by local philosophers. It is designated as a pragmatism. The founder of this updating is C.Pirs. Works in area of logic, language promoted development in the USA information technologies and have provided leadership of this country in working out of the software and computer systems. In a modern kind positivism and a pragmatism represent the English-speaking analytical philosophy popular at the American and British universities. Under the influence of positivism there was such science as sociology. Positivism promoted development of philosophy of a science which became popular in Europe, to the North America. On the basis of synthesis of positivistic and Marxist ideas the science philosophy roughly developed in the USSR. In Belarus this direction was generated with the assistance of V.S.Stepin. It contacts activity of the Minsk methodological school. On the basis of science philosophy research interests of institute of philosophy of the Russian Academy of Sciences and philosophical chairs of leading high schools of a city of Minsk, first of all BSU are closely integrated. Thanks to V.S.Stepina's works scientists, mathematicians, logicians have found the general problematics of the analysis of research process.

The Marxism is the philosophical school which has arisen in Germany on the basis of economic ideas of the Scottish school, social ideas of the French school, Hegel's dialectic and materialistic ideas and Фейербаха. The school became popular on all continents. In some states it has the status of the state ideology. K.Marks is created dialectic and a historical materialism. They have given modern definitions of the nation, the state, basis and a superstructure, the gender policy. In Russia the Marxism has got huge popularity thanks to G.V.Plehanov, V.I.Lenin. It was modified in a wide spectrum of political models of the power, beginning from authoritative to the totalitarian. The Marxism passes in the beginning of the XXI-st century the difficult period of transformation in democratic institutes. The Chinese and Vietnamese communists have achieved the greatest successes in this business. They could remain with the power and spend modernisation of the countries of socialist camp. The Chinese economy became the second after American on the basic total indicators. In Belarus the Marxism has played the important role in formation of the national state. This state has provided continuity of development of Belarus in the conditions of full political and economic independence. Philosophical ideas of Marxism in Belarus develop D.I.Shirokanov, A.I.Zelenkov and P.A.Vodopjanov.

The psychoanalytic philosophy has arisen in the end of the XIX-th century on the basis of psychology. It is considered the ancestor Z.Frejd. The mentality of the person is considered by it from a position of internal mechanisms of consciousness. In these mechanisms the key role is taken away to a sexual instinct with which physiological energy of a life associates. This energy dominates in consciousness of people. It should be considered, since children's age when bases of a high-grade life of the individual are formed and the complexes which are a subject of special studying and therapy can be formed. Sexual energy can be transformed by the individual to constructive and destructive forms of social activity. G.Jung has continued the analysis of private world of consciousness at level of public groups. It has entered concept collective unconscious, an archetype. The psychoanalytic philosophy is popular as in the USA, Europe, and in Russia. It is present at the literature, cinema, medicine, ergonomics and the gender policy. In Belarus psychoanalytic ideas are used in medicine, psychology, the gender policy, at safety maintenance in places of a mass congestion of the population. The concept of crowd one of the first was in details studied by Z.Frejd. The introduction into marriage, family creation are the major condition of internal mental harmony of the person, it сконцентрированности on professional work, responsibility and success.

The structuralism is the philosophical school connected with linguistics, ethnography, sociology. It has arisen in the XX-th century in France and in the USA. The French philosophers have interest to culture. They actively study structures colloquial and a written language, are engaged in ethnographic researches. Popularity researches Z.Levi-Strossa in pool of Amazon which is allowed to formulate a problem of protection of steady structures of ability to live of mankind and have received preservations of a

biological variety of a planet, the radical people. Steel Z.Derridy's works in structuralism transition in one of updatings of philosophy of the postmodernism accented on problems of modern culture. In the USA the structuralism, thanks to T.Parsonsa's works, became methodology of working out of social technologies of a stable society in which the basic stabilisation functions are assigned to civil structures. It has allowed the country, in the conditions of constant inflow of the population from the outside, to create a basis of social balance at level of the multicultural structures presented by city communities. In Belarus the structuralism is actual in the sociological version of the decision of problems as it is necessary for country to involve constructive potential of a civil society in business sphere.

The postmodernism is the newest philosophy of culture which, taking into account technologies of visualisation, interactive dialogue, social networks, tries to present the culture world as earlier not existing space of dialogue, life. Transformations are analyzed in a wide spectrum of linguistic, psychological, economic problems. The basic thesis of a postmodernism is formulated as a deconstruction of classical outlook. The postmodernism has played a huge constructive role in development of the Belarus culture, thanks to an aesthetics developed by representatives of Vitebsk art school. Among known artists of this school L.Pen, K.Malevich, M.Shagal. Thanking their activity, Vitebsk became capital of modern culture of Belarus.

§4 Materialism and idealism in classical and nonclassical philosophical systems

The philosophy traditionally deals with a life problem. Thus it is not limited only to its present existence. It connects the present existence with the historical past and future. This position is designated as materialism (Demokrit `s line). Religious-spiritual positions are accented on a recognition as an initial fundamental principle of life of the non-material essence designated as the God, spirit, soul, absolute idea, перводвигатель. These positions are designated as idealism (Platon's line).

Within the limits of a materialistic direction historically allocate dialectic, mechanistic updatings. Dialectic updating was developed Geraklit, K.Marx. It considers material life in development. Mechanistic updating is developed by B.Spinosa, I.Newton. It describes material life on the basis of laws of classical mechanics.

Within the limits of an idealistic direction allocate objective and panegoism. Objective (Pifagor, Platon, Aristotle, Gegel) deduces the absolute idea existing out of consciousness of the person as an initial substance of life. The God can be such absolute idea. The panegoism (Berkeley, Fichte) is accented on consciousness of the person as initial essence of life.

The modern epoch does not give basic value to materialism and idealism opposition as they are localised in different segments of activity of public consciousness (scientific and religious). From the point of view of scientific and technical activity by the most important representation about a matter and consciousness, as the certain bases of creativity is.

Material life appears in engineering, administrative, economic practice as a protogenic reality with physical, chemical, geological, biological properties on the Earth (biosphere) and a technosphere (the technogenic reality created by mankind on the basis of a biological and geological reality). The world outlook aspect of life in this case is concluded that the reality exists both on the Earth, and in the Universe. Thus, material life is presented the natural reality in the form of the Universe, the Earth and the person. Human consciousness and it is material practical embodiment in the form of a technogenic reality.

Interest to an ontologic problematics has considerably increased in XX-th century philosophy. In statement "a question on life" the approach to treatment of the concept that was most full reflected in M.Heidegger's works varies. According to M.Heidegger life is a unique theme of philosophy. In work «Dasein and time» he marks Life and time, what exactly the question on life is the basic philosophical question. Having entered basic term Dasein, M.Heidegger puts a problem to overcome the relation which has developed in classical philosophical tradition to life as most to the general and empty concept. Life according to Heidegger does not possess any person substantial and it is not closed in itself, but leaves itself, showing itself real. Life which ourselves are, presence, literally, "here-life" is treated by it as realised by the person time and final through a prism of own existence. Thereby, M.Heidegger has found consid-

erably new reference point for philosophy, trying to confirm it on the real base of the most human existence to which abstract ideas and principles are deeply alien. Terminology became area of the ontologic analysis in postmodernist philosophy. Life problems reveal in Z.Deleza, Z.Derridy's works, ZH.-I. Nancy. Z.Derrida offers the deconstruction project for the purpose of life reconsideration, and also to value of this life and to the conditions defining possibility of its understanding. The question consists not that life is, but that we are compelled this life constantly означивать. From here Z.Derridy's well-known ontologic thesis: "Il n'y a pas de hors-texte" (there is nothing, that would exist out of the text). Instead of metaphysical presence the deconstruction designates the organisation of textual senses. Plurality postmodernist philosophy leans against representations about presence of set of the possible semantic worlds. The synergetics supplements a modern scientific picture of life with nature interpretation as realities in which dynamics of processes is defined by nonlinear tendencies of self-organising.

§5 Substantive and relational concepts of space and time

Space and time as categories of modern culture, activity, are included into the competence of various specialities. In BNTU it is a question of architects, builders, designers. The space is the important economic category from the point of view of logistics, transit functions of territory, its transitivity. Experts of customs business are included in spatial economic possibilities of Belarus as they provide the important direction of tax activity of the state. Time contains huge potential of historical memory which allows to consolidate the nation within the limits of the decision of problems of a sustainable development. The factor of historical memory is a basis of preparation of engineers of military-technical specialities. The ideology of regional Euroasian system of safety is based on this factor.

Space this material life with certain physical, chemical, biological, social properties. In scales of the Universe it acts as the basic place of formation of objective, system structures with certain dynamics and power. In philosophy the space is defined as the objective reality given to us in sensations, existing irrespective of consciousness of the person. The images of space reflected by consciousness are designated as перцептуальные (mentality level) and conceptual (thinking level).

The space energetically also is information is sated. It generates particles which form a building material for macro-and mega - bodies. The Basis of generating ability of space as dynamic environment is formed by four interactions - gravitational, electromagnetic, weak nuclear, strong nuclear

The material spatial environment is an objective reality, a subject of display and studying from the point of view of topological and metric properties.

Perceptual the form of display of space is functionally shown in consciousness of the person at level of psycho-emotional reflexion.

The conceptual form is realised by consciousness of the person at level of logiko-conceptual thinking and has result in the form of scientific concepts of space and time.

The spatial environment is characterised by dynamics certain by a saturation of events and the information. The processes occurring in space have duration which is designated as time. In the tideway of dynamics time направленно also is irreversible. Duration of spatial processes in a combination to their dimensions is designated as existential continuum (3 spatial and 1 time co-ordinate). In scales of the Universe as a starting point the point in which there was a big explosion is accepted singular and dynamics has got the natural basis fixed by astrophysics, physics and chemistry subject.

Metrological and topological properties of space are described geometrie. In classical philosophy long time are substantive and relativistic approaches to space. The substantive approach enters representation about space as independent essence, a condition of existence of material objects. To this position adhered I. Newton. The relational approach of property of space and time puts in direct dependence on the material objects determining the metrics of space, and also on speed of their movement. These representations developed A. Einstein.

The social space is fixed by subject features of activity of mankind and the industrial zone, city line, region, an agrarian zone, a rest zone, a sanatorium zone etc. Social time – chronological parametres is designated as geopolitical, economic, architecturally-building, architecturally-landscape.

Features of social space play a key role in country development. So, in case of Belarus it is a question of favourable geopolitical position which creates economic resources of transit, logistics and customs activity. For architects and builders the social and natural space is an object of designing, creativity, industrial activity, an esthetics, design. There are rich traditions of development of cultural space, its aesthetic interpretation in the form of certain styles. In social space actual philosophical reflexions of architects about ecology, ergonomics, system methodology, history, a spiritual life of a society are visualised. The big not urbanised spaces are zones of woods, bogs, agricultural activity. In Belarus much becomes for uniform distribution of anthropogenous pressure to biosphere. Efforts for an intensification of an agricultural production, agrotourism to raise an effective utilisation of territorial complexes are simultaneously undertaken.

Social time is displayed by the categories setting the importance of the present, the past and the future. Chronological traditions set integrity and continuity of cultural dynamics.

§6 Nature as a subject of philosophical and scientific knowledge

The nature is existing irrespective of consciousness of the person the material life, characterised is immanent to it laws of occurrence, functioning and development. Nature is the nature which is out of consciousness of the person. The environment is the spatial component of the nature characterised by dimensions, tridimensionality, heterogeneity, orderliness. Taking into account concrete properties the environment is presented by a space and the geographical environment.

The geographical environment is a natural space within a planet the Earth. It is characterised by features of physical, chemical, biological structure and the biosphere is designated as atmosphere, hydrosphere.

The biosphere is the space of the Earth generated by activity of live organisms. The term has been entered into a scientific turn by the Austrian paleontologist Zjuss. In the XX-th century, from natural sciences positions, it was analysed by N.Vernadsky. It has proved on concrete examples from chemistry, geology, that live organisms have extended the activity to planet and became geological force. To live organism one more geological force in the name of mankind was added. She has created own space of activity and has included in it biosphere. This new space is designated as a noosphere. In this space thanks to design activity of mankind the technics and industrial technologies that hat given the basis to speak about a technosphere began to play a planetary role. The ecology is a science about the house what for people the planet the Earth with its biospheric complex is.

In nature concepts the priorities of its studying caused by social activity of people are reflected. These are concepts space; atomik; naturalism; mechanik; energy; environment; synergies; bionics.

The concept space is developed by antique thinkers and originally carried out world outlook function. Space in it was treated as the certain area of geographical life limited to sphere of motionless stars and having the spiritual basis. In XIX a century this concept has received new interpretation in the Russian orthodox religious tradition thanks to N.Fedorova's works. Space began to be treated as truly inner world – the mankind purpose. The science of space flights and revival of all was necessary for realisation of this purpose died that they could join the live. In accordance with K.Tsiolkovsky and N.Korolev, the space technologies became a reality and Russia becomes the first space power having wide experience of realisation of space programs. It became possible after it has compared schedules of solar activity on certain time cycles and the schedules giving a picture of dynamics of epidemics in Europe on years. The conclusion was obvious in favour of that thesis, that the Sun is the major regulator of vital processes on the Earth.

Koevolution tendencies became dominating in development of interdisciplinary communications. As a result in the XX-th century the space geology, space chemistry and space biology were issued astrophysics. Physicists began to consider space from the point of view of the basic theoretical sections. It became for them the necessary empirical basis.

The concept atomik has been developed by antique thinkers, within the limits of the ontologic project of life as emptiness and atoms filling it. To atoms the tendency to objective concentration and me-

chanical movement in emptiness is characteristic. Atoms became original border of a macrocosm behind which it was supposed nothing. However in the end of XIX centuries of the physicist has approached to necessity of studying of the nature at microlevel. The quantum theory of atom has been developed there was a physics of elementary particles. The place of purely mechanical dualism of emptiness and atoms was occupied with kvantovo-wave dualism. The naturalism concept is developed by antique thinkers. In Renaissance the naturalism began to associate with anthroponaturalism. In XIX a century natural-science updating of naturalism as empirical studying of the nature was formulated. In the end of XIX centuries the modernist style aesthetics has departed from naturalism principles. Most the classical period of aesthetic perception of the nature has ended with this.

The concept mechanic has ambivalent character as treats the nature as rigidly determined system at the heart of which dynamics laws. These laws have been formulated by Newton. Within the limits of such scientific section of physics as mechanics they are objective and applicable. It substantially concerns and technical activity of people. The mechanistic picture of the nature dominated in a science to XIX centuries when there were new concepts, in particular, energy.

In XIX a century the mankind in the name of Europeans and Americans sharply felt requirement for additional energy sources and movements. Therefore this century became a century of the physics diversifying the structure by such sections as thermodynamics, an electricity and magnetism. Energy became key concept. Soon scientists had been formulated the law of preservation and energy transformation. From it followed that quantity of energy in the world invariably. There was a question on updatings of energy and the power-intensive nature in the form of minerals of an organic and inorganic origin. Technological transition of mankind to use electric and thermal energy in industrial volumes has as a result begun.

Philosophers are involved with some aspects connected with energy: first, it is its materiality; secondly, it is the questions of social safety connected with it and stability; thirdly, ecology. Philosophers always remind mankind that inexhaustibility of a matter simultaneously means inexhaustibility of energy as that, and also its updatings.

In the conditions of beginning XXI of a century the mankind uses only small share of a power variety of the nature, placing emphasis on the most accessible and cheap resources presented by oil and gas. In process of growth of the world prices for them application of other energy sources is based. However not any economic system is capable to adapt without serious consequences for similar tendencies. Therefore energy associates with the whole complex of social and economic and tehniko-technological problems.

Synergies the concept treats the nature as the objective reality which is in dynamics of an order (orderliness) and chaos. The chaos is the major condition of evolution as allows the elements released from system самоорганизоваться according to the changed conditions of an environment. Thus changes mention also elements.

The bionics is a concept treating wildlife as the sample in the course of designing of artefacts, taking into account giving of functions of live systems by it. The bionics became a part of engineering activity. Environmental is a preservation of the environment, air, water space, natural complexes, a biological variety of a planet. The standard part includes indicators of a chemical, radioactive condition of environment, a temperature background. Standards of ecological safety affirm each country. At the international level monitoring of a condition of environment contacts decisions of regulating character in the form of special reports, agreements, conventions, decisions. The Kioto report is the realisation of methodology of quotas regulating volumes of industrial emissions, established for each country separately. Belarus actively realises strategy of preservation of the environment, preservation of a biological variety of a planet, a sustainable development. The ministry of natural resources and the Ministry of Internal Affairs are actively included in formation of nature protection methodology. To these structures necessary financial, material resources, the newest technologies are allocated, preparation of experts in higher educational and average special institutions is conducted. Large social and nature protection programs are realised in the territories polluted by radioactive elements after technogenic failure on the Chernobyl atomic power station. In territory of Belarus reserves, national parks operate, actions for improvement of conditions for complex use of

the Belovezhsky dense forest, Pripjatsky Polesye are realised. The environment becomes an additional resource of appeal of Belarus in tourism sphere.

Koevolution is a methodology of activity on the basis of reproduced local biological resources. The greatest prospects in this case have an agricultural production. Koevolution is the major resource of export activity of the enterprises, the companies and the important source of currency receipts. The term «koevolution» is entered into a science by biologists in second half of XX-th century for a designation existence, on the terms of biological cooperation, kinds, for example, birds and plants. Researches in microbiology have allowed out effective biotechnologies technology which are used in cosmetics, pharmacology and the food processing industry and city municipal services.

§7 Philosophical anthropology

The person is a subject of studying of anthropology. This science investigates historical, cultural, psychological aspects activity, behaviour and private world of people. The historical anthropology is connected with archeology. The cultural anthropology studies communities of people in a close connection with ethnography, sociology and a demography science. The anthropology is accented on behaviour of people from the point of view of the right. It has powerful research base in the form of special laboratories, law-enforcement structures. The main task of these structures consists in preventive maintenance of offences, and also in operative actions of investigation of the facts of crimes, formation of an objective picture of actions of concrete people. The psychology studies private world of the person, its mentality and consciousness. It promotes the best understanding of features of emotional, sensual, rational, spiritual human life. The social psychology opens features of dynamics of public consciousness at level of the small social groups operating according to the certain cultural program, or formed spontaneously in the form of crowd. Safety of the population in the urbanised space, in the conditions of carrying out of holidays, festivals, sports actions, taking into account tragical consequences of display of the mechanism of crowd, is one of key problems of law enforcement bodies. Danger to associates can be formulated by separate people and be planned as destructive action with heavy consequences for a life. The motivation results from features deviant behaviour, the aggressive relation to the social environment. Therefore struggle against terrorism is the important condition of maintenance of public safety.

There is a complex of the sciences studying the person as a biological being. First of all it is a question of anatomy, medicine, ergonomics, bionics, physiology of the higher nervous activity. Population health is the major resource of the state, the nation. In Belarus to this question the considerable attention as the nation requires the decision of questions of demographic safety is paid. The uniform parity of generations of people creates a steady basis of work of a preschool educational system, formation, manufacture. Pensioners do not have alarms concerning a provision of pensions. In the nations consisting of people of old age, inevitably there are problems not so much maintenance of pensions, how many self-maintenance with older persons of own old age.

The philosophical anthropology studies the person in a complex of concepts inherent in it, namely, as a biological and social being. It considers achievements in studying of the person of concrete sciences, and also problems and the senses which are a subject of theological judgements, reflexions of people about meaning of the life, death, the God, belief.

Subject of philosophical reflexions are questions of an origin, life, essence of the person. In a question of an origin of the person the philosophy starts with the given modern sciences. For medical sciences, genetics the law connected with an evolutionary origin of species. It allows to be engaged in diagnostics, to treat hereditary diseases, to solve the important problem of gene engineering connected with manufacture of donor bodies. Technologies of cloning cause the ambiguous relation as they are based on use стволовых cages, assume intervention in spheres which mention the major aspects of morals and religious belief. At sources of the theory of evolution stood C.Darvin, G.Mendel. Christians get acquainted with this true in the Bible. Abortions, suicide, deprivation of a life of other person, marriage and family destruction, and also the sinful affairs connected with словоблудием, drunkenness, a narcotism, arrogance, cruelty, violence, gluttony are subject to condemnation. Archeologists in the course of excavation, anthropological

historical reconstruction practically have completely tracked the basic stages of evolution of mankind. Genetics this evolution have tracked at level genom the person and have revealed set of the similar person in biological systems and animals that are allowed to raise efficiency of struggle against carriers of infections. Thus scientists do not aspire to world outlook generalisations in a question of mutual relations of a science and religion as in questions of rescue of a life. Except genetic, surgical problems doctors face the complicated questions arising on border of a life and death. One of these questions is designated as a problem ewtanazi. It is a question of the right of the patient if it is capable to make of the decision in a situation of heavy disease, on the basis of the verdict of doctors given to it about hopelessness of its condition, to make decision on the termination of a life to avoid the hardest physical tortures. The similar mechanism of decision-making is regulated by legal relations, a responsibility of the parties, public control and the country legislation. One more aspect of profession of a physician is connected with concept of death at level of mentality, consciousness. It is a situation when the human body is functional only at level of biochemical exchange processes. Usually such condition is provided with devices feeding an organism. It can last tens years. In this case about the patient doctors divide weight of responsibility with its near relations. Time conditions of clinical death have generated the whole direction of reflexions of people about the world after death, about transition from a life to death and from death by a life. Basically it is a question of the mechanisms of consciousness accompanying these transitions by the certain maintenance of impressions, images.

In mutual relation of a life and death the functional and various sense for the person bears value of a life as possibilities of a choice are connected with it, love, creation of a family, creative realisation. On the basis of these motivations the maintenance of life of the person is formed. In this maintenance activity, dialogue, spirituality is presented. Activity forms the social importance of the individual as persons, as human capital. Dialogue reflects variety of social relations of the person. Spirituality reveals humanism, humanity. The lion's share of that represents the person, is formed in public and individual consciousness. It is private world of the person which combines public norms of morals, the rights with own vision of a reality. By means of consciousness the individual reflects the information, processes it, forms knowledge and skills of activity, dialogue, behaviour. The brain directly influences dynamics mental, thought processes of the individual. In a more comprehensive sense influences of an organism on consciousness it is necessary to consider sexual features of people - men and women, and also age - children and parents.

The gender problematics became one of key in a modern society as in it the complex of the questions is fixed, men concerning the social status and women. It is a question as of material incomes, and the political, civil rights. The feminism philosophy has made much for social justice restoration in mutual relations of men and women. In Belarus there is no sharpness in the given question as business qualities of people dominate over the sexual. The state in details enough regulated social aspects of a life of the woman as mothers.

The person is so many-sided, that philosophers cannot capture its feature the uniform approach. Therefore there are concepts of the person. The modern philosophical anthropology is presented sotsial-darvinistskoj, Marxist, psychoanalytic by concepts of the person.

The sotsial-darvinistsky concept of the person was generated on the basis of the evolutionary doctrine of Darwin about a struggle for existence. These ideas have received the greatest resonance via O.Spengler, F.Nitsshe's works. In this case the person is treated as the biosocial being characterised or aspiration to will, or content amorphous by qualities. Ideas of Darwinism are used in the form of political ideology of nazi and chauvinism.

The Marxist concept of the person is developed by K.Marx, F.Engels. It is conformable C.Darvina's evolutionary theory regarding an origin of the person as biological kind, but thus a main role in transition from a monkey to the person takes away to work. F.Engelsa's work "the Role of work in the course of transformation of a monkey into the person" opens this approach. The person is treated as the person aligning on set of public relations.

The psychoanalytic concept of the person is developed by Z.Freud, G.Jungom. It is focused on mentality of the person, consciousness. The thesis that the psychoemotional sphere of mankind has the certain

structure connected with presence of not reflexed area in the form of instincts, archetypes, complexes, dreams affirms. Between these spheres there are difficult mutual relations which are a subject of studying of psychology.

Existential the concept of the person is stated in S.Kierkegaard, K.Jaspers, M.Heidegger, Z.Sartre, A.Kamju's works. It is accented on studying of the person in usual and extreme conditions of the technogenic validity. The existentialism has appeared is close to the world literature, especially to Russia, France. In Belarus existentialism structures are looked through in V.Bykov, A.Adamovich, I.Shamjakin's products.

The problem of the person is one of the most ancient in philosophy. Socrat, Platon, Aristotle, humanists of Renaissance were engaged in it Protagor. Modern anthropological reorientation has caused new approaches to studying of the person. So, in the symbolical concept of the philosopher неокантианца E.Kassirera accepted value of the special environment of existence of the person - a znakovo-symbolical reality, from which various parts: language, a myth, art, religion "the confused fabric of human experience" also is weaved. In M.Merlo-Ponti, E.Mune's works, Sartre, B.Valdenfelsa, G.Burkhardt's ZH.-item the concept about projective life of the subject in the world (life-with-other) is developed. Analyzing relations of the person and the world, M.Merlo-Ponti notices, that human experience is possible only being in the world, on points of crossing of "my" experience and experience of "others". The basis of life of the person is created by its active sensuality. Perceptual experience is type of initial experience of the person. The phenomenological tradition underlies methods of philosophical anthropology, in particular methods of research of a human corporality where it is overcome дуалистическое opposition corporal and spiritual, the corporality history reveals.

The characteristic tendency for existential philosophy to consider human life as unique, not reduced to any general schemes and laws has developed under the influence of M.Heidegger, M.Buber, K.Jaspers. The person for existentialists is not neither theoretical object of research, nor a class element along with other elements of this or that sort, – it is what has decided to be. Its existence is given as possibility выхождения for limits of – to the God, the world, freedom, to itself. Essence of the person is its ability to possess экзистенцией as self-creation possibility.

Going back to "life philosophy" the tradition to consider the person as "not taken place animal" has found the reflexion in the psychoanalysis theory. Z.Freud's statement that in the civilisation basis constant bridling of human instincts and consequently the free satisfaction of instinctive requirements of the person is incompatible with a civilised society lays, has laid down in a basis of its theory of the person. Investigating neuroses, Freud has come to conclusion that the reasons of their occurrence lay not only in individual pathologies, but also in the organisation of a modern society which suppresses inclinations and requirements of the person. The concept of the person which has been put forward by Z. Freud, is developed as history of transformation of a humanoid animal in the person by means of fundamental transformation of its nature. Not constrained principle of pleasure conducts to the conflict to a natural and human environment in which there is a traumatic comprehension of that the full and painless satisfaction of all its requirements is impossible. With consolidation of a principle of a reality human existence changes: the person gets ability to "test" a reality, develops reason functions, such as attention, memory and ability to judgements. Actually the person is the being simultaneously living in two worlds: in the world organised I, aspiring to that is useful, and in the world unconscious which operates a pleasure principle, cover more ancient, primary processes.

If the Marxist philosophy proceeded from consideration of the person through a prism of public relations Freud on the contrary passes from the analysis of inclinations of the individual to treatment of public tendencies. The modern philosopher G.Markuze has carried out organic synthesis of ideas of Marx and Freud. According to its ideas the free multidimensional person can change the social order created by domination of the person over the nature and the person over the person, considerably having reconsidered self-perception. Unlike Z.Freud and G.Markuze considered, that the conflict between a civilisation and instincts is not hopeless, and repressiveness belongs only to specifically historical organisation of human existence.

The important role in the person is played by the personal beginning which reveals through a choice of social communications and relations. The choice is the freedom interfaced to responsibility. In self-actualisation the phenomenon of the person, individuality, creativity is reflected. The choice the individual of concrete ways of self-realisation is the demonstration, the meaning of the life generated in its consciousness. Values concretise vital positions of the person and allow the individual to commensurate them with values of a mass culture.

The personal beginning allows the individual to resist to the technologies of a manipulation actively applied in a modern information field, social networks.

§8 Specificity of a social reality and society structure

The social reality is a product of historical activity of mankind. It includes is material-industrial sphere, spheres of economic, social, political, spiritual relations. Specificity of a social reality consists that it is space of ability to live of people. This space includes components lifeless and wildlife in the form of biosphere, and also culture. The person is a basic element of social space as it actively forms it according to requirements, values, traditions, ideals. The concept of the person of space of a social reality is concretised through society structure.

At a social reality actively there is a population possessing demographic, sexual, age, ethnic, social, racial, religious signs. The basic role in a modern society is played by cultural, national signs which form a variety of social groups. One of them have a territorial sign of the nation, others territorially are not caused. They are a product of valuable orientations, a material standard of living. With XVI centuries the social reality develops in the form of the technogenic civilisation based on priorities of scientific and technical development.

New updating of a social reality became a subject of studying of philosophy. Results of philosophical researches are presented formation, Weber, civilizatin, teknodeterminizm, passionar, communicative concepts.

Formation the concept is developed by K.Marks, F.Engels and V.I.Lenin. It considers scientific and technical progress in a close connection with criteria of social justice. For these purposes initial representation about a formation as unity of basis and fine tuning is entered. The basis fixes specificity of economic relations between social groups. It is primary on influence on a superstructure connected with sociopolitical, spiritual relations between social groups (classes). In basis the basic contradiction of technogenic development connected with discrepancy of relations of production to character and a level of development of productive forces of mankind is covered. Discrepancy pours out in the social conflict and leads to change of socioeconomic structures. This change can be carried out through a social revolution.

The Weber concept represents scientific and technical progress in a context of religious-cultural traditions of an economic pragmatism. It has proved influence of traditions on efficiency of economic activities and the organisation of a society on an example of Protestant ethics of work.

Technogenic dynamics associates with live system with signs of a birth inherent in its elements, ripening, destruction, a competition. The aspect of a competition dominates in works of end XX - beginnings XXI of centuries. Technogenic civilisations are characterised industrial, postindustrial, information by levels of development.

The Tehnodeterministsky concept was developed by E.Kapp, T.Veblen, F.Dessauer, A.Rostou and D.Bell. It is accented on the technician as the self-sufficient essence having defining influence on all aspects of ability to live of mankind. Similar representation is designated as технократизм. This position causes criticism. In this connection A.Toffler analyzes a shock from the future, M.Memford – a car myth, the Roman club – the ecological threat proceeding from технократизма

Passionar the concept enriches technogenic dynamics sinergetik processes of population explosions and demographic expansion, influence of space factors on a terrestrial world order. It is developed by L.N.Gumilev.

The communicative concept it is system J.Habermas is stated. F.Apel, M.Heidegger, M.Bakhtin, L.Vitgenshtejn, N.Kristeva brought in it a linguistic context. Communications exist as area of socially

caused activity of the person and are the open systems including diverse elements. Paramount function of forms and communication media is regulation of conscious practical activities of individuals. Stay in society forces the person to communicate with an external world. Therefore its relation to environment is initially mediated by sign systems. Sign systems arise in the course of a makes a necessary condition for realisation of public relations. Further during social interaction and an information exchange accompanying it develop and get visible steady cultural forms социокультурные functions and their structural embodiment: Samples of interaction and behaviour, value, norm, institutes. Similar rules and standards provide stability of a society and its reproduction.

Philosophical researches in the field of communications have arisen during an epoch of New time when the theory of "the public contract" Russo has connected problems of an origin of language and an origin of morals, the right, social norms and the state. Changes of communicative technologies in the XX-th century have led to considerable growth of researches in this area. F.Sossjura's linguistic concept and C.Pirs, U.Morrissa's semiotics theory formed a basis for B.Rassel and L.Vitgenstein's researches within the limits of analytical philosophy.

The beginning of studying of a mass communication as social phenomenon is connected with a name of the German sociologist of M.Weber. In 20th XX century it has methodologically proved communication of periodicals with social structures of a society. In T.Adorno, G.Markuze, M.Horkhajmera's approach the critical orientation also is reflected. They prove influence of a mass culture on change of types of the person. So, specialising on the theory and sociology of music, T.Adorno shows destructive воздействие mass-media on the person. G.Markuze has designated mass media as "the intermediary between owners and those who depends on them". Scandal in the Great Britain, connected with the mass media, burst in 2011, has shown that in this area there are problems of moral character.

In researches of the Canadian sociologist of M.Makljuen the typology of types of the culture based on oral, written and audiovisual means of dialogue historically developing and replacing each other is developed. According to M.Makljuen, everyone "the communicative technology" sets the social world – "galaxy" which, despite possibility of expansion or change of configurations, imposings of galaxies against each other, has the area and possesses accurately fixed borders. Formation of new communicative technology sets new type of thinking and the perception, a new way of life and new forms of the social organisation. First, in connection with new codes the maintenance of many social concepts changes. Secondly, change of communication technologies causes destruction of structure of social space steady before because the entered codes, becoming carriers and simultaneously products объективированного consciousnesses, inevitably limit a social order in communications space.

At the heart of theories of "an information society" the statement that the information is the main source lays, means and a manufacture product, and changes in a society are put in pawn in ways and information transmission media. The information becomes one of the main values of a society. For communications it is connected with qualitatively new level of processing and information distribution, with creation of the communicative systems, capable to provide information interchange.

In modern culture, according to Z.Bodrijjara, process "emplozion" is developed. The physical term "emplozion", that is, – explosion inside at the expense of prompt compression of space, time and the information, is used by it for the description of a modern situation. Emplozion at all is not accident it exists and in the controllable, directed form. Unlike a linear orientation outside, the structure here is concentrated on a cycle of constant repetitions. Such position leads to loss of ontologic value бинаризма. The disproportional increase in the information in relation to number of people perceiving it leads to clearing of the information of its sense: the message, as the message carrier, instead of its maintenance matters only. High skill to communicate of the modern person is reached by disappearance of sense of the information at a large quantity of transmission media of this sense. It leads to disappearance of the primary source of the information as any conductor of a mass communication acts only as means for other way of communication. The information does not make any sense and only "plays" it communications by dialogue simulation. In turn, loss of sense of the information leads to washing out and destruktion channels of its transfer. As modern information networks form a reality of other level (here there is no accurately set form, the

rigid communication defining its structure) the device of social space is redesigned also. Various social models appear projections of internal formal properties of media. In this connection the maintenance of many social concepts changes, in the conditions of electronic intermediary of a position of social groups appear not closed and freely varying. The increase in possible kinds of the organisations (transnational, international, national, municipal, local), and also crossing of these levels by functional communications of corporations, the international and non-governmental organisations, professionals and computer users leads to nonlinear structure of construction of society.

Nonlinearity create threat of stability of a social reality, therefore the concept of the structurally functional analysis of the society, the developed T.Parsons is actual. In it the American sociologist has formulated idea of self-regulation of social system at the expense of the structures of a civil society presented by the religious organisations, the ethnic communities creating a variety of the multicultural environment. The state leans against effective mechanisms of self-regulation of a society. In Belarus to this direction of activity the increasing significance is attached. The state assigns hopes to authority of Christian faiths - orthodox and Catholic. The big work on creation of constructive atmosphere is spent in an information field, first of all, in social networks. These networks became the basic tool for protest movements which use them not only in the organizational purposes, but also instructor. On sites the information with the detailed description of technologies of terrorism, creation of the panic, the raised aggression, ideological hatred takes places. In a counterbalance to destructive actions of immoral people, the society offers legal mechanisms of achievement of agreements, carrying out of economic, political reforms if they reflect interests of the majority of the population, to the nation. The minority should reckon with opinion of the majority and not impose the representations through atmosphere of threats, acts of terrorism as the mass destruction of people is demonstration of illegal activity. The society cannot stably exist in a situation when conflicts start to dominate over the constructive decision of problems. Therefore social contradictions should be considered not as a sign of split of a society, and as aspiration of a society to uneasy dialogue with those who would like to find the constructive place in a developed social reality.

§9 Phenomenon of globalisation

Globalisation reflects accelerated processes of an intensification of dialogue of mankind, cooperation of technogenic structures, features of a social life in conditions the Internet - spaces.

At level of economic representations it is a question of formation of system of transnational manufacture and trade. On a level of development of information-computer technologies it is a question of occurrence on a planet of uniform communicative space.

On a science level of development it is a question of formation of practice of functioning of the international research centres of innovative activity, technoparks, кластерных structures.

On an educational level it is a question of creation of the educational services corresponding to uniform international standards.

At level of preservation of the environment (ecology) it is a question of strategy коэволюции and a sustainable development which beginning was necessary within the limits of the United Nations in 1992 in Rio de Janeiro.

Globalisation is complex process. It is a subject of studying of philosophy, sociology, political science, economic, technical, pedagogical, biological sciences. Globalisation is capable to generate the consolidated basis of mankind for the decision of global problems.

In a globalized society transnational corporations form zvezdno-network structures. Huge megacities are served by difficult municipal infrastructural networks. Mass media create "global village". Thanks to expansion of network structures in economic the new transnational space, образуемое by such leading international political, economic and financial organisations as ОЭСР is formed, the WTO, IMF and the European bank of development etc. In similar space occurs виртуализация economy in which continuously there is a shift from manufacture of the goods to manufacture of services, "immaterial" branches of economy.

Occurrence of the term "globalisation" connect with a name of the Anglo-American sociologist of

R. Robertson which in 1983 used concept globality in one of articles, and in 1992 has stated bases of the concept in a system kind. The Socially-philosophical judgement of the term of globalisation is closely connected with works of such authors as D. Bell, P. Burde, E. Giddens, A. Toffler. The theory of a post-industrial society offered by D. Bell, describes its features as creation of a new class of intellectual elite, occurrence of new technologies, easing of contrast of leisure and work, estrangement of the person. D. Bell also has developed the concept of a relativity of deficiency according to which a place of the deficiencies eliminated by technical progress will occupy new, such as information deficiency, deficiency of time and consumption. In work "Flight from freedom" E. Fromm develops the thesis that the modern person has an aspiration to refuse the individuality and feebleness in favour of freedom. G. Markuze and E. Fromm's ideas help to establish connection between processes of alienation of the person, атомизации societies and globalisation processes.

In Belarus these questions are in the centre of attention of the state. The country participates in regional cooperation of the Euroasian states concerning military safety. In territory of Belarus the military infrastructure which counterbalances a geopolitical situation in Europe operates joint with the Russian armed forces.

§10 Coevolution and sustainable development

The term «coevolution» is entered into a scientific turn by ecologists in the sixties the XX-th centuries.

In social ecology coevolution contacts a problem of adjustment of mutually advantageous coexistence on the Earth biosphere and technogenic activity of mankind. For the decision of this question it is necessary to know certain analogues of optimum coexistence of diverse structures. The analogue can be developed proceeding from the biosphere organisation as global system. From the point of view of industrial culture the biosphere concerns systems of type without waste. It accumulates considerable resources in a kind углеводородистого and other kinds of raw materials. Efficiency of biosphere is defined by gradual consumption of renewed kinds of energy, first of all solar, and also its repeated use in cyclic exchange processes. In an ideal technogenic civilisations should aspire to similar efficiency of consumption. But the mankind in the conditions of beginning XXI of a century is only in an initial stage of technogenic development from the point of view of efficiency of biosphere. Therefore coevolution between a technogenic reality and biospheric is, but it is in an initial stage of development.

Transition strategy on мутуалистическую коэволюцию is formulated in 1992 in Rio de Janeiro within the limits of the United Nations and designated as strategy of a sustainable development of mankind in which limits the basic manufacturers of the emissions, harmful substances should find a consensus under key programs of ecological stabilisation of a planet.

In concept «coevolution» processes of interdependence, interference is reflected in level lifeless, wildlife and a society. If the importance of modernisation and a quality management is not called in question the relation to investment in preservation of the environment is ambiguous, as has confirmed the international forum which was passing in 2010 in Copenhagen. In December, 2010 at the international conference on change of the climate, passing in Cancun in territory of Mexico agreements on the differentiated contribution of the states of the world in ecological projects have been reached. But not all countries have approved this decision. However anybody any more does not deny presence of a powerful social base at supporters of balanced development. This feature affects and the maintenance of modernisation and quality management standards. Therefore there is a necessity for more steadfast analysis of processes of interaction of mankind and the nature, the live and lifeless nature for a context of evolution and modern lines in the world market. Coevolution it is allocated as a subject of special studying originally was up to standard of interaction of live organisms and environment and became a subject of studying of biologists and ecologists. Such approach has opened a way to working out of the interdisciplinary concept coevolution. Following the results of scientific researches became obvious, that coevolution creates between systems steady processes of an exchange by substance, energy, the information.

The most known updating coevolution at level of molecular structures is presented by a biomineralization. This updating has made possible formation of minerals by molecules and by that the secondary mineralization of the planet. This aspect is important for studying from the point of view of geology and development of the mining industry in the country.

Coevolution became a subject of active studying at level of internal processes of biosphere.. They are studied in the form of mutual relations the owner – a parasite, a predator - extraction, an insect – a plant. Formation of interrelations between populations in the course of evolution went in the geographical environment. Biologists have revealed three basic mechanisms of interaction of the populations based on narrow specialisation, generalization and symbiosis.

Narrow specialisation provides population access to substance, energy, to the information on the basis of formation of a certain way of life (night, day), adaptations to a diet consisting of one kind of organisms that inevitably affects transformation of a body and its working bodies. Generalisation reflects aspiration of population to survive in the geographical environment by expansion of a variety of food, pantophagy, migration. Symbiosis develops the interaction connected not only with food, but also safety. Knowledge received by scientists of the basic mechanisms coevolution is used for development of a veterinary science, increase of efficiency of selection work, struggle against parasites.

Mechanisms social coevolution are used by mankind since the early periods of history. The mechanism of reproductive possibilities of the animal and vegetative worlds was originally used. This type of culture basically depended on presence of a biological variety of a food orientation, successful hunting, fishing and collecting. Such type social coevolution did not guarantee stability of a life of communities of primitive hunters. Therefore the mankind has made a step to development of biotechnologies of domestication of wild animals, selections of plants, uses of natural materials.

Coevolution mankind with the biological variety of a planet modified by it became a new stage in which frameworks society resources have repeatedly increased that has made possible formation of agrarian civilisations, occurrence of city culture. In the conditions of intensive growth of the population, its requirements caused by formation of secular culture, the considered historical type coevolution became insufficient from the point of view of requirements of the West European population. The massive migration of Europeans on other continents could not solve the arisen problem even. Historical mechanisms coevolution a society and the nature in which the special role is taken away mashinno-cannon ingress, mutually changing the person and the external nature by means of technogenic activity have as a result started to be formed.

The technics in the form of cars and scientifically organised work has allowed a society to increase repeatedly productivity of activity and to provide surplus value manufacture. There was a basis for existence of liberal economy. In its basis regulation mechanisms through a supply and demand, a public division of labour between a city (the basic consumer of biological production) and village (the consumer of tools of work and the goods of industrial group) lay. The additional resource base was necessary. The manufacture of cars and systems of communications in the form of coal, iron ore that has caused rapid development of the mining industry and the infringement of stability of prirodno-landscape complexes caused by this development (запыление atmospheres, aeration of superficial breeds, pollution of underground waters, erosion of fertile soils). Industrial developers began to compete to traditional users of the earth (agricultural, wood manufacture). Development of transport communications has led to additional withdrawal from an agricultural turn of the earths.

By end XIX of a century the industrial society has strengthened technogenic pressure upon the nature through active development of power, motor industry and the chemical and petrochemical industry. Consumption of resources has extended on additional reserves accumulated in the form of minerals. The fulfilled breeds began to collect in industrial sailings, drains. Environment had not time to adapt for such volumes of substance. Actually activity of mankind has fallen outside the limits reproductive possibilities of biosphere. Limitation of resources has pushed the largest manufacturers and consumers to formation of outlook of the geopolitical control over territories potentially rich minerals. The world energy crisis of the eightieth years of the XX-th century has shown to mankind that the new historical form coevolution in

which basis principles of a sustainable development of a society and the external nature from positions of potential of hi-tech modernisation should lay is necessary. Interests of the nature and economic profitability have incorporated in point of innovative strategy of formation of the high technology manufactures based on technologies of deep and effective processing of raw materials, secondary use of resources, processes without waste. This reorganisation occurred within the limits of culture formation systemotechnik designing of the territorial structures, the urbanised spaces. Within the limits of the considered approach problems of maintenance of hygienic conditions of ability to live of the population by rational wildlife management, preservation of the environment, modernisation of an infrastructure and communications, optimisation of air, transport, water streams (sewer structures) began to be solved.

Macrodesigning as territorial units has selected region, agglomeration. Microdesigning is accented on average and small cities. The main parametre koevolution in systemotechnik designing is defined by concept of ecological equilibrium which is reached in borders of a landshaftno-natural complex by maintenance of a territorially-biospheric variety, redistribution of technogenic loadings. It is a question of creation биоценозов, capable to self-regulation in the conditions of the technogenic environment. For the decision of this problem it is necessary to know base biological interrelations which provide stability биоценозе in the given region. Classification of a biological variety of a planet by similar criterion a world science only is begun. Stability bio is defined substantially by self-regulation and reproduction of atmospheric air, water resources, soils, wood and park zones, and also geochemical and physical activity of landscapes, balance of a biomass.

The loadings are projected also on the second participant 1) maximum permissible concentration of chemical elements in atmosphere, water, soil; 2) criteria of zoning; 3) restrictions; 4) rationing of sanitary ruptures, clearings of industrial emissions and sewage, recyclings, dust disinfectings. The big plans of mankind in the tideway of the decision of these problems contact modernisation and innovative activity.

Innovative activity solves problems 1) perfection of technologies of sewage treatment, 2) reductions of emissions in atmosphere of harmful substances, 3) processings of a firm industrial and municipal waste; 4) introductions technologies; 5) creations of ecologically pure types of transport, safe power, systems of effective water supply and water removal, operative communication; 6) introductions of new methods of engineering preparation of territories; 7) uses of silent types of transport; 8) progressive methods of water preparation; 9) modern methods of protection against influence of electromagnetic fluctuations, radiation, thermal pollution; 10) technologies of a lining of engineering communications, 11) optimum placing of technical systems in territory.

§11 Globalisation and a problem of identity

Globalisation of a social reality has got steady character and the basis. Its economic advantages are obvious and to Belarus as transit state. Manufacturers aspire to overcome as much as possible the factor of national borders and by that to get access to the huge consumer and information market. The economic ability to live of mankind it is inapplicable to spheres of a political, cultural, spiritual life where a variety of interests dominates, values, traditions. In the conditions of globalisation it is a variety of a political, cultural, spiritual life has incorporated in an identity phenomenon.

Political bases of identity are presented by values of independence of the country, a life in the national state, ideological traditions of religious belief within the given state, a historical role of certain ethnic groups in creation of the given state and culture. All it demands the balanced policy in questions of migration, the rights of migrants, assimilation, integration of migrants into values of societies new to them. In Belarus questions of national identity are in the attention centre as historically many ethnic groups which have created own national states boundary with our state participated in formation of the Belarus nation. They are citizens of this state. For various reasons the part of ethnic Poles has appeared in territory of Belarus. These people are citizens of the Belarus state. This fact does not give the bases to politicians of Poland to speculate on a card of the Pole as the nation is formed by the consolidated economic interests. These interests usually divide some ethnic groups. In this consolidated basis the idea of the nation as economic system with concrete interests and participation in the international division of la-

bour is concluded. Any nation will disagree on distribution in its territory of the legislation of other state. The international law which reflects not ethnic, but humanitarian aspects of a life of people admits uniform only.

Cultural bases of identity of the nation are formed by the art creativity of the people expressed in folklore. Material forms of creativity are presented by crafts, the technologies of traditional activity connected with agriculture, hunting, fishery, collecting, бортничеством, ethnic cuisine. Art forms of creativity are presented tool, vocal, musical, choreographic, карнавальной, celebratory culture, customs, ceremonies, the fine arts, national architecture, the design, corresponding stylistics of a national suit, a head-dress, footwear, subjects of master's utensils. Spiritual forms of creativity reflect private world of the people, feature of its mentality.

A little historically the close forms identity of regional level. Such generality arises under the influence of the general interests of the decision of problems of safety, human contacts, an intensification of internal resources on the basis of cooperation of efforts of managing subjects. For Europeans the key idea reflecting an essence of their historical relationship, the idea of the European house is. For the Euroasian states key idea is the idea of the patriotic unity which bases have been put in pawn during the Soviet period of history. So, in solving battle in 1941 near Moscow Russian, Ukrainians, Belarusns, Kazakhs, Kirghiz battled. The Panfilovsky division battled near Moscow as if it there was Alma-Ata.

Having a necessary arsenal of protective means, resources the generality cultivates the identity and even aspires to development transboundary spaces. In this sense civilization activity reminds the tectonic. Each of civilisations has the plate and these plates sometimes are in very active interface.

The problem civilization identity consists that test its stability not only external factors in the form of the same globalisation. In any civilisation thereof ethnic separatism which can use technologies of terrorism takes place. If in a regional civilisation the processes of disintegration connected with loss of periphery the civilisation kernel also can undergo to destruction begin. But it while only one of assumptions as globalisation chronologically occupies the small historical period and it obviously insufficiently for end defined civilization cycles. While in the scientific literature fears concerning the consolidation of civilisations caused by globalisation and the epoch of collision of civilisations (E.Hantington) connected with it are expressed only.

The culture philosophy studies a wide spectrum of problems, beginning from structure of material, art, spiritual forms of activity of people, finishing dynamics of structural formations at level of civilisations.

The Structurally functional approach to culture allocates it as the social reality connected with material, art, spiritual forms of activity of people. The ethnographic approach fixes structures of a life, a family, folklore, marriage, a myth. The sociological approach reveals features of national, mass, elite cultures. The psychological approach explains mechanisms of behaviour of people in the conditions of a mass culture when problems of public safety get key value. Ethics supplement psychology with the analysis of behaviour of people in the conditions of a mass culture from the point of view of categories of morals, morals. The aesthetics shows culture as the certain image of the world formed by people on the basis of style, taste, religious traditions. The religious studies show features of spiritual culture of mankind. The archeology and history form археологическую a basis of reconstruction of ancient civilisations at level of architectural complexes. They provide museums with receipts. The information from places of excavation is used by philosophers for working out of the theory of culture. The important role in understanding of culture is played by archival activity.

Culture philosophy questions of communication of scientific and technical progress with values of creativity interest. This interest is caused by that the technics regulates the rigid technologies of activity which are leading up a role of the person before mechanical functions. In the huge social car value of individuality is lost. The importance of the person thereby decreases. To it the relation as to any other artefact is formed. Especially obvious such situations become in extreme conditions of modern wars where purely tactical problems of drawing of blow on the opponent prevail, liquidations of an infrastructure, communications. The destiny of the peace population thus is not taken into consideration. It perishes as a result of

mass blows of aircraft, rocket bombardments. It becomes the basic way of demonstration of force, ideology propagation. The more the killed peace inhabitants, the there is more than attention to initiators of aggressive actions. All these features of functioning of a modern information society have created vicious practice in which basis the pursuit of effective event lays. This pursuit provokes immoral technologies not only aggressive actions, but also earning money on публикации materials of victims of violence. All it means that the mass culture philosophy practically has completely lost sight of key categories of ethics, the right, creative freedom. In narrower sense speech should go about philosophy of pop culture not carrying out the critical function of the analysis of popular virtual images of serials, computer games. Mass media in the name of a yellow press bring huge demoralising effect in mass consciousness. Noted tendencies of development of a mass culture became visible in the XX-th century beginning. They have generated moods of decline of culture, destruction of technogenic civilisations. About it wrote N.Berdjaev, O.Spengler, K.Jaspers. Graphic means futurists, expressionists, кубисты have shown this problem. Gradually the fine arts resource was transformed to commercial service, propagation of consumer culture, pop art. Alternative movements of student's youth could not anything constructive in a counterbalance of this transformation offer. Defeat has been caused by absence of own ideas, thoughtless copying of east philosophy. The imaginary hobby for east culture soon became a part of commercial technologies of a modern mass culture, the show industry. Scenic экстремализм images it began to be supplemented with narcotic dependence. Degradation symptoms moved as a creative anguish. However creativity cannot be destructive from the psychological point of view. Speech should go about the commercial anguish assuming scandals, a non-standard way of life as a part of advertising, image of the pop executor, the actor. Existentialists would name activity in show industry sphere as boundary where the border between a life and death becomes a condition of commercial success. Stars die of overdoses. It does their popularity of stronger. However behind these separate death there is a certain way of life which is perceived by youth as natural. As a result the show industry has accelerated formation of the shadow market of drugs. Users of narcotics represent basically generations of teenage age, and also student's youth. People of the senior generations have not got under this influence as they found in a mass culture answers to real social problems.

The science methodology is accented on mechanisms kultura for the purpose of formation of educational, educational, professional space of activity of artists, musicians, sculptors, designers, architects, writers, poets, choreographers, composers, directors, operators, dancers, soloists. These people can count in the market environment only on commercial success. For some kinds of creativity this situation looks as extremely a challenge. Many artists, writers, singers remained during lifetime poor people. The glory of their products became possible only after centuries, decades. The state gives considerable support of the presented creative youth in Belarus. Schools with a creative bias, average special and higher educational institutions work. On TV the special channel devoted to questions of culture is created. Considerable resources are allocated for reconstruction of buildings of theatres, palace complexes, city building. Festivals will be organised, the corresponding infrastructure is created under them, are allocated considerable дотационные the resources doing culture accessible to mass spectator. Within the limits of development of agrarian tourism the infrastructure of traditional culture of Slavs is recreated. In this area can show itself many talents. Interest to traditional culture constantly grows. Distribution of this interest among youth is promoted by the ethnographic, historical, patriotic clubs held by them festivals.

§12 Dialectic and sinergetik concepts

The philosophy considers a natural and social reality in development. It is a question of changes of the directed character, different intensity, a configuration. One philosophers in life development большее take away value to straight-line characteristics of systems, continuity, others - to mechanisms of self-organising of systems in nonlinear conditions.

Linear representation of life was issued in the dialectic concept of development of natural and social systems. This work was consistently carried out Geraklit, by Platon, Aristotle, the Edging, Gegel. K.Marx, F.Engels transformed dialectics to methodology scientific and practical activities. The dialectics describes

mechanisms of development by means of categories, principles, laws. In it find reflexion answers to three basic questions on a source of any development, the mechanism of development, an orientation and continuity of development.

The source of any development sees dialektiks available in a natural and social reality of the contradictions which structure is formed by the contrasts possessing properties of identity and distinction. So, a variety of the physical world is created by four basic interactions - gravitational, electromagnetic, weak nuclear, strong nuclear. A variety of the biological world create geophysical, chemical, geological, genetic, koevolution interactions. The unity and conflict of opposites law specifies in interrelation of conditions of identity and distinction of contrasts. If in interaction of contrasts distinctions the contradiction passes in a stage of the constructive struggle connected with detection koevolution of a resource of development, raising stability of system to external influences start to dominate.

Mechanisms of development of life are concluded in the quantitative and qualitative changes which are in an interconnection of a measure and the maintenances of certain processes. The measure characterises indicators of the optimum functional environment of development of systems, their extreme limit on which border the system is transformed to new quality, according to the changed conditions of development of life. The optimum functional environment is formed under the influence of physical, chemical characteristics of interactions. Within the Earth the complex of physical, chemical, geological, organic interactions has generated the optimum environment in the form of biosphere. It approaches both to live organisms, and mankind for realisation of social programs. People in addition to optimum characteristics of the geographical environment enter optimum indicators of resources put into circulation to industrial activity. These indicators are designated as a quota. Entering quantitative restrictions on consumed resources in economic sphere the mankind pursues the aim of maintenance of profitability is mountain - also oil-extracting branches, an effective utilisation of resources on the basis of a competition of manufacturers at the expense of quality.

Manufacturers have developed quality management system for maintenance of necessary level of competitive capacity. It is synthesised in the international system in which frameworks the quality standards operate, corresponding certificates stand out, laboratories of diagnostics of quality operate, the standard base, outlook functions. Originally the quality management has been concentrated to activity end results. However this control it has appeared insufficiently because activity errors are pawned at a design stage of artefacts, technological processes. Therefore the quality management has extended the control to all stages of activity up to production realisation, and its service. In Belarus to questions of introduction of a quality management the considerable attention as the national economy is focused on export problems is paid.

The development orientation is formed by processes of increase in functional, adaptive possibilities of natural and social systems to constantly changing conditions of their existence. The similar tendency in a society is designated as progressive. It is accompanied by degradation of separate elements. In economy of market type the lifting periods are replaced by recession, stagnation, depression, revival of a social life. These are hard times for the population. They manage to be overcome, as development in economic sphere has cyclic character. It means, that the progressive vector becomes every time dominating after time recession. Philosophers describe these processes through the mechanism of negation of negation. This mechanism is formulated in the form of the law.

The development orientation is in many respects determined by cumulative mechanisms of natural and social dynamics. These mechanisms operate at level of the information, energy and cultura. They create continuity of development of life and, accordingly, a basis of steady existence of a reality. It is the important feature it is used in the adaptable purposes by live organisms, also people in the course of social activity. The orientation and continuity of social development have generated mechanisms of transformation, modernisation, scientific and technical revolution. Belarus could overcome with the minimum consequences a world economic crisis thanks to that was guided by principles of modernisation of existing industries, agrarian sector. Finally the economy became effective to level of the decision of export problems.

Categories in dialectics, except functions connected with interpretation principles and laws, carry out function of reflexion of laws of development of various spheres of life, human activity, knowledge of social sphere. These categories on advantage have pair character. Among them it is possible to allocate individual; essence and the phenomenon; the maintenance and the form; possibility and the validity; necessity and accident; necessity and freedom; cause and effect.

The dialectics is applicable in ontology, anthropology, gnoseology, social philosophy. It can be considered as universal methodology. One more concept of development began to apply for the similar status in the XX-th century – sinergetik. In it life is treated as the certain integrity characterised by dynamics of chaos and self-organising of systems.

Conceptual registration of synergetics occurred in 60-70th years of the XX-th century. Scientific Belgium, Germany, Russia occupied with interdisciplinary subjects participated in this work. To number of founders of this movement carry G.Haken, I.Prigozhin.

The system approach considerably supplements a picture of development of life as in addition to the linear equations enters the nonlinear equations and necessity dialectically combines with accident within the limits of concept of dynamic chaos. This chaos possesses constructive properties of the architect. It forms conditions for matter self-organising in dissipative structures of open type. The role at transition from dynamic chaos to an order is carried out by fractals, atraktors. They store the information on base principles of the organisation and a variety of life. Thus atraktors are more flexible architectural as under certain critical conditions they can change a development trajectory, leaving for an existing set of vectors. In this case researchers face a phenomenon casual atraktor. Dissipative structures are in a mode of constant information interchange and energy with environment. Elements forming them possess a considerable autonomy which allows them to separate from system at any moment and to return to a condition of dynamic chaos. Here they have an opportunity for the next self-organising taking into account changed dynamics of external and internal factors.

The synergetics focused attention of production workers on the nonlinear processes connected with value of random factors in operational characteristics of technical systems. These factors can be ignored at designing, it is possible to consider. If they are considered, it is a question of working out of engineering systems of safety of technical systems. Especially it is in the technical systems providing work with sources of a nuclear energy, chemical substances. Technogenic accidents staticized creation of system of monitoring, working out of technologies of action in extreme conditions. In Belarus these problems are assigned to the ministry of extreme situations.

Synergetics occurrence along with dialectics testifies that real developments of life are much more various, than one-two concepts of development of the same life. Probably, the philosophy will come at any stage to synthesis of conceptual constructions.

Conclusions on the module 1 consist that the modern philosophy considers the most actual aspects of formation of a modern scientific picture of the world, the person, a social reality, methodology of activity in the conditions of globalized economy, modernisation. This general synthetic picture of scientific outlook allows to the competence of the expert of quickly varying conditions of professional work.

Chapter 2

FILOSOFICAL AND METHODOLOGICAL ANALYSIS OF SCIENCE

Keywords: a science, scientific researches, methods of scientific researches, empirical level of scientific researches, theoretical level of scientific researches, modelling, innovative activity, technopark, an innovative infrastructure.

§13 Science as a social institute

Research and development includes:

- Basic researches (theoretical and search);
- Applied researches;

- Developmental works;
- Skilled, experimental works (can be carried out on any of the previous stages).

Preparation of scientific shots is carried out through postgraduate study and doctoral studies, the organisation of scientific activity of students. In Belarus 184 councils about protection of dissertations (134 doctor's and 50 candidate) which provide protection of dissertations on 275 specialities function. Development of personnel potential of a science regulates State programs «Scientific shots». The national patent system is an is standard-legal base on protection of objects of the industrial property – the inventions, useful models, industrial samples, trade marks and service marks, selection achievements, topology of integrated microcircuits.

In Belarus functions about 300 scientific organisations. In scientific researches and workings out is engaged 30 thousand persons. Researches and workings out in the field of engineering science traditionally prevail. The cores personnel and financial resources are concentrated in National academy of sciences of Belarus, the Ministries of Education, public health services, the industry. The national academy of sciences of Belarus is the higher state scientific organisation of republic to which problems on development and coordination of a domestic science and formation state scientifically – the technical policy are assigned.

State scientifically – the technical policy is directed on priority support of the most perspective scientific researches, scientifically - technical workings out and the innovative projects focused on the decision of problems of social and economic development of the country. The control system of scientific researches and workings out is based on use программно – target methods. These are government programs of basic researches in the field of natural, technical and social studies. Scientific researches and workings out under orders of republican state bodies, облисполкомов, the Minsk Executive Committee of the City Soviet of People's Deputies, presidential programs, branch, regional scientifically – technical programs, innovative projects.

Program and target methods provide primary support of priority directions scientifically – technical development (mechanical engineering, information, medicines and medicine, ecology, agriculture, laser and plasma technologies, the optoelectronics, new materials with special properties, methods of technical diagnostics, chemical synthesis of substances, selections of plants, biotechnologies, etc.). In these purposes at the state support are created and function the Belarus republican fund of basic researches, the Belarus innovative fund, Fund of information of Belarus.

The scientific school – the organizational-creative structure of activity obliged by the existence to the visible scientist-organizer, capable on the basis of the received results to create the whole direction of researches and personnel potential in the form of the prepared candidates and doctors of sciences, and also capable to provide continuity of generations, an urgency of spent researches and workings out. In BNTU 46 scientific schools function. Among them: «Synthesis of foundry materials, mechanisms of their regeneration and repeated use, computer modelling and working out of technological processes of manufacturing сложнопрофильных отливок black and colour alloys» (the founder – fund of engineering science, Prof.D. M. Kukuj), the building mechanics (Profs.A. A. Borisevich), physicists of laser materials (Prof. N. V. Kuleshov).

Scientific researches – scientific researches within the limits of the project, called to collect the missing information to make substantiations of theoretical and empirical character, to study structure of new materials, territories for subsequent use in engineering decisions.

§14 The tendency of integration in development the science

In the XX-th century the science was transformed in sistematik activity in which frameworks of a steel to prevail accents of working out of actual research programs on a joint of set of disciplines. For reflexion of the new approach to vision of a natural and technogenic reality began to use possibilities of the metatheoretical analysis t The national innovative system of Belarus is a set of the legislative, structural and functional components providing development of innovative activity in Belarus.

The transfer of innovations from scientific sphere in industrial sphere, and then it business occurs by means of formation of the special organizational structures which have received the name of subjects of an innovative infrastructure. Position about an order of creation of subjects of an innovative infrastructure has been confirmed by the Decree of the President of Belarus № 1 от 3 January, 2007. The innovative infrastructure assumes presence of technoparks, technopolises, the is innovative-technological centres, the small innovative and venture enterprises, free economic zones.

Hanks to which there was possible cybernetics, an ergonomics, gene engineering, quantum optics, synergetics, bionics.

According to methodological problems bases of a scientific picture of the nature in shape quantum mechanic, sinergetik, microphysical, thermodynamic, environment, noosfer representations were developed.

New role in a science the mathematics thanks to the equations for practically any problems, especially modelling, experiment has started to play, measurements, designing.

Physics as the leader of natural sciences, has generated interdisciplinary communications with geography, chemistry, biology, astronomy, geology. Each of natural-science disciplines has entered into close contact with scientific and technical disciplines that has given the basis to speak about the complex of scientific and technical disciplines forming the list corresponding professional компетенций.

The interdisciplinary status of a science specifies in its aspiration to the decision of complex problems, including an exit in practical activities. Practical specialisation has generated industrial, ecological, social directions of activity of a science.

§15 Scientific rationality and its types

On importance degree scientific researches are subdivided into the works which are carried out under scientific and technical programs, the confirmed State committee on a science and technologies, the works which are carried out under plans of the branch ministries and departments and work, carried out under plans of the research organisations.

Depending on a financing source scientific researches divide on state budgetary, хозяйственные and not financed. State budgetary scientific researches are financed by republican state bodies, НАН Belarus, the state organisations, subordinated to the Government of Belarus, at the expense of means of the republican budget. In financing of programs can be involved and other means, including means of local budgets and innovative funds of republican state bodies. Хозяйственные works are financed by the organisations-customers (industrial or research) on the basis of economic contracts. Not financed researches are carried out under own initiative of scientific personnel.

Basic research. By means of it basic bases, ways and methods of the decision of a task in view are established.

Research workings out establish necessary dependences, properties, the laws creating the preconditions for the further engineering decisions.

Trial workings out have the purpose of finishing of research before practical realisation and approbation in the conditions of manufacture. On the basis of results of skilled-industrial check corrective amendments in engineering specifications for working out introduction in manufacture are introduced.

The scientific direction is a science or a complex of sciences in which area researches are conducted. The complex scientific problem is a set of the problems united by the uniform purpose.

Specific scientific and technical problems are characteristic for certain manufactures, problem industries. So, in motor industry the economy of fuel and creation of new kinds of fuel are actual.

The theme of scientific research gives answers to the concrete scientific questions covering a part of a problem.

The scientific question is the scientific problem concerning a concrete theme of scientific research. The direction of scientific research is defined by the scientific program, the state theme, хозяйственной subjects.

The theme of scientific research should be actual (important, demanding the prompt permission), to have scientific novelty, to bring contribution to society development, to be economically effective for a national economy. The profitability requirement is sometimes replaced with the requirement значимости, defining prestige of a national science, the state. The theme choice essentially becomes simpler in the presence of tradition of scientific school.

Productivity of scientific research is a question of the organisation of planning, work performance. Plans and sequence of actions of scientists depend on a kind of object, the purposes of scientific research. So, if it is spent on technical themes the basic preplanned document – the feasibility report in the beginning is developed, and then are carried out theoretical and experimental researches, the scientific and technical report and results of work is made take root into manufacture.

Stages of scientific research:

The preparatory;

Carrying out of researches;

Works on the text;

Introductions of results of scientific research.

The preparatory stage assumes a theme choice; a substantiation of necessity of carrying out of researches; definition of a hypothesis, the purposes and research problems; working out of the plan or the program of scientific research; preparation of means of research (toolkit). The theme of scientific research is formulated, the reasons of its working out are proved. By familiarity with the literature and materials before the spent researches it is found out, in what measure theme questions are studied also what results are received. The attention concentrates on questions on which answers are not present or they are insufficient. The list of statutory acts, the domestic and foreign literature is made. The research technique is developed. Means are prepared.

The research stage includes regular studying of the literature on a theme, statistical data, archival materials; carrying out of theoretical and empirical researches; processings, generalisation and the analysis of the received data; explanations of the new scientific facts, arguing and a formulation position, conclusions and practical recommendations and offers.

Work on the text assumes composition definition (constructions, internal structure) works; specification of the title, names of heads and paragraphs; preparation of the draught manuscript and its editing; text registration, including the list of the used literature and appendices.

The Vnedrenchesky stage consists in transfer of workings out to manufacture and maintenance of their author's support.

Plan of scientific research-it the basic idea which connects structural elements of a technique, defines an order of carrying out of research, its stages.

In a research plan contain:

The purpose, problems, a hypothesis

Criteria, indicators

Sequence of application of methods, order of management of an experiment course, a procedure for registration, accumulation and generalisations of an experimental material.

The research plan assumes:

-- Problem and theme choice;

-- Definition of object and subject, the purposes and problems;

-- Working out of a hypothesis of research;

-- Choice of methods and working out of a technique of research;

Structural components of research process

General acquaintance with a research problem;

Formulation of research objectives;

Working out of a hypothesis of research;

Statement of research problems;

The organisation and experiment carrying out;

Generalisation and synthesis of experimental data.

The organisation and experiment carrying out:

The technique of scientific research is a set of methods, ways of research, an order of their application, interpretation of the received results. Depends on character of object of studying, methodology, a research objective, the developed methods, the general skill level of the researcher.

Object of scientific research – system, process or the phenomenon, generating the problem situation demanding studying.

Subject of scientific research – a part, the party, property, the relation of the object investigated with a definite purpose in given conditions, an element of object of research.

Hypothesis – the scientific assumption the representing probable decision of a problem. Should be formulated clearly, precisely, consistently, have communication with the theory.

As problems – scientific research are called questions, reception of answers on which is necessary for research objective achievement.

§16 Evolution of organizational forms of science

The state committee on a science and technologies of Belarus is the republican state body spending a state policy and realising function of state regulation and management in sphere of scientific, scientific and technical and innovative activity, and also protection of the rights to objects of intellectual property, and submits to Ministerial council of Belarus.

Elements of innovative infrastructure of Belarus:

Park of high technologies (specialisation – IT – the industry and accompanying branches)

Scientifically-technological parks (technoparks) – 10 organisations positioning as technoparks, 3 of which have the corresponding status appropriated (according to the Decree of the President of Belarus from January, 3rd, 2007 № 1)

The Belarus innovative fund

Business incubators (including specialising on support of the innovative enterprises) – 9

The centres of a transfer of technologies (including the Republican centre of a transfer of technologies and its regional representations, and also the organisations with which corresponding cooperation agreements are concluded) – 24

The innovative centres – 5

The research-and-production (scientifically-practical) centres – 56

The information and marketing centres – 10

Scientific and technical libraries (including factory) – 476

Consumers of services, innovative infrastructure are 318 is innovative-active enterprises.

Business incubators are an examination of innovative projects; search of investors and if necessary granting of guarantees; granting on favourable terms premises, the equipment, pilot production; rendering on favourable terms legal, advertising, information, consulting and other services. Term of stay of the client in a business incubator – from 1 till 2,5 years. For each service the check is drawn to the client. After an exit from a business incubator within 1,5—2 years the financial debts should be extinguished. Besides, in the contract deductions from profit in favour of a business incubator can be provided (as a rule, no more than 5 %), which businessman pays within 3-5 years after an exit.

Technopark – the innovative organisation which overall objective is transformation of results of scientific and technical works into the new competitive goods and services, sharp reduction of an innovative cycle from idea to the goods. This purpose is reached at the expense of cultivation of small and average innovative firms on the basis of any high school or scientific institution. For achievement of an overall objective the technopark solves following primary goals:

Organizational, legal, information, economic consultation and assistance to development of small innovative firms;

The organisation of services of collective using for marketing, advertising, publishing, foreign trade activities, licensing, certification, patenting;

Search of sources of financing;
Creation of joint ventures in various areas of innovative activity;
Carrying out of exhibitions, seminars, conferences;
Realisation of trading and intermediary activity.

§17 Science as a system of fundamental and applied researches

Theoretical scientific research are based on application of mathematical and logic methods of knowledge of object. Result of theoretical research is the establishment of dependences, the description of properties and laws. Results of theoretical research demand verification.

Theoretical and experimental scientific researches provide experimental activity on natural samples or models.

Empirical scientific researches are carried out in laboratory conditions in which properties are studied, dependences and laws, and also spent for acknowledgement of the put forward theoretical positions.

Basic researches are directed on opening and studying of the phenomena and laws of the nature, creation of principles of research.

The purpose of opening of laws, detection of communications between the phenomena, creations of new theories. Basic researches are connected with a great risk and uncertainty from the point of view of reception of the concrete positive result which probability does not exceed 10 %. Such researches are conducted on border known and unknown. Despite it, basic researches make a basis of development both the science, and a social production.

Applied researches – creation new or perfection of existing means of production, consumer goods etc. Object of research of engineering science are cars, technologies, organizational structure. Practical orientation and a concrete special-purpose designation of applied researches does probability of reception of results expected from them rather considerable, not less than 80-90 %. As a result of applied researches on the basis of scientific concepts the technical are created.

Complex scientific researches study diverse properties of object, each of which can provide application of various methods and research means. As an example of complex research the estimation of reliability of the new car serves. Reliability of the car is integrated property and maintainability, a keeping and durability of details is caused by its such separate properties, as non-failure operation.

As the differentiated scientific research is called research in which process one of properties or group of homogeneous properties is learnt. Each investigated property of reliability of the car is differentiated.

§18 Science language: objective, definitions and terminology

Semiotics – a science about signs and sign systems, sign behaviour and sign communications. The modern natural sciences have reached a new level of research of the nature (the quantum physics, synergetics, etc.). A number of problems of theoretical, methodological, practical character, transfer to nanotechnologies have forced to search for new physical and geometrical approaches. For the description of real objects and mathematical abstractions concepts *fractal and fractal geometry* (from Latin "fractus" - fractional, broken, etc.) have been introduced. They have been offered by Benois Mandelbrott in 1975 for a denotation of irregular, but self-similar structures. The birth of fractal geometry can be connected with the edition in 1977 of Mandelbrott's book ` *The Fractal Geometry of Nature* '. In that work scientific results of other scientists working during 1875-1925 in the same area (Poincare, Fatu, Julia, Cantor, Hausdorff) have been used. However only presently it was possible to unite these works in an uniform system. The fractal geometry has opened new possibilities and is actively applied in various areas of natural and engineering science.

There are different definitions of a fractal set:

Fractal (latin *fractus* - crushed, broken, splintered) - a complicated geometrical figure, possessing the property of self similarity, that is made of several parts, each of which is similar to the whole figure. In a more comprehensive sense as fractals one understands point sets in an Euclidean space, having fractional

metric dimension (in sense of Minkowski or Hausdorff), or a metric dimension which is distinct from the topological one.

Fractal is an infinitely self-similar geometrical figure in which each fragment repeats itself at scale reduction. *Fractal* – is a self-similar set of a noninteger dimension. Thus, the fractal possesses a hierarchy and a scale invariance (scaling). One of its major properties is the property of self-similarity, i.e. the fractal appearance does not change in any space scale. That means preservation of the principle of a similarity at various levels of the investigation of the structure. *Natural* and *technogenic fractals* have accurately limited interval of scales in which the fractal's principle is kept and in which they exhibit the fractal nature. In the reality any fractal has some minimum and maximum scale of length. At smaller or great values of this length the self-similarity vanishes or it is broken. When in the form of fractal there are elements of randomness, it is spoken about "*casual fractals*". To speak about a self-similarity in these cases it is possible, but only in the statistical sense i.e. when it is impossible to speak about exact copies, but only about coincidence of statistical characteristics (when the average on statistically independent realizations of the object is carried out).

Classification of fractals

- Fractals are *deterministic* which are built recursively by means of some given algorithm, and *stochastic*.

- *Randomization fractals* are produced by means of a recursive procedure into which on each stage a casual parameter is introduced.

Deterministic fractals which in a certain range of scales *possess property of an affine self-similarity* are often considered. This property is generalization of the usual self-similarity in the sense that a part of *the affinely-self-similar fractal* is similar to the whole object after non-isotropic scaling. An example of such fractals are many rough surfaces received as a result of different technological processes.

Multifractals are inhomogeneous fractal objects, for which complete description, unlike regular fractals, it is not enough to introduce only one value, namely its fractal dimension, but the whole spectrum of such dimensions, which number is infinite, is necessary. The reason of that is that along with purely geometrical characteristics, such fractals possess also some statistical properties.

: Fractals in the processes of the self-organized criticality

Fractals naturally arise at study of nonlinear dynamic systems, in particular, dissipative systems with locally interacting degrees of freedom.

Models, with a discrete range of local variables, are known under the name «*cell automats*». Most popular of them is *Abel's model of a sand heap*. These models arise a particular interest for the description of the avalanche like dynamics, inherent in many systems in the nature.

The fractal analysis has made revolution in the character of researches in the various areas of the science: meteorology, medicine, geology, economy, etc. Development of representations of fractal physics and geometry allows explaining many puzzles and phenomena. For example, by means of fractal physics such paradox, as effect of the flaring sky is easily explainable. New knowledge starts to be applied actively in practice as well. So, for example, the fractal aggregate of each substance is formed under certain physical conditions which are not understood up to the end. However, what is already known, gives the chance to use laws of formation of fractal aggregates for the creation of materials with unusual physical properties. Thus, it is possible to create materials, capable to absorb electromagnetic radiation in a wide enough range of wavelengths, new dyes, liquid crystal systems, nanostructure, solid state substances with porosity to 99 % and new process in engineering for the struggle against the scum in steam boilers and power installations, and, unfortunately, new exemplars of lethal weapons.

§19 Forms of reflective judgement of scientific knowledge

In 18-19 centuries the science has been involved in methodological discussion about possibilities of knowledge of the world. Among philosophers and scientists there was a majority of those who did not see restrictions of informative character. But there were those who doubted cognoscibility of the world (Berkeley, the Edging). The special line was represented by sceptics. Successes of a science in the XX-th

century in knowledge were so obvious, that practically all scientists have forgotten about these discussions. The exception was made only by crisis in the physicist, происшедший in the beginning of 20 centuries the in details enough analysed V.I.Lenin in work «Materialism and empiriokritik». In the end of century there was a problem not cognoscibility borders, and moral borders of research activity of scientists in connection with application of the weapon of mass defeat and rapid development of gene engineering. The gnoseology, methodology are engaged in studying of this question of the logician.

The logic studies specificity of the scientific formalized thinking which is not giving in often to rules of verification, dealing with virtual objects. However conclusions and recommendations of this thinking often leave in area of acceptance of administrative decisions, designing of control systems.

The logic opens requirements to process of scientific researches from the point of view of its sequence and to representation of results of scientific researches.

The logic of scientific researches regulates process of realisation of an object in view in the form of specific targets. The hypothesis in which expected results of researches and workings out are stated is originally formulated. Then the condition of a question in the form of already reached by other experts is studied. This condition is fixed by an abstract statement of a problem. Against the reached results problems of scientific research are specified. They pass in a stage of constructive search of missing decisions by carrying out of laboratory measurements, mathematical modelling, computer data processing, designing, manufacturing of a pre-production model, its research to conformity to the set parametres.

Representation of results of scientific researches is carried out in the form of scientific publications, certificates of introductions, patents, the text of the dissertation, scientific reports on themes. The dissertation is the key form of representation of results of scientific researches at level of the personal contribution to development of a science, concrete scientific area, engineering activity. All these documents are regulated regarding registration by concrete instructions and requirements. The dissertation demands support in the form of certain stages of its representation on faculty meeting, Council about protection of dissertations. All these stages, as well as a stage of scientific researches, the post-graduate student, the competitor pass at active participation of the supervisor of studies. In this process it is important to young scientist to seize skills of verbal and nonverbal communications, этим scientific activity, scientific communications and the argument.

The gnoseology studies the status of the scientist in research process and analyzes not only a problem of reliability of results of scientific activity, but also moral responsibility for scientific and technical workings out.

The methodology is concentrated on the theory of a method and the description and classification of methods applied in scientific researches. In modern engineering the modelling method is most claimed. It is connected by that in this method began possible to connect practical and theoretical problems of activity on the basis of use of computer technologies.

§20 Social values and norms.

The industrial direction of activity of a science is connected with realisation of projects in area нанотехнологий, quantum optics, microbiology, bionics, power, quantum chemistry. This activity in Belarus is realised through the scientifically-practical and scientific and technical centres. In high schools these problems are put before structures of a research part, technoparks.

The ecological direction of activity of a science is accented on studying of consequences of anthropogenous pressure from mankind on biosphere. Technologies of decrease in this pressure at the expense of more uniform distribution of anthropogenous loadings to the biological environment, clearing and restoration of an environment, preservation of a biological variety as basic condition of stability of biosphere are developed. Considerable resources of saving up technologies are concluded in bionics. Environment is technology of preservation of the environment at the expense of use of system characteristics of environment. In Belarus considerable experience of ecological scientific researches, technological activity on the basis of bionics is saved up. It has allowed the country to cope independently with problems generated by failure on the Chernobyl atomic power station.

The social direction of activity of a science is connected with medicine, sports engineering, social psychology, pedagogics, management. In Belarus medical workings out are priority from the point of view of maintenance of demographic safety of the country. Not less important role is taken away in maintenance of national problems to a sports complex. For the state are important as successes of the Belarus sportsmen at the international competitions, and constantly operating sports infrastructure which along with sportsmen the country population uses. The information sector of services puts before a science of a problem of increase of efficiency of sector, safety of social networks. These questions are important in connection with the become frequent cases of use of social networks as tool of illegal activity. In the given area cooperation of efforts of lawyers, psychologists, teachers, programmers, philosophers, sociologists, political scientists is necessary.

§21 Ethics of science

Methodological principles of ethical activity in a science were formed throughout several thousand years. For the first time this problem was staticized by medical sciences (Hippocratic Oath). In Renaissance ethical principles of scientific activity have been staticized by humanists and have received continuation in researches of scientists of new time and Education. Rapid development of engineering science in the XX-th century has induced physicists to statement of a question on ethical aspects of scientific and technical researches, especially against active application of the weapon of mass defeat. Development of computer technologies and corresponding communications has induced philosophers to working out of problems of program ethics and virtual dialogue. The gene engineering transformed a modern science to bionics and has deduced an ethical problematics on level of universal discussions in which the importance of valuable subjects and necessity of interactive monitoring of public opinion was defined, including carrying out of national referenda.

Ethics were actively squeezed out from a science under various pretexts. One of them consists that the philosophers, dealing with ethical problems and concepts, and could not give an accurate substantiation to those offers which they use arguing about morals, morals, responsibility. In this sense ethics mismatch strict formal canons of logic and mathematics. It has given the basis to scientists not to think about possible moral consequences of their activity. If these scientists made crimes against humanity their actions became a subject of the analysis of legal structures. But after the Second World War scientists practically did not become a subject of heightened interest for legal structures as scientific workings out directly did not contact character of their application by other people. In this connection heightened interest for justice was represented by military criminals and terrorists.

The Internet has even more divided functions of moral, legal responsibility. It became an offshore zone where known degree of freedom was received by pedophiles, hackers, the criminal groups actively using social networks for the organisation of shadow business, aggressive actions. Only legal sanctions cannot return a global network in atmosphere of action of public norms. Philosophy rehabilitation in questions of social communications is necessary. Each person should understand accurately, that social networks just as also social relations not mediated by technical devices are a part of uniform social space where morals and the right nobody cancelled. It is important to understand scientist who give to the mass consumer technical devices through system of their batch production, sales.

The Internet resources create illusion of that candidate and theses for a doctor's degree are written by компелляции texts of different authors. Sometimes such "experts" at all do not understand a difference between scientific and amateur sources of the information at level Википедии. Abstract style cannot be mixed with plagiarism. This style means a statement of achievements of other scientists and engineers own author's style corresponding to retelling of understanding generated in a brain of the given problem. But the understanding of working out of other scientist cannot move as opening. It is a question of an estimation of the results received by other scientific schools.

So, the problem of mutual relation of a science and morals has got a special urgency in second half of XX-th century as the main object in system the object-subject becomes интерсубъективный the world. For which strengthening of accent of the subject in scientific researches more and more essential necessity

for working out of ethical principles and standards. In realisations of this problem the big role becomes characteristic belongs applied этикам - bioethics, biomedical ethics, техноэтике, computer ethics, ecological ethics which have arisen in the seventies XX centuries as reciprocal spiritually-moral reaction to innovative technologies. They develop moral principles and focus scientists on observance of social responsibility before the person and mankind. The purpose of these fields of knowledge is ethical examination of scientific researches introduced in practice taking into account universal and individual values. Inclusion of humanistic reference points and norms creates possibility to carry out not only the new approach to strategy of scientific and technical development on the basis of innovative technologies, but also to prevent, or to soften not predicted, uncontrollable and undesirable consequences from their realisation.

Principle "do not do much harm," having arisen in bowels of the most ancient civilisations, is a principle synonym "sanctity of a life." It includes a recognition of the universal rights and personal freedoms, collective nature, confidentiality, the impartial analysis of medical, technical and technological errors. So today in the conditions of intensive development of a science there is a question on expediency of workings out in those or its other areas, about etics uses of those or other methods, their realisations. For example, the perspective area nanotechnology will allow to work in the future at level генома, to correct genetic infringements and by that, apparently, will open prospects of treatment of hereditary diseases. But, on the other hand, researches in the field of manipulations with геномом, and also the cloning is connected with risk of ethical aspects such as safety in research for the person, risk of use of techniques with a view of selection of certain genotypes (eugenics). The technological working out, which use is supposed for improvement of health of the person, should pass careful check before introduction in practice, the constant control during its use also is necessary.

As a regulator of ethical examination, a principle "do not do much harm" assumes not only personal safety, but also collective safety. Not casually in the concept of the Sustainable development accepted at Conference on environment and development (Rio 1992) one of conditions its observance is application of ecologically safe high technologies which are starting with interests both present, and the future generations. Following a principle "do not do much harm" the scientist, the engineer, the doctor, the ecologist fulfil the public duty, realising responsibility for results of the activity.

The principle of the informed consent is based on human rights realisation on reception full and a trustworthy information about an environment condition, about a condition of its health, about appointment and functions of technical devices etc. He assumes informing on the purposes, consequences of innovative technologies, forming thus in a society social conditions of adaptation of its subjects to achievements of a science of technics and innovative technologies.

The principle of an autonomy of the person proves in an independent, free choice of ideas, methods and means of their realisation, the voluntary consent or disagreement with opinions and arguments of other subjects.

At definition of strategy and professional work tactics it is necessary to be guided by the principle of tolerance expressed in acceptance of the universal rights and freedom, respect of self-expression and display of individuality of each of the members of the community included in given process. Their joint cooperation assumes goodwill and the equality based on principles "do not do much harm", the informed consent and an autonomy of the person.

§22 Creative freedom and socially-moral responsibility of the scientist

There are methods of activization of creative thinking, methods of regular search, methods of the directed search. Expediency of application of the method, belonging to this or that group. Depends on complexity of a solved problem. Methods of activization of creative thinking are directed on elimination of psychological inertia of the thinking interfering a finding изобретательских of decisions. They allow to increase number of put forward ideas, raise productivity of process. The most known methods of psychological activization concern: brain storm, shadow brainstorming, a method of focal objects, синектика, a method «receptions of analogies», conference of ideas, a method «коучинг» and others.

Methods of the systematised search concern: the is functional-cost analysis, morphological the analysis, a functional method of designing Митчета, lists of control questions, a method of garlands of associations and metaphors, a method repeated consecutive классифицирования, a method of synthesis of optimum forms, a method of the system economic analysis and поэлементной working off of constructive decisions.

Among these methods some were development or synthesis of others. The is functional-cost analysis – a method of technical and economic research of the technical systems, directed on parity optimisation between their consumer properties and expenses for display of these properties.

Main principles are:

The functional approach which assumes abstraction from object as is material-material structure, a formulation of its main useful function by strict rules, taking into account that performance of useful functions in analyzed object always is accompanied by harmful both neutral functions, and object representation as complex of functions carried out by it. Functions are classified and ranged on the importance, rather, and also quality of performance of functions is estimated.

The cost approach, the economic analysis.

The system approach and carrying out.

Revealing of undesirable effects.

Collective creativity.

Application of additional methods of technical creativity (methods of activization of creative thinking).

Algoritmik the analysis.

The iterative approach.

Result of carrying is construction of model of ideal object at the final stage of is functional-ideal modelling, and also reception of the list of problems and offers on realisation of ideal model.

Methods of the directed search two – an is functional-physical method of search designing of R.Kolera and the decision theory problems. The decision theory problems is developed in the sixties 20 centuries. The author of the theory is Henry Saulovich Altshuller – the science fiction writer, the engineer, the inventor. All has begun with the contradiction. Altshuller has done huge volume of work. Having analysed ten thousand inventions from patent bases and the technical literature, has found out, that the huge variety of unique problems from different areas of technics can be reduced to the limited number of the typical technical contradictions which decisions already are once found by someone. Examples of such contradictions: durability – weight, speed – manoeuvrability and so on. Altshuller considered, that the technics develops through occurrence and the permission of similar contradictions. Contrary to widespread ideology of search of compromises he asserted, that the best the decision will eliminate the contradiction. To facilitate search of such decisions, it has collected and systematised typical decisions of often meeting contradictions. So there was a table of application of receptions of the permission of technical contradictions. In TRIZ disclosing of laws of development of systems in the technician, art, and in any other area in which arise изобретательские problems became a mainstream: creative problems, unsoluble habitual ways.

TRIZ represents a set of the methods united by the general theory. The basic tool of TRIZ was the algorithm of the decision problems which represents a number of the consecutive logic steps which purpose is revealing and the resolution of conflicts, existing in technical system and interfering its perfection. TRIZ helps with the organisation of thinking of the inventor by search of idea of the invention, and does this search more purposeful, productive, promotes a finding of idea of higher level.

TRIZ lacks: and accurate mechanisms of transition from the formulated contradiction to its practical permission have not been found. It created serious complexities in the decision of real problems by means. The dialectic approach (the analysis of contradictions), has been deformed by introduction of concepts the technical and physical contradiction. These new concepts deformed an essence of the dialectic contradiction formulated in the dialectic logic that led to difficulties in contradiction revealing at attempts of the decision by means of problems. The majority of the formulated laws of development of technical

systems are faster laws of development of technics, and it is far not the full. For this reason, harmonious methodology of the decision of the problems, based on development laws, and has not appeared. And the formulated laws basically were used as methodical substantiations to resulted examples of inventions. As well as any technique, TRIZ is not universal. Trizovsky laws of development of technical systems are not applicable to live and information systems. TRIZ will not solve a problem if there are no accurate data about relationships of cause and effect between elements in system and character of interaction of system with надсистемой.

At certain stages of work by TRIZ technique search of new ideas and decisions demands additional tasks and attraction of experts from various areas of a science and technics. And here there can be a following problem of designing – shortage of knowledge, and also limitation of means.

Despite these lacks, the International Association of TRIZ works; regional Associations of TRIZ in the USA, France, Italy, Austria, Israel, Australia, South Korea, Taiwan, Mexico, Latin America and in the countries of the former USSR. In the USA Altshuller's institute (The Altshuller Institute) works. The summit of developers of TRIZ has for an object to unite experts who are engaged in theory and technique development. In Internet there are some hundreds sites and more than one million the references devoted by TRIZ.

The international conferences on TRIZ are spent. In the USA Altshuller's Institute, in Europe MA TRIZ and ETRIA, in Japan of TRIZ the Forum.

To solve a research problem, it is necessary to formulate it as constructive. Then we formulate to a problem the contradiction, an ideal end result (CALVES). The contradiction and CALVES reveal an essence, push to decisions. To formulate CALVES and the contradiction it is possible in several variants. It allows to find some decisions at once.

Further we reveal available resources. Resources is everything, that can be useful at the problem decision. It is desirable to use resources which already are present at a problem situation, and also resources, expenses for reception and which use are low.

The found decisions it is estimated from ideality positions. We set questions:

How much difficult and expensively to carry out the decision?

Whether system resources are involved?

Whether there will be undesirable effects at introduction of the received decision?

TRIZ includes:

Laws of development of technical systems (HARDWARE)

Information fund of TRIZ (system of receptions, effects, standards, resources)

The analysis (the structural veshchestvenno-field analysis) technical systems

Algorithm of the decision изобретательских problems

Method of revealing and forecasting of emergencies and the undesirable phenomena

Methods of the system analysis and synthesis (the system approach, the analysis and synthesis of requirements, the functional analysis and synthesis)

The is functional-cost analysis

Methods of development of creative imagination

The theory of development of the creative person

The theory of development of creative collectives

TRIZ sections we can divide into methods of the decision of problems and methods of development of creative qualities.

Laws of development of technical systems – most the general statistical regularities and tendencies of development of technics, revealing as a result of the analysis of patent fund and history of development of technics.

The information fund includes:

System of standards on the decision problems (typical decisions of a certain class of problems);

Problems – analogies;

Technological effects (technical effects, physical effects, chemical effects, mathematical effects, the most developed from them now – geometrical, and also tables of their use).

Receptions of elimination of contradictions and the table of their application;

Receptions of the permission of technical contradictions (40 basic receptions and the table of their application and 10 additional);

Receptions of the permission of physical contradictions (receptions – antireceptions, the receptions broken into groups, ways of the permission of the physical contradiction).

Resources of the nature and technics and ways of their use.

ARIZ is a program (sequence of actions) on revealing and resolution of conflicts, the decision of problems. ARIZ includes: the program, a supply with information eating from information fund, and management methods psychological factors which enter a component into methods of development of creative imagination, provide the parts intended for a choice of a problem and an estimation of the received decision.

The analysis allows to create structural model of initial technical system, to reveal its properties, by means of special rules to transform problem model, having received thereby structure of the decision which eliminates lacks of an initial problem.

The analysis is a special language of formulas with which help it is easy to describe any technical system in the form of certain (structural) model. The constructed model will transform by special rules and laws, receiving the structural decision of a problem.

TRIZ includes the device of system researches, specialised for the analysis and synthesis of the technical systems, based on laws of development of technics and for forecasting of development of technical systems.

The is functional-cost analysis is a method of technical and economic research of the systems, directed on parity optimisation between their consumer properties (the functions, still perceived as quality) and expenses for achievements of these properties. It is used as methodology of continuous perfection of production, services, industrial technologies, organizational structures. Problem Φ CA is achievement of the highest consumer properties of production at simultaneous decrease in all kinds of industrial expenses.

Methods of development of creative imagination allow to reduce psychological inertia at the decision of creative problems. System of development of creative imagination existing in TRIZ (it is developed by G.Altshuller and P.Ammuel).

The theory of development of creative collectives is developed by B.Zlotin, A.Zusman and L.Kaplan. They have revealed stages and cycles of development of creative collectives, laws of their development, braking mechanisms and developments of collectives, principles of prevention of developments of stagnation in collective.

The elementary receptions of invention:

Analogy

At the decision of problems the idea of the decision can be received by application of the known analogical decision containing in technical, to fiction, the nature.

In the nature the bionics is engaged in revealing and use of analogies. It investigates objects live and flora and reveals principles of their action and design features, for the purpose of application of this knowledge in a science and the technician.

Inversion or return analogy means performance something on the contrary. This reception means that if the object is considered outside, that, probably, we reach desirable result if it we will investigate from within. If any object is located vertically. That application of inversion means, that it put horizontally – and on the contrary. Inversion assumes possible replacement of a mobile part motionless, refusal of symmetry in favour of asymmetry, transition from a stretching to compression. The empathy is an identification of with the person ability will put itself to the place of another. Reception actors often use. The designer identifies itself with developed object, process, a detail. Application consists in that the person has looked from a detail position (from «its point of view»), that it is possible to make for elimination of lacks or for performance of new functions.

Imagination

Use of imagination for stimulation of new ideas consists in reflexion over some fantastic decisions in which unreal things or supernatural processes are if necessary used. Often happens it is useful to consider ideal decisions even if it is interfaced to some share of imagination. There is a hope, that reflexions about the desirable can encounter new idea or the point of view which, finally, will result in the new, realizable decision. At brainstorming it is necessary to create conditions to unchain subconsciousness.

Process of generating of ideas is necessary for separating from process of their estimation. At problem discussion many do not dare to state courageous, unexpected ideas, being afraid of sneers, errors and the negative relation of the head.

Recommendations about carrying out of brain storm:

Appoint somebody as the leader. It should provide to each of participants possibility of discussion of the put forward ideas. Before performance of the following participant the leader generalises offers previous;

Strengthen and encourage all offers. Do not suspect the given stage about details. Concentrate efforts to development as it is possible *большого* numbers of ideas. Encourage short performances without an estimation of own or another's thoughts;

Erroneous ideas does not exist;

Listen to idea up to the end;

Nobody knows answers to all questions. The success of work of group depends because, whether each participant will be capable to agree with opinion and remarks of the others. Encourage all to accept active participation and avoid to impose the own agenda;

Select the best offers. After the taken away term ask to divide participants ideas into three groups: 1 – having excellent potential, 2 – good, 3 – unacceptable;

Concentrate attention to the most promising offers from the first group. Grind these ideas. Spend the second brain storm to define, why they well approach and as they can be realised. Look for ways as it is possible to derive from them the greatest profit;

Keep best of other ideas. Conduct a card file of other potentially suitable possibilities.

The morphological analysis – is an example the system approach. The method is developed by F.Tsvikki who has intuitively applied the morphological approach to the decision of astrophysical problems and has predicted existence of neutron stars.

Problem accurate information is necessary for carrying out of the morphological analysis. Regardless of the fact that in an initial problem it is a question only of one concrete system, researches on all possible systems with similar structure are generalised and as a result the answer to more extensive question is given.

The essence consists in construction of tables which should capture all conceivable variants.

The method is capable to generate many combinational ideas, but is not capable to allocate from set of ideas sufficient for the problem decision.

The method of control questions to stimulate them by means of leading questions. It is applied in the form of a monologue turned to, or dialogue of inventors. Authors select from *изобретательского* experience questions which provide advantages of a method of control questions before a usual trial and error method. One of the fullest and successful lists of control questions belongs to English inventor T.Ejloartu. According to it it is necessary:

To learn opinion of some unaware people in the given case (i.e. to avoid psychological inertia);

To arrange chaotic group discussion, listening without criticism each idea;

To try "national" decisions: artful Scottish, universal German, prodigal American, difficult Chinese etc.

Questions in such system allow to see more full property of improving object but as it to change – they do not prompt.

B.Vangandi has developed 108 receptions and the questions which use can or is effective solve a problem or lead to new idea.

State the problem in the form of the story (so it is possible to find out the information of a detail not noticed earlier).

What in a problem is the most important?

Find the problem fresh wording.

What will change after the problem decision?

Change the problem name.

Why the given situation is a problem?

The essence of a method of focal objects consists in transferring of signs of casually chosen objects on improved object.

The method of focal objects does not give a guarantee that something can turn out concrete, but it liberates thinking and leads to unexpected combinations. The method promotes imagination development, but to speak about any directed or planned change of object it is not necessary.

Method sinectic, the offered V. Gordon, is the most effective method of psychological activation of creativity. Sinectic is development and improvement of a method of brain storm. This storm is conducted by constant group. Its members get used to modern work, critics cease to be afraid do not take offence, when someone rejects their offers.

Constant groups have many advantages. Experience of the decision of problems gradually collects. It is possible to improve group structure, entering new participants. Mutual understanding grows, ideas seize from a half-word. The head decision process, calling serial use of analogies: it stimulates generating of ideas and does not constrain search freedom.

In a method it is applied four kinds of analogies – a straight line, symbolical, fantastic, personal methods.

At direct analogy the considered object is compared to more or less similar similar subjects.

The symbolical analogy demands in the paradoxical form to formulate a phrase, it is literally the phenomena briefly reflecting an essence. For example, at the decision of the problem connected by marble, it is found a word-combination «an iridescent constancy», as the ground marble (except white) – all in the bright patterns reminding a rainbow, but all these patterns are constant.

At fantastic analogy it is necessary to present fantastic means or the characters who are carrying out that is required on problem conditions. For example, it would be desirable, that the road existed there where it car wheels concern.

The personal analogy (empathy) allows presenting itself that subject or a subject part about which there is a speech in a problem.

It is important to transform ability unusual – in habitual and, on the contrary, habitual – in unusual. To see for new (and therefore unusual) a problem, a situation familiar and, hence, solved by known means. The fresh sight that already became habitual is important.

§23 Science and innovative development of a modern society

Tool function of a science consists in use of its experimentally-measuring, modelling possibilities. In the conditions of XXI centuries the science became technoscience as has concentrated in laboratories unique complexes, the bench equipment, materials, an infrastructure and communications. The similar base allows a science to use various methods and the newest means of processing and representation of knowledge.

World outlook function of a science consists that it develops principles on which basis the scientific picture of a natural and technogenic reality is formed. This picture carries out interdisciplinary synthesis of results of scientific researches in integral representation. In XXI a century the important role carry out quant mechanik and sinergetik nature pictures, sistemotechnik a picture of engineering activity.

Heuristic function of a science consists in opening before unknown phenomena, their description, and adaptation to already existing kategorial structures. If there is a necessity of revision of the fundamental interpretations, caused by opening then scientists go on a way of change of the world outlook bases of separate disciplines, or sciences as a whole.

Innovative value of a science consists in transformation of a modern science into system инженеринговой activity in which frameworks of research are combined with the invention, designing and designing not only artefacts, but also activity systems.

In Belarus innovative value of a science is defined by special value as the country can count only on the human capital in the international division of labour. From this position Belarus finds partners for cooperation. It is a question that there are states which possess superfluous financial resources. They are interested in their strategic use on the terms of cooperation with the technological states. Thanks to an innovative resource Belarus has drawn attention of Bahrain, Venezuela, China

The innovative resource of Belarus opens possibilities not only for the international cooperation, but also more an effective utilisation of own natural resources available for the country, импортозамещения, export potential escalatings.

Innovative function of a science reveals by means of functioning of a special infrastructure in which aspects of financing of scientific researches are considered, introductions of innovative workings out. Financing of innovative activity is conducted through the state and venture funds. Introduction of innovative products of researches is carried out by means of activity of technoparks. The state places emphasis on practical return of scientific researches. Workings out are key criterion of award of candidate and doctor's degrees.

§24 Science and social technologies

Business assumes presence of the businessmen, favorable conditions of activity, financial resources. Business is connected with bank sector, the industry, agriculture, building, information technologies. In Belarus much becomes for development of the business, favorable conditions of investment. Large business is represented by owners and heads of transnational corporations. Average and the small-scale business demands constant support from the state as it forms stability of structures of a civil society.

The considerable role in economic functioning is played by speculative business and the institutes of large regional stock exchanges connected with it. At this level of exchange activity the prices for strategically important resources, indexes and ratings are fixed. Macroeconomic tendencies usually contact possible political decisions, expectations. The important role is played annual, by quarterly accounts of the companies about incomes, unemployment indicators.

The science, in the conditions of liberal economy, constantly is engaged in aspects of studying of labour activity, a surplus value, the capital. Samples of similar researches have been shown by representatives of the Scottish, Marxist, Chicago, Austrian economic schools. During post-war time, in connection with development of computer technologies, social activity математизировалась and for it statistical methods of the analysis of macroeconomic tendencies became important.

The increasing role in development of economy of Belarus and Russia is played by business philosophy, business philosophy, philosophy of risks and economic safety.

The business philosophy develops the principles of ethics of business relations adapted for the Euroasian region, responsibility, взаимочастия business and the state in the decision of social programs.

The business philosophy is accented on problems of creation of middle class at level of small and average industrial structures, spheres of services, service. Such structures create workplaces in small and average cities do attractive rest on the basis of agrotourism, road and экологического туризма, folklore.

The philosophy of risks develops methodology of activity of domestic economic structures in the conditions of the unstable markets, quickly varying conjuncture of activity.

The philosophy of economic safety at level of the concept of national safety defines segments of activity the most vulnerable in the competitive environment and develops actions for their strengthening to self-sufficiency level.

In the politician, in the conditions of the XX-th century, there was a change connected with growth of influence of legal, sociological, politological sciences. Considerable in this process processes of democratisation of a public life have played.

Management and science have actively adjoined in the end of XIX centuries when there were the questions connected with necessity of adjustment системотехнического of manufacture, introductions of the effective organisation of work, marketing and logistics. Great depression of the thirtieth years of the XX-th century only has strengthened requirement of cooperation of administrative commercial structures and scientific schools.

Science and education have entered into close contact in XV111 a century when in France traditions of polytechnical preparation of engineers have been put in pawn. Institutes became the basic centres of scientific activity, technoparks.

§25 Scientific and technical progress

Scientific and technical revolutions create a basis for modernisation of systems of activity existing in a society. Activity has complex and versatile character. First of all it mentions economy as in its limits material assets and artefacts subject realisations in the world market in the conditions of sharp competitive struggle are created. Modernisation allows by use of the newest equipment, the technologies, new principles of the organisation of work, automation to reduce power consumption, activity, power dependence, to improve indicators of activity of the enterprises in the field of quality, volumes of manufacture. The economy export potential as a result, there is a possibility for considerable currency receipts in the country. The state has an opportunity service of promissory notes, increase in gold and exchange currency reserves. Modernisation is spent according to government programs, business plans. The important programs are connected with maintenance of national safety. The societies having sufficient financial and intellectual resources are most intensively modernised. Belarus is in number of most quickly modernised states of the world thanks to the considerable scientific potential, growing investment appeal. The large investor in programs of modernisation of economy of Belarus is the Peoples Republic of China.

§26 Scientific revolutions and modernisation

Innovations (definition is given under the text taken from the Law of Belarus «About bases of the state scientific and technical policy») are created (mastered) new or advanced technologies, kinds of a commodity output or services, and also the organizational-technical decisions of industrial, administrative, commercial or other character promoting advancement of technologies, a commodity output and services on the market. Innovative infrastructure is set of the organizational structures, capable to provide innovative process. Technoparks, technopolises, venture structures, innovative funds concern that.

Innovative process is the activity providing creation and realisation of innovations in the form of a transfer of technologies. Transfer of technology is transformation process новационного a resource in useful technological, artefaktno-consumer commercial function.

Investments are a financial investment in innovative projects for the purpose of reception of profit on their realisation. Investment climate is atmosphere of investment created by the state corresponding guarantees of the property right to the financial capital and received profit from the point of view of observance by both parties of the obligations taken on.

Investment risks is absence of guarantees of full conformity of result from the point of view of expectations on an input of innovative process and an exit from it, that is fraught with loss of investments. Venture financing is financing of the innovative enterprises of the small-scale business occupied with working out and manufacture of high technology production, connected with attraction of the private capital. Consulting is the commercial market connected with rendering of services in the field of the information, knowledge, innovative products (an electronic database).

The intellectual property is reflects the copyright fixed legally to products of intellectual activity in scientific, industrial, marketing areas. Patentno-licencing is the work connected with legal, organizational maintenance of commercial use of objects of intellectual property, protection of the rights of the developer.

The form of protection of objects of the industrial property is legally designated as the patent. This document certifies authorship, a priority or the possession right the given product and the exclusive right

to its use. Function of patent body is carried out by the national centre of intellectual property. In the activity it is guided by the Law of Belarus «About patents for the inventions useful to model, industrial samples».

"Know-how" is not patented - 1) the knowledge used in strict privacy; 2) the experience of scientific and technical, industrial, administrative, commercial character applied in scientific researches, workings out, technological processes, marketing, operation and service.

Scientific researches are the search prospecting activity connected with gathering of the missing information, knowledge of the nature, the person, technical devices and processes, the natural and social environment, the person-machine the systems, used for working out of theories, formation of laws, optimisation of design decisions.

Leasing activity is the optimised activity based on cession of rights of use of inventions, industrial samples, trade marks, "know-how". In a broad sense – transfer to other organisations of experts, the industrial, building technics, with a view of innovative problems and an effective utilisation of available resources. Granting of the rights is made out in the form of licences (the licence contract). The basic advantage of leasing consists in concentration of research and development at level of the specialised companies that will allow manufacturers to co-operate with these companies and to save own resources as licence cost it is considerable below expenses for research and development.

Franchising is the way of the innovative development based on the licence contract on the right of use of technology checked up by the market of a how and a trade mark (brand). Many Belarus enterprises thus get access to innovative products and technologies. In turn the European partners have an opportunity increases in volumes of manufacture and their realisation in the new markets. Precisely as well the manufacturers using known brands and leave for themselves on the new European market. Engineering is the activity connected with working out of innovative projects, the organisation of productions at the enterprise within the limits of an introduced innovation.

§27 Social mobility of the scientist

System SRWS of Belarus includes: participants SRWS, standard base, information-analytical system, system координаций and management system of actions, financing system, standards. Effective work of all system SRWS is possible only under condition of effective functioning of all its components.

Scientifically - research work of students of high school of Belarus are characterised by set of forms and work methods.

The system of republican actions includes:

Competitions

Conferences of students and post-graduate students

Exhibitions of the workings out executed with participation of students

The action, devoted to propagation of importance and the importance of scientific work of students;

The action devoted to problems of the organisation of work with presented youth among employees of high school.

Competitions solve problems of revealing of best of the best, encouragements, stimulations, attraction to SRWS a wide range of students. The system of republican actions SRWS includes following competitions: It is focused, basically, on the students who are engaged with the supervisor of studies. The system of encouragement of participants of competition has multilevel structure: winners of competition, authors of works of the first, the second, thirds of categories. Authors of the best works are encouraged with special fund of the President of Belarus.

Competition on competition of grants докторантами post-graduate students, the students trained in establishments of the Ministry of Education of Belarus. The competition purpose is address support of post-graduate students, the students who have achieved the best results in research activity.

The competition spent by special fund of the President of Belarus, on rendering of financial support to intellectual and creative associations of pupils and the students, won social recognition by perspective workings out and achievements.

Pedagogical, to science officers and other persons who have brought the special contribution to development of abilities of presented pupils and students in a sphere of education, sciences, technics and high technologies, working out of modern techniques of their education and training, on a competitive basis incentive awards special fund of the President of republic Belarus are awarded.

Conferences

In republic it is annually spent an order of 50 international, republican, regional conferences of students in various directions of scientific activity. It allows students of high schools (on the majority to specialities).

§28 Science methodology in Belarus

The methodological science of Belarus was formed on the basis of dialectic philosophy. In the sixtieth years of the XX-th century in the USSR heightened interest to science studying as social institute, form of public knowledge was showed. In Minsk V.S.Stepin became one of initiators of similar researches. It had been developed the concept of evolution of a theoretical science on a material of physics from classical forms to modernization. Technopolis – the structure similar to technopark, including small cities which development is purposefully focused on the scientific in them scientific and research-and-production complexes. Association of small firms in aggregate creates an infrastructure necessary for realisation of large innovations. The technopolis centre is the large university – the generator and the carrier of the fundamental knowledge underlying innovations. Scientifically – financially industrial groups solve problems of integration and activization intellectual, information, material and financial resources for development of scientific and technical potential of region, the country.

Technopark "Polytechnic" by means of the developed network of information-marketing services advances university workings out in manufacture. Research-and-production structures of Technopark let out and realise final innovative production in the market. The technopark carries out business incubator function, creating and supporting the small innovative enterprises.

Technopark BNTU "Polytechnic" the co-ordinator of innovative activity not only within the limits of university, but also in scales of all educational system of the country. On the basis of Technopark the Interuniversity cent of marketing of research workings out where the information on workings out of higher educational institutions and scientific institutions of the Ministry of Education of Belarus and directions of their activity is collected is created. On bases in Technopark the Belarus-Venezuelan centre of scientific and technical cooperation, the Belarus cent of scientific and technical cooperation with provinces of the Peoples Republic of China, the Belarus-Latvian centre of a transfer of technologies and other joint structures are created. The manager in the field of innovative activity is the businessman inclined to defensible risk. The maintenance of work of the given experts is based on accurate knowledge of the organizational processes occurring at realisation of innovative activity, legislative features, possibilities of financing, economy and marketing.

Innovative networks operate at levels: global – most effectively carrying out basic researches, national, regional, branch. These are professional associations of the infrastructural organisations or physical persons, activity and which services are connected with коммерциализацией and a technological transfer, creation and management of the starts-ap-companies, innovative development. Their methodological toolkit – the industrially-academic communications, a writing of business plans, creation of new business, financing of innovations, formation of innovative culture and management and many other things.

Development of network structures is carried out through use of the newest telecommunication technologies that creates the special form of the device of an environment of these subjects. Virtual under the form, they have no rigid organizational-legal field. In similar associations mechanisms of horizontal communications with partners and specific coordination of cooperation operate.

In the offered model a special role play such концепты as a scientific picture of the world, ideals and norms of scientific activity, philosophical principles and culture categories. In separate aspects of new methodology were engaged L. Kuznetsova, A. Elsukov, E. Petushkova, J. Jaskevich.

In national academy of sciences the important role in formation of methodological approaches the philosophy and right Institute in which frameworks the directions connected with studying of domestic philosophical thought have been created, philosophical problems of natural sciences, dialectics, anthropology.

The science in Belarus is presented in National Academy of sciences, higher educational institutions, branch institutes, design offices, the design organisations. Traditionally in structure of scientific researches technical, medical, interdisciplinary directions prevail. The state has set a problem of active participation in innovative strategy of development of economy for a science. It has caused necessity of creation of an innovative infrastructure on the basis of National Academy of sciences. The basic role the scientifically-practical centres began to play the companies, and also holding structures which actively use potential of design offices, design organisations. Financial maintenance of scientific activity began to co-ordinate directly with investment in the projects. Basic researches are spent within the limits of the government programs focusing researchers on formation of a basis for technological breaks in the field of high technologies. One of key is the direction connected with gene engineering, quantum optics, cybernetic. Transition of fundamental knowledge in applied in the form of workings out occurs by means of technoparks. High results of activity are shown by Park of high technologies which has managed cybernetics achievements to transform into the profitable business based on high technologies. As a result in the country there are graduates of high schools who represent the human capital of the state. The further integration of a research part of a science with industrial innovative problems of domestic structures is supposed. It determines processes of closer research-and-production cooperation of participants of innovative process.

The science of Belarus represents a kernel of modern intellectual culture of the country. Especially closely science and art are connected in architecture, design, ergonomics, инвайронментализме, anthropology, medicine, in particular, to cosmetic, sports engineering, pedagogics, building sphere. Modern engineers practically unite functions of the designer, the designer, the architect, the restorer. Basic advantage of the Belarus engineering school consists in it.

The science of Belarus is at a stage of active modernisation. The state searches effective methodology of use of scientific potential at a stage of innovative workings out. Considerable prospects contain in realisation of methodology integrated кластерных and куматоидных structures.

§29 Forms of scientific communication

The argumentation included the тезис and demonstration and proof. Discussion – the major means of intellectual dialogue, a way of optimisation of creative search. Productive discussion promotes revealing, statement and the decision of concrete scientific problems, occurrence of new interdisciplinary directions, search and introduction of non-standard approaches to the decision of contradictions constantly arising in a science. The argument is the speech procedure serving обоснованию of this or that point of view, for the purpose of its acceptance by the recipient (to which it is addressed). In argument allocate the thesis, arguments and demonstration. The thesis is the initial judgement which validity reveals in the course of the proof. As a rule, the thesis comprises new idea, original thought which it is necessary to give reason. Arguments are statements, from which value (true or false) the validity of the thesis is deduced. Demonstration is a logic interrelation of the thesis and arguments.

The thesis should be formulated clearly, accurately, in an explicit form, not to suppose ambiguities and a variety in its interpretation. As arguments can be used statements about the established facts established by means of direct supervision or during research experiments.

The axiomatic method is widely used in the geometry, some sections of physics, chemistry, others natural and the exact sciences. Within the limits of the argument following demands are made to axioms:

The basic types of the argument:

On *character of a substantiation*: the proof, a refutation, acknowledgement, objection, an explanation, interpretation;

On a *demonstration orientation*: the deductive argument and not deductive;

Within the limits of professional work of the expert of technical qualification such types of the argument, as the proof and a refutation more often are used. *The proof* – the logic operation proving the validity of the initial thesis; *the refutation* – opens it ложность. In a science the proof is often based on carrying out of supervision and experiments, use of private consequences from the basic standard concepts. Proofs happen *direct* and *indirect*. In direct – the validity of the thesis is deduced from the validity of arguments, in indirect – from them ложности. Similarly in *a direct refutation* ложность the thesis follows from ложности arguments, in *indirect* – from their validity. As a direct refutation data to absurdity »are often used«: the validity of the thesis is supposed, logic consequences are deduced from it, ложность which becomes obvious and serves as argument in advantage ложности the initial thesis.

Within the limits of the scientific argument except *a thesis refutation the refutation of arguments* (their inconsistency though it yet does not mean ложности the thesis reveals), and *a demonstration refutation* is often applied (absence of logic communication of the thesis with the resulted arguments though it too does not mean ложности the thesis reveals; it is necessary to search for new arguments which will be logically connected with it through this or that form of conclusion).

By means of proofs the science acquires new knowledge, the refutation allows to get rid it of fallacies, errors and errors. Except these strict logic operations, the scientific argument widely uses *acknowledgement* (for example, in favour of the scientific *hypotheses* which validity is not established yet with all evidence), and *the objections* directed on easings of the thesis, though and not possessing absolute logic reliability (for example, the reference to the person of the opponent, to feelings of listeners, etc.). *The explanation* opens the reason of the observable facts, explains features of action of fundamental laws of the nature generalised in scientific theories. *Interpretation* is interpretation of sense of this or that statement (text), in strict logic value – attributing to the certain formalized sign system of this or that concrete maintenance. As a result there is an artificial language describing the corresponding subject domain. The formal theory is not proved, yet has not received adequate interpretation on the basis of a principle of isomorphism and гомоморфизма between sign system and its model.

§30 Methodology of scientific research

The scientific method is a way of achievement of a research objective. Methods of scientific knowledge share on the general and special. The general methods concern: theoretical, empirical, mathematical methods.

Programs are developed for the period necessary for achievement of the purposes put in them, but no more than for 5 years.

Organizational and methodical maintenance of working out and performance of programs of scientific researches is carried out by National academy of sciences of Belarus with participation of other state customers, and also Council about coordination fundamental and applied researches; programs of applied scientific researches and the programs of complex character containing an applied part – NAS Belarus together with the State committee on a science and technologies with participation of other state customers of programs.

Programs of scientific researches are developed in priority directions of fundamental and applied scientific researches of Belarus, confirmed Ministerial council of Belarus on representation of National academy of sciences of Belarus, taking into account priority directions of scientific and technical activity in Belarus.

§31 Specificity of a system method

The innovative system as set of the interconnected managing subjects who are carrying out working out, creation and manufacture of innovations, and also intellectual products for achievement of the purpose – the organisations of effective manufacture at optimum use of resources – has an infrastructure. One of its elements are the innovative networks formed on a voluntary basis. They directly do not participate in creation of innovations, but play the important role in maintenance of all innovative process.

Government programs of scientific researches are subdivided into government programs of the fundamental, focused fundamental and applied scientific researches.

The government program of basic researches is a complex interconnected theoretical and (or) the experimental search research works directed on reception of new knowledge of the basic laws of development of the nature, the person, a society, is artificial the created objects and ways of their application. An ultimate goal of a government program of fundamental scientific researches is reception of the new scientific knowledge expressed in the form of laws, theories, hypotheses, principles, directions of researches and in other forms.

The government program of the focused basic researches is a complex of thematically co-ordinated tasks directed on the decision of a separate large scientific problem and on finding-out of directions of further use of new knowledge received thus for reception of practically important results. Ultimate goals state the program of the focused fundamental scientific researches are reception of new knowledge within the limits of a separate large scientific problem, and also reception of the scientific results focused on practical application.

The government program of applied scientific researches is a complex of the tasks directed on research of ways of practical application opened before phenomena and processes, the decision of the concrete scientific problems having the direct appendix in a national economy. Ultimate goals of a government program of applied scientific researches are reception of practically important scientific results expressed in creation of laboratory samples or breadboard models of products, technologies, substances, grades and hybrids of plants, samples of breeds of animals, techniques and methodical recommendations, and also carrying out of organizational-methodical actions for performance of workings out within the limits of the state target and state scientific and technical programs.

Programs of scientific researches can be complex and include fundamental and applied researches. In such cases the orientation of tasks and ultimate goals of sections of programs should meet the requirements, shown to corresponding programs.

§32 Methods of theoretical research

Theoretical methods of scientific researches:

Modelling allows an experimental method to objects and direct action with which is inconvenient or it is impossible, assumes cogitative actions with model.

Abstraction consists in mental derivation from insignificant and fixation of one or several interesting researchers of the parties of a subject;

The analysis is a method of research by subject decomposition on components.

Synthesis – connection of the parts received at the analysis in whole.

Mathematical methods include:

Statistical methods;

Methods and models of the theory of counts and network modelling;

Methods and models of dynamic programming;

Methods and models of mass service;

§33 Methods of empirical research

Empirical methods of scientific researches

Scientific supervision is the deliberate and purposeful perception caused by a problem of activity. The object is studied in natural conditions of its existence, without influence on it and environment.

Scientific measurement is a definition of the relation of the measured size to other size accepted for unit. As set of actions it is directed on a finding of numerical value (length, volume, duration etc.). The international systems of units of measure and their standards operate. Creation of universal systems of units of measure has given to scientific supervision accuracy and generality. For example, with the advent of mechanical hours in XIII—XIV centuries in Europe affirm time units: second, minute, hour.

The metrology is engaged in working out of measuring technics, studies methods and reception principles by practical consideration information on the sizes characterising properties and conditions of different objects, creates measuring devices.

Research experiment – the method of the knowledge based on fixing and the control of conditions set by the researcher. Check of hypotheses and theories – experiment function.

Chapter 3

PHILOSOPHY OF NATURAL SCIENCE AND TECHNOLOGY

Keywords: technics, technologies, engineering activity, designing, technics philosophy, an artificial intellect, innovative activity.

§34 Philosophy of technology

The technics, along with art, a science, is one of forms of involvement by the person of the external nature in activity processes. This involvement is carried out within the limits of the certain technological processes of activity used by mankind for the decision of diverse problems. From other forms of involvement of the external nature of the technician differs konstruktive engineering essence.

Technics thereof, reflects creative and scientific potential of mankind, its technological and engineering culture. It is updating of natural processes in артефактной to the form, the form of communications and infrastructures.

Independent character of the natural beginning in the technician and technological processes forms a risk factor (technogenic accidents) which is supplemented with the human factor connected with errors of people, physical. All these features define ambivalence (duality) of technics and are a subject of judgement of philosophy of technics (technology philosophy).

The dual essence of technics defines a support of philosophy of technics on:

1. natural science as the basic source of knowledge of the external nature;
2. technik science – as the generalised picture created by mankind of a reality in aspect of laws inherent in it;
3. To the logician and the mathematician – as a rationale of engineering activity;
4. The humanities – as the basic source of knowledge of the person, its consciousness (thinking, mentality);
5. Social and economic sciences – as the major determinants of optimisation технизированной realities;
6. Cybernetics – as a science about management;
7. Ecology – as a standard basis koevolution strategy.

Necessity of working out of philosophy of technics as complex methodological basis of engineering activity has been realised by philosophers and engineers in XIX a century. The term «technics philosophy» has been offered by E.Kapp representing German school of philosophising engineers. Activity of these engineers is co-ordinated within the limits of the Union of German engineers created in 1857. It is possible to familiarise with works of these engineers in the book «technics Philosophy in Germany», published in Moscow in 1989.

In American tradition of philosophy of technics accents of engineering management in conditions industrial, technologikal, postindustrial, information, globalisations prevail. One of the first this problematics was designated by Web flax. It is possible to familiarise with works of English-speaking authors in collections «the New industrial wave in the West» (M, 1986) and «the New postindustrial wave in the West» (M, 1999) . In Russia one of initiators of working out of problems of philosophy of technics was Engelmeer. The important role N.Berdjaev's work «the person and the car» has played. In Belarus of origin of interest to technics philosophy connect with activity of the engineer-railwayman Pavlovskj.

The technics philosophy has to subjects:

- To the technician activity and technical knowledge;

- Technical consciousness

Spheres are accordingly allocated:

- Cultures and technicians;
- Methodology of engineering science and designing;
- Engineering ethics.

The main task of philosophy of technics is concluded in research of the relation of the person to the world through technics means.

In the centre of attention of philosophy of technics there are problems of essence and sense of technics.

The technics philosophy considers technics as a reality in the form of set of artefacts of tool appointment formed by mankind with operational and upravlenchesko-control functions. From here questions:

- What technics nature?
- How the technics co-operates with various spheres of human activity?
- Whether is the technics a threat source?
- Whether there is a technics absolutely independent reality (the world without the subject)?
- How the technics modifies the nature?
- What features of dynamics of technics as technogenic civilisation?

The technics philosophy includes interdisciplinary researches and workings out. It consists of two sections accented on questions of a statics (structure) and dynamics (development).

From the point of view of structure of the technician should be understood as:

- Set of technical devices of the communications structurally-organised in system and an infrastructure;
- Engineering activity;
- Technik science.

The philosophy of technics except methodological and world outlook components connected with innovative activity of mankind. It means, that it describes mechanisms of technical creativity (heuristics), and also their introduction in practical activities. These problems enter into a prerogative of engineering innovative management. For this management the concept of the innovative cycle connected with introduction of new ideas, products and technologies of economic activities practice is key.

§35 Natural science and technology

They are connected first of all with concepts physical and an obsolescence.

Physical deterioration is a loss by constructive elements of technical system of initial physical and chemical properties that brings an attention to the question on system liquidation as not subject reconstruction and modernisation. If the liquidation requirement is not carried out, physical deterioration inevitably conducts to technogenic accidents.

The obsolescence – is connected with innovative activity of mankind and characterised by loss by existing technical systems of technological conformity to requirements of ergonomics, ecological compatibility, productivity, functionality.

Modernisation is a reaction to an obsolescence not to lead up technical system to physical deterioration.

Modernisation is based on laws:

1. Generality, repeatability of a condition of certain elements, processes;
2. Expansion of assortment of natural and artificial materials;
3. Development of new energy sources;
4. Development of new forms of movement of a matter;
5. The intensity of processes connected with pressure, in temperature, in the speed, etc.
6. Increase of purposefulness of technical decisions;
7. Specialisation and integration increase (interchangeability);

8. Automation;

We can allocate also laws:

1. Completeness of parts of the technical system, saying, that a necessary condition of functionality of technical systems is presence and the minimum working capacity of the basic parts of system;
2. Power conductivity of the technical system, saying, that a necessary condition of functionality of technical systems is energy pass by its parts;
3. The coordination of rhythmic of the technical system, saying, that a necessary condition of functionality of technical systems is the co-ordinated rhythmic of all parts of system;
4. Transition in надсистему, saying, that diverse systems contain effect constructive системo-технической an optimality (for example, the conditioner as connection of a refrigerator with a heater);
5. Transition from macrolevel to microlevel;
6. Increase of dynamism and controllability of technical systems;
7. Increase of flexibility and internal differential technical systems (system engineering);
8. Optimisation of is functional-structural, veshchestvenno-power and information making technical systems;
9. Ecological safety;
10. Functional nonlinearity of difficult technical systems, from here necessity of development of monitoring systems and blocking both the human factor, and the functional centres in system of communications and infrastructures (the law of localisation of supernumerary technogenic process);

One of technics organic laws is the ambivalence law. It says, that any technical device grows out of technical and scientific creativity of the person and simultaneously natural process, connected with action of physical, chemical, biological laws.

§36 Philosophy of engineering activity

Engineering activity was historically connected with necessity of a management of civil work on erection of large-sized objects cult, defensive, transport, cultural-entertaining, transport communication, irrigating, housing appointment. On the basis of certain knowledge the engineer formed an image of object and in the course of civil work gave necessary consultations to executors (technical workers), resolved questions character. For realisation of the project necessary human and material resources were given to it. It bore directly responsibility before the customer.

In the conditions of technogenic development of Europe and America in XV III a century there was a question on an engineering education as scales of building activity have considerably grown, value of military engineering has increased, has begun, under the influence of industrial revolution, mechanisation of industrial-technological processes.

The engineering education has demanded a scientific basis. As a result engineering activity began to be defined as the technical activity based on regular application of scientific knowledge. In this activity there is the konstruktivistsko-creative cycle connected with invention, designing, engineering researches, introduction (innovations). Innovative activity is accented on technology and the organisation of manufacture of a necessary artefact (product). Problems of working out of manufacturing techniques of a product are thus solved, including технизированную a component in the form of the equipment.

The engineer deals not with technical systems (devices and technological processes), and with their descriptions. It will transform these descriptions from not clear requirements of the customer to accurate and unequivocal, for example, to drawings. Thus it uses the procedures of engineering activity turned out in engineering according to the accepted regulations.

From the point of view of manufacture the engineer should be able:

1. To maintain and repair, project and liquidate technological processes and devices;
2. To put, develop, solve problems, to predict, invent and make of the decision on technics introduction. To understand value of the work and its consequence, as in the useful functions created by it the hardware, and in undesirable effects.

Traditionally basic sense of engineering activity considers designing.

In the course of activity the engineer:

1. Co-operates with the customer as the user of the future product;
2. Transfers to colleagues the technical documentation necessary for them for working out of parts of the hardware;
3. Transfers to workers the technical documentation on manufacturing;
4. Conducts manufacturing architectural supervision;
5. Transfers to the customer (and necessarily and to the potential consumer) the operational documentation;
6. At new stages actively works with the customer.

The full cycle of engineering activity includes invention, designing, engineering research, technology and the manufacture organisation, operation and a technics estimation, liquidation of the out-of-date or failed technics.

Invention. On the basis of scientific knowledge and technical achievements action principles are created, ways of realisation of these principles register in designs of engineering devices and systems of separate components.

Designing. Result of design activity is the technical device intended for a batch production. The design consists of definitely connected standard elements which are let out by the industry. If any elements does not get or their parametres mismatch requirements they are invented and projected. For manufacture and a variation of technical characteristics additional engineering calculations and the account of some such requirements, as simplicity and profitability of manufacturing, convenience of use, possibility of application of standard or already available constructive elements are carried out.

Technology and the manufacture organisation. An initial material of this kind of activity are material resources from which the product is created, and a product – the ready technical device and a management to its operation. Function of the engineer in this case consists in the organisation of manufacture of concrete type of a product and working out of manufacturing techniques of a certain design of this product, and also if it is necessary, tools and cars for its manufacturing or its separate parts.

Operation, estimation of functioning and liquidation. Operation of technical systems is connected with camera activity, maintenance service. While in service technical system the estimation of its functioning that is especially important for modernisation of systems is spent.

At a stage of working out of new technical system requirements to materials and the components entering into its structure, from the point of view of possibility of their recycling with the minimum damage for environment and health of people should be formulated.

For classical engineering activity orientation of each kind of engineering practice to corresponding base engineering science, and subsequently even on the whole complex of scientific and technical disciplines is characteristic.

§37 Methodology of design

Designing process represents a special kind of human activity. Objects of designing can include as material (industrial structures, cars etc.), and non-material objects (social designing). Designing process is an information-processing activity of creation of information models of planning of technical works, technical innovations and development of methods, means and procedures for their realisation.

The modern line of perfection of process of designing consists in its automation as designing problems are not limited to preparation of the design documentation. Complex system designing includes knowledge of objects, social requirement for them, an estimation of their realizability and an estimation of consequences of introduction in operation.

Designing begins with reception of the information on a condition of the given area: data on technical devices, materials, manufacturing methods, components, processes, a market condition etc.

The designing purpose – creation of the object meeting certain requirements of the customer, possessing certain quality (structure). The object is developed in the znakovno-symbolical form.

Designing is guided,

1. An independence principle. Realising this principle, the designer describes and develops processes of functioning of a product, defining them as the first components first or second nature integral components. It is considered, that the designer at designing can neglect distortion of processes of the functioning, resulting engineering-design activity as using knowledge (law) of these processes, it provides them and reduces distortions to a minimum.

2. A realizability principle. The principle enters a division of labour between the designer and the manufacturer. It determines the project so that that could be realised in modern manufacture.

3. A conformity principle. Assumes, that the certain morphology (structure) can be put each process of functioning in conformity, certain designs are put functions in conformity. In a practical plane this principle is fixed by system of norms, normals, methodical instructions.

4. A completeness principle. Activity should come to the end with working out which satisfies requirements of the customer.

5. A principle of constructive integrity. The projected object is provided with existing technology. It consists of elements, units and relations which can be made in existing manufacture. The projected object can be presented and developed in the form of final number of units set, for example, in industrial catalogues, norms, rules.

6. An optimality principle. This principle assumes effective decisions.

The science and designing are closely connected, as designing process assumes carrying out of scientific researches, researches in a context of the decision of a design problem.

§38 Priorities and problems of high technologies

In second half of XX-th century the object of engineering activity changes. Instead of the separate technical device, the mechanism, the car the difficult cheloveko-machine system becomes object of research and designing. The maintenance of engineering activity changes also. Along with progressing differentiation of engineering activity on its various branches and kinds, process of its integration accrues. For realisation of such integration special experts - engineers-system engineering are required.

Sistemotekhnicheskyy activity is carried out by various groups of the experts who are engaged in working out of separate subsystems. The partition of difficult technical system on subsystems goes to different signs: according to the specialisation existing in engineering science; on area of manufacturing concerning designing and engineering groups; according to the developed organizational divisions. To each subsystem there corresponds a position of the certain expert (unessentially separate individual, but also group of individuals and even the whole institute means). These experts are connected among themselves thanks to existing forms of a division of labour, sequence of stages of work, overall aims etc. For realisation системотехнической activity co-ordinators (the main designer, the project head, the main expert of the project or service of scientific coordination, the head of scientifically-thematic department) are required. These experts carry out coordination, a scientifically-thematic management in a direction of association of various subsystems, operations in системотехническую activity.

System designing consists of sequence of the stages including actions and operations. These are stages:

1. Technical project preparations;
2. Manufacturing;
3. Introductions;
4. Operation;
5. Estimations;
6. Liquidations.

At each stage sistemotekhnicheskyy activity the sequence of operations is carried out: the analysis of a problem situation, synthesis of decisions, an estimation and a choice of alternatives, modelling, updating and decision realisation.

Sistemotekhnicheskyy activity is a necessary basis for working out and an effective utilisation of high technologies. In Belarus there is an evolution of design structures on level the structures based on cluster a

principle of activity. The similar mechanism is fulfilled on Park of high technologies. This structure could integrate the human capital in the field of information technologies into the international system of a division of labour. Domestic high schools had an opportunity access to modern bases of practice, employment of graduates. Similar prospects are available in area нанотехнологий, gene engineering.

§39 Methodology of scientific and technical researches

The important part of engineering activity is the technical knowledge. It possesses the specificity defined by a problem objectively to reflect a reality for the purpose. Unlike the natural sciences reflecting the natural phenomena as those, техникoзнание it is focused on a way of application of studied objects in the technician and technological processes.

The important property of technical knowledge is нормативность. Therefore its necessary components are standards. It is shown and in the description of technical objects which are characterised on the basis of set of technical requirements.

Distinguish following kinds of technical requirements: technological, operational, ergonomic, aesthetic, ecological. A little conditionally they can be subdivided also into the general both specific. All these requirements are expressed as in the positive form (necessity of maintenance of new possibilities), and in negative (the instruction about недопущении harmful consequences of scientific and technical progress).

The technical knowledge is characterised also by formal signs.

Developing methods and theorization means, engineers-researchers promote not only to development of technical knowledge, but also create possibility of effective participation of natural sciences in the decision of the engineering.

The technical theory is directed on the description of the objects resulting purposeful activity of the person. One of the major problems solved by technical knowledge is working out of techniques of designing of engineering objects.

The maintenance рецептурного a layer is made by methods, calculations on designing of concrete types of technical objects. In дотеоретической to the form this layer was realised in the form of empirical skills, recipes, receptions. With occurrence of the technical theory it is allocated as a special element of the knowledge connected with area of direct practical influence on the objective environment. Through these of a knowledge layer communication of is abstract-theoretical models with really functioning деятельно-стными schemes is carried out. Through it industrial requirements, conditions of an experimental research and other forms of practice influence the organisation of theoretical knowledge.

The technical objects become more difficult, the there is a necessity for a substantiation of recipes, techniques of technical activity more sharply. That the nobility how to design technical objects, it is necessary to understand, that they themselves represent, what their structure, what processes in them are made, as they function. The knowledge of only one natural laws cannot form such knowledge. At invariable natural-science characteristics of artefacts application of actually technical knowledge conducts to the diversified technological effects. The maintenance of a subject layer of engineering science is fixed in representation theories about ideal artefacts, i.e. it is artificial the created objects.

The humanitarian layer is realised in a number of socially-technical theories (ergonomics, design, etc.).

For performance of the social order it is necessary to express it in such form which would allow to connect technical requirement with possible means of its satisfaction. This role is carried out by a technical problem.

Taking into account the basic requirements to a technical problem its formulation should contain following basic components.

The technical problem contains in the formulation the most necessary material for creation of new technical object. The further advancement to the purpose assumes both informative and practical actions.

The idea is the special form of the organisation of the knowledge, comprising prospects of the further knowledge and practical activities. The validity is reflected in it not in its direct kind, and in natural

communications and development. The idea depends on a cogitative material of which it is formed also which it systematises.

For idea as an initial material the problem condition acts.

Character technical requirements and their mutual relations is of great importance for definition of a direction of search. Under the relation to each other technical requirements can be: 1) the interchangeable; 2) the complementary; 3) mutually exclusive.

Difficulty of a material embodiment of idea in technical object causes necessity of the technical decision.

The technical decision should satisfy to certain substantial and formal criteria. It should provide positive effect achievement.

To the technical decision some formal criteria are shown also: it should be stated accurately and clearly for all on whom the recognition and the further practical embodiment of a plan (experts, administrative services and so forth) depends.

On readiness degree allocate basic (preliminary) and definitive technical decisions. Such distinction is defined by a distance separating them from technical idea and technical object. The basic decision characterises only some essential lines of this or that variant. The definitive decision comprises the developed program of actions on technical object that assumes a detailed substantiation of a plan and carefully engineering specifications working out. The technical decision creates a basis for transition to a practical embodiment of new technical object.

Subjecting a technical innovation to check, production of goods simultaneously promotes the further perfection of the technical decision. So, it is necessary to reckon with factors insufficiently considered earlier that causes, in particular, negative result of engineering activity. It in turn causes of updating of the formulation of a problem and decisions. In the course of practical use the sphere of applicability of an innovation which can be wider or already is more precisely defined also, than it was originally supposed.

The scientific and technical researches connected with possibilities of the technical theory and experimentally-laboratory base also urged to promote it.

The quantum mechanics became a part of engineering activity thanks to workings out in the field of laser technologies. Singularity of the approach of quantum mechanics to the physical world has demanded a substantiation of nonclassical methodology. This problem was executed by developers of quantum mechanics. Among them were N.Bor and M.Planck. The new methodology orders the object description to carry out taking into account a research situation, informative means. This circumstance influences the maintenance of interpretations. Under the influence of new methodology the natural sciences began to use mainly mathematical language allowed to solve both theoretical and practical problems.

§40 Creative methods in engineering activity

Heuristics – a science about laws and methods of creative-research activity.

Use of heuristic methods (эвристик) reduces time of the decision of a problem in comparison with not directed search of possible alternatives. In the psychological and cybernetic literature heuristic methods are understood as any methods directed on reduction of search, or as inductive methods of the decision of problems.

The heuristics is a science about creative thinking. As a basis for it laws of development of technics and psychological features of creative process serve.

As basis for it laws of development of technics and psychological features of creative process serve. Under each problem the method of the decision consisting of a set of known methods and unknown persons as conditions constantly vary, the purposes, and, hence, and problems is searched. The basic problem in search of the decision of a problem is the exit on search area in which there is a decision. Classification of methods of search of decisions:

1. Heuristic methods (strategy of casual search);
2. Methods of is functional-structural research of objects;
3. A class of the combined algorithmic methods (strategy of logic search).

Into number of heuristic methods enter:

- "Brain storm" (A.Osborn);
- Sinectic;
- Focal objects (C.Vajting);
- Garlands of accidents and associations (G.Bush);
- Lists of control questions (D.Poja, A.Osborn,). To a class of is functional-structural research:
- The morphological analysis (F.Tsvikki);
- Matrixes of opening (A.Mol);
- Decimal matrixes of search (R.Povilejko);
- Functional designing (R.Koller);
- Morphological классифицирование (V.Odrin).

A class of the combined algorithmic methods concern:

- Algorithm of the decision problems — (G.Altshuller);
- The generalised heuristic method (A.Polovinkin);
- Complex method of search of decisions of technical problems (B.Goldovsky);
- Fundamental method of designing (E.Metchett);
- Evolutionary engineering (S.Pushkarev).

Search of decisions with use of these methods is system and purposeful. Thus, the problem decision depends on character of a problem, from degree of completeness and reliability of the initial information, and from personal qualities of the developer: from its ability skilfully to be guided in the information environment, from degree of possession of knowledge and creativity methodology. Besides the direct product of creative activity answering to an object in view, there is also a by-product. During the successful moment this by-product can be shown in the form of the help conducting to the intuitive decision.

The heuristics gradually evolved to computer technologies on which basis expenditure of time for search and search of possible analogues, prototypes was sharply reduced.

§41 Modern concepts of natural sciences

Engineering activity is connected with the whole complex of the scientific and technical disciplines leaning against a number of natural-science concepts, connected with physical, chemical, geological, biological, astrophysical properties of substance, space, energy, a field.

It is a question about:

1. To the optics having an exit in instrument making, laser technologies;
2. To the thermodynamics having an exit in power;
3. To the quantum mechanics connected with instrument making, laser technologies;
4. To the nuclear physics having an exit in power, military production;
5. To the genetics having an exit in gene engineering;
6. The organic and inorganic chemistry connected with chemical manufactures, ecology, metallurgy;
7. The geological theory focused on mining branches, including oil and gas.

Natural-science knowledge is transformed in engineering at level functional, line and block diagrams.

The function chart displays the general representation about technical system irrespective of a way of its realisation and is a product of idealisation of this system on the basis of principles of the certain theory. In engineering science function charts are accented on certain type of physical process and more often are identified with any mathematical scheme or the equation. So for example, at calculation of electric chains by means of the theory of counts elements of the electric scheme — inductance, capacity and resistance — are replaced by certain rules special идеализированным with a functional element — унистом which possesses only one functional property — it passes an electric current only in one direction. To the homogeneous theoretical scheme received after such replacement topological methods of the analysis of electric chains can be applied. On a function chart the decision of a mathematical problem by means of

a standard design procedure on the basis of application before the proved theorems is passed. For this purpose the function chart by certain rules is led to a typical kind.

The line scheme or the functioning scheme describes the natural processes proceeding in technical system and connecting its elements in a single whole. Such schemes are under construction proceeding from natural-science representations. So for various types of functioning of system chain elements, for example electric, change a kind.

The block diagramme fixes a constructive arrangement of elements of technical system and communications with the account of a prospective way of realisation. It represents a theoretical sketch of this structure on purpose to create the project of the future technical system. In it on working out the result of the technical theory, and also a starting point of engineering-design activity is reflected in its basis of new technical system.

Natural sciences development influences engineering activity as physical, chemical, biological, geological laws are used in various branches of industrial and agrarian activity of mankind. Most actively engineering workings out were affected by scientific revolutions connected with nuclear, quantum, genetic, logic, thermonuclear researches. A. Einstein's theoretical activity became a harbinger of nonclassical methodology in a science. She has allowed to find out fundamental value of a relativity. Definitive formation of nonclassical methodology has occurred under the influence of the quantum mechanics.

§42 Social and innovative activity of mankind

Social engineering activity is connected with organic designing. It means, that its problems include designing of systems of activity. Innovative activity became one of results of such designing. In it possibilities of a science, engineering, economy are integrated.

Science ценна for mankind the issued results fundamental and applied researches in the form of patents, trade marks, opening, inventions. The engineering is important that it translates results of scientific researches in the form of technical and technological workings out. The economy allows a science and engineering to be claimed within the limits of a public division of labour, financing of projects, programs fundamental and applied researches. Management is focused on maintenance of effective strategy of activity of mankind.

In the XX-th century factors of intensive economic development of mankind have come into force. With a view of rationalisation of scientific and technical researches, giving of a special-purpose character by it also generates the system of innovative activity including: strategic marketing; research and development; technoparks, the innovative manufacture passing in continuously modernising infrastructure and communications.

Strategic marketing consists in studying of dynamics of the market in the field of requirements, a rise in prices, including on energy carriers, ecological and safety requirements.

The primary goals of research and development are: new knowledge and new areas of their application; theoretical and experimental check of possibility материализации knowledge in manufacture sphere; practical realisation of innovations.

Research and development assumes basic researches (theoretical and search); applied researches; developmental works; skilled and experimental works.

The finishing stage of research is transition from laboratory conditions and experimental manufacture to industrial production. Workings out are understood as regular works which are based on the existing knowledge received as a result. Workings out are translated in the form of innovative projects.

The innovative project is a complete set of the technical, organizational-planned and settlement-financial documentation which passes corresponding examination.

In itself innovative projects can be not claimed. Innovative structures are necessary. They were issued in the form of technoparks, business incubators, technopolises, the centres of high technologies.

The primary goals of these structures is

- Formation of the conditions favorable for development of innovative activity;
- Creation and development of small innovative and venture firms;

- Selection and support of perspective scientific projects;
- Successful коммерциализация results of scientific researches and scientific and technical workings out;
- Service;
- Qualitatively new approaches to the organisation of work of scientific universities and young researches;
- Training of students;
- The decision of the regional problems connected with reorientation of economy with materialo- and power-intensive on development of the high technology branches;
- Creation of preconditions for an effective exchange of the high technology production in the world market.

Technoparks solve the major problems of regional development – give new workplaces, promote structural reorganisation and transition of traditional manufactures to new technologies.

Research parks are engaged in maintenance of creation of conditions for effective carrying out of scientific workings out.

Technological - the organisations of the small high technology manufactures focused on a transfer of technologies, коммерциализацию results of scientific and technical workings out promote.

Industrial technoparks provide placing of small high technology manufactures in the certain closed territory, creation of industrial premises and workplaces.

Grjunder technoparks, being a version industrial, support creation of new small firms in a manufacturing industry.

Incubators of small high technology firms, business incubators can be in structure of technoparks or to be the independent organisations.

Technoparks have such large links, as

- The commercial centre including consulting, инжиниринговые and auditor firms,
- Venture fund,
- Incubator of small firms,
- Business centre.

The basic functions of technoparks are connected with planning; marketing; audit. They render services in the field of legal, economic-legal, tax consultation, credit services. Assist in reception of the governmental orders; search of investors; the manufacture organisations; the decision of technical questions; development of technologies. Are engaged in leasing of the hi-tech equipment; insurance of property, investments, reinsurance; introduction of information databases; preparation and training of shots; publishing; the organisation of exhibitions; rendering of economic-household services

The constructive methodology assumes role strengthening cultura in engineering activity in the form of design.

§43 Concept of artificial intellect

The mankind traditionally used technics as natural continuation of hands and feet. In the XX-th century there was real and necessary a technics used in administrative function, capable to incur function of the human thinking, capable to become natural continuation of the major functions of a brain. This problematics has got a scientific basis in the world to the cybernetics combining possibilities, the general theory of systems, mathematical imitating modelling, computer science, computer technologies.

One of the first terms "cybernetics" used Ampere in work «Experience about philosophies of sciences, or an analytical statement of classification of all human knowledge». In 1843 Trentovsky has given administrative sense in work «the Relation of philosophy to cybernetics as to a management skill the people». In the conditions of the XX-th century the term has been staticized by N.Wiener. It has found accord with F.Bertalanfi's works (the founder of the general theory of systems). Within the limits of this approach opening of has been made that any system, irrespective of its nature is opened and exists at the expense of a feedback – constant information interchange. It in many respects explained occurrence accelerated on

dynamics of inventions of the direction connected with means of communications – telegraph, phone, mechanografik, radio, TV, the computer.

Set of the discipline, studying properties of the information, ways of its representation, accumulation, processing, transfer by means of means also is computer science. The Artificial intellect is qualitatively new stage in computer development when there was a transition from domination of programs to domination of data in them. From the machine word placed in one cell of a computer memory, there was a transition to vectors, files, files, lists, the abstract types of data which are carrying out function of representation of knowledge. It is a question of realisation интерпретируемости, presence:

1. Classified communications between the knowledge concerning an element of set, and knowledge of this set;
2. Situational relations of a simultaneity, a finding in a space point;
3. Special procedures of generalisation, filling of knowledge available in system etc.

Representation of knowledge in the computer is realised on the basis of creation of isomorphic structure of human thinking. It is a question of imitating model on which basis in the computer machine search of transformations of the model corresponding to the decision of a problem of the games, inventions, recognition etc. Following stage of imitation of intelligence consists in reflexion methodology. There was a transition from a classical paradigm of an artificial intellect, to the nonclassical allowing computer to estimate the previous knowledge and the purposes (reflexion model).

Artificial intellect systems, using the rules of processing of the information put in pawn in them, develop schemes of expedient actions on the basis of the analysis of the models stored in their memory. Ability of reorganisation of these models, i.e. to self-training, is a sign of evolution of these systems. The key role in working out of programs belongs to programmers.

Certain level of representation of knowledge creates a spectrum of use of computer technologies in network, sistemotechnik the plan. One of directions are the intellectual systems, the invariable element of flexible industrial systems, safety systems.

Within the limits of the information law problems are solved:

1. Creations of the devices which are carrying out the big number of logic operations with high speed;
2. Workings out of the problemno-focused languages for computer use;
3. Constructions of imitating models of the rigid or nonrigid decision of the decided problem.

The problem of development of an artificial intellect is connected and with certain technical questions. Capacities of the computer are sufficient, but the special structure of operative memory is necessary. The decision of this problem goes on a way of machine intelligence and artificial reason. Therefore are connected with:

1. Working out of the theory of a deductive conclusion and the proof of theorems;
2. Research of game machine programs (chess, draughts, gamblings etc.);
3. Working out of the theory of construction of dialogue systems for dialogue with the computer in the languages close to the natural;
4. Construction of heuristic programs for imitation of activity of the person at the decision of the problems resistant to formalisation;
5. Creation of artificial analogues of biological fabrics (нейронов, internal bodies, muscles);
6. Modelling of creative processes (the music composition, creation of cartoon films);
7. Researches in the field of collective man-machine reason.

The technical cybernetics, in difference from theoretical cybernetics, is dealt with by problems of automation of technological processes, management of difficult technical complexes, working out of the automated systems technological and administration managerial control (the integrated systems), recognition of images, systems of the automated designing, the automated control systems of scientific researches and experiments, the automated control systems of industrial tests.

Technical possibilities of cybernetics considerably will increase with application nanotechnology, optical structures.

Thus, an artificial intellect is the technical system which solves problems and is capable to self-training on the basis of transformation of the mathematical models simulating a reality. It is necessary to understand the description as mathematical modelling in the form of the equations and inequalities of real processes (physical, chemical, technological, biological, etc.)

Cybernetic modelling is a version of mathematical modelling.

In Belarus the key role to development of information technologies is taken away. Functioning of Park of high technologies testifies to it. Much is made in the field of technical cybernetics. Automation of design and design works has occurred fast rates. The important role is played to manufacture system by the automated control systems and the control. Automatics sates technical devices that promotes more high efficiency of work.

§44 Concept of virtual reality

The term «a virtual reality» has been used for the first time in the Massachusettsky institute of technology in the late seventies of the XX-th century. Lenjer has adjusted manufacture of interactive computers with the head helmets allowing the user to plunge into the virtual worlds with the maximum spectrum of sensations. These computers have been integrated into complex multimedia operational environments and have created a basis for cheloveko-machine континиума.

V.S.Babenko, N.A.Nosov definite a virtual reality as the phenomenon connected with activity of consciousness of the person.

The virtual reality exists while the generating reality operates. The subject who is in a virtual reality, directly does not feel intermediate links. Thus he sees all virtually occurring with the point of view. The main participant of events always is he.

The virtual reality possesses properties:

1. it is produced by activity of any other reality, external in relation to it;
2. exists actually, only «here and now», only while the generating reality is active;
3. has time, space and existence;
4. cooperate with all other realities.

Electronic virtual reality:

1. It is ontologically proved by aspiration of the person to create the alternative world;
2. It is shown mainly ;
3. It is wide on force of influence;
4. Can change consciousness of the subject (feedback).

The virtual reality is a fertile basis for realisation of computer modelling in dynamics that allows to track artefact technical characteristics in as much as possible approached to real conditions of the dynamic environment, 1) for example, conditions of fight, impassability for the transport technics, 2) the decision of landscape problems of building of hydroobjects, microdistricts etc. Thanks to the reached level of imitating modelling the bionics was staticized.

The virtual reality has created a phenomenon of the visualisation based on requirement of people in communications, satisfaction of desirable images, plots, intrigues, game requirements in an information society. There was a huge industry of visualisation of various entertaining projects. The mobile communication combined with computer technologies, has given powerful spur to development of communicative technologies. Features of a new information reality are studied by dialogue philosophy. She analyzes categories I, Another, нарратив, a discourse, означивание, action, the text, language, the information, the message, a slogan, интенция, a brand, симулякр.

In Belarus the information sector actively develops. The virtual reality causes heightened interest in Internet users. A mobile communication facility is actively used for dialogue. With a virtual reality Belaruns start to work practically from school age. It is possible thanks to creation of the newest computer classes at schools and grammar schools. In higher educational institutions students master virtual tech-

nologies of designing, designing, modelling, carrying out of scientific researches, realisation of workings out.

Computer technologies have allowed to create network spaces in which borders the information transfer is carried out, activity coordination is possible. It is important, that these possibilities of communications were not beyond a legal field, humane values. For last years legislators and law enforcement bodies have made much for a regulation of activity of citizens in social networks. Speech, first of all, goes about suppression of appeals to violence, threats, drug traffic and people, pedophilia. Activity of citizens which is directed on the organisation of mass actions of violence, robberies, disorders is especially supervised. Those who are engaged in similar organizational affairs, first of all bear responsibility for results of violence. Except legal aspects the virtual reality assumes moral aspects of activity.

§45 Ethics of program engineering

Theorists of computer ethics (80th of the XX-th century) are philosophers of J. Moore, D. Johnson, J. Snepfer, L. Lloyd, U. Betchel. They have shown, that computer ethics are a dynamical and difficult field of research, 1) including the analysis of relations between the facts, concepts, values taking into account constantly changing computer technology, 2) being on border between new technologies and standard ethics.

Ethics of computer technologies are close to ethics of business and a social ethics. Traditional ethical categories not always help to solve the problems arising in sphere of computer technologies.

In the computerised society the values connected with the former concept of work gradually were reconsidered: communicating, not leaving the house, with the computer terminal, the employee lost constant contact to colleagues; operating the robot by pressing of buttons.

Recognising that operations of the computer time most part there are "invisible", J. Moore has allocated three sorts of the computer "invisibilities" having ethical value. The first type of "the invisible factor" he named "an invisible deceit", i.e. intended use of invisible operations of the computer on purpose to carry out unethical or criminal act.

J. Moore in this connection results a hypothetical example. The programmer working in bank could steal so-called "superfluous percent". During bank operations at calculation of percent from contributions after a rounding off of the sums constantly there are cent shares. The programmer could make and enter into the computer the corresponding program with the task to translate these residual shares of cent from all bank operations into the account, having carried out thereby abduction of "superfluous percent".

The second type of "the invisible factor" in computer technology of J. Moore named presence of "invisible values of the program", i.e. the values unintentionally entered into the program, and for the time being not known that who uses the program, even that who makes it.

As an example of J. Moore results a concrete case. At creation Programs for preliminary sale of air tickets in the USA in 80th programmers used an alphabetic principle. This "invisible value of the program" remained noticed. The third type of "the invisible factor" computer technology - "an invisible complex of calculations". The computer is capable to carry out so difficult calculations which simply are not covered by human consciousness, are incomprehensible for human understanding and are not subject to the control (even if the program is quite accessible to our intelligence). From here also there is a question, writes J. Moore, it is how much possible to trust "invisible calculation".

Because the logic of the computer is capable to vary infinitely, also the potential sphere of application of computer technics from here is boundless. The permission of such essential problems as liquidation of failures and disproportions in economy, change of the concept of alienation and дегуманизации the individual and so forth On the other hand, the computer technology conducts to creation of "alien intelligence", on the one hand, depends on computer technology, possessing differing from human values.

Computer revolution has generated, besides problems of the general character, such essential problems, as intrusion by means of the computer in private life of the individual and computer criminality. The group of problems of the computerised society concerns a professional etiquette and jurisprudence, the property rights to computer programs, responsibility for errors committed by the computer, changes of

structure and valuable characteristics of professional ethical codes (ethics of the doctor, ethics of the teacher, ethics of the businessman etc.).

Computer ethics represent the analysis of the nature and social influence of computer technology in a combination to corresponding formulations of the ethical justification of technology. According to J. Mess, global problems of computer ethics arise in connection with absence of clearness in questions on what ethical restrictions at application of computer technology. Computer ethics urged to formulate rules of these new actions, it should answer questions of ethical use of computer technologies both social, and personal character for mechanical application standard ethical максим in the conditions of the computerised society becomes insufficient.

The basic characteristic of an epoch of a computerisation consists in so-called "a logic pliability of the computer", i.e. the computer can be programmed for performance of any logic operation, irrespective of its ethical value. J. Snepper in article "Responsibility for mistakes made by the computer" allocates among those scientists who considers the computer as "the agent of action", making decision and bearing responsibility for errors appearing in these decisions. J. Snepper has predicted possibility of creation of supercomputers by which it would be made a duty to "answer" for the decisions.

The question on "computer errors" also represents a special problem. If it is a question of the medical computer programs, making the diagnosis, ordering the medicines, defining their dosage in this case the decision concerns health of the patient.

D.Dhanson considers, that only knowledge and ability for the computer professional it is not enough of one, it by all means should be guided by laws and professional etiquette requirements.

The term has been entered into 80th of the XX-th century American etiks «the computer professional» (programmers, system analysts, system engineerings, sellers of the computer equipment, employees of bank and design spheres, workers of national education, diagnosticians, doctors, schedulers and developers of the budget).

«The computer professional» enters mutual relations with the employer, the client (or the consumer), with colleagues by a trade and with all society. That is why such person should test on itself action of the categorical imperative including:

1. Confidentiality. Engineers should respect confidentiality of the employers or customers irrespective of, whether the corresponding agreement subscribed them.
2. Competence. The engineer should not overestimate the level of knowledge and not should to undertake work which is outside of its competence meaningly.
3. The rights to intellectual property. It is necessary to protect intellectual property of the client patents.
4. Abusing the computer. System programmers should not abuse computer resources of the employer or the customer; we here understand a wide spectrum as abusings – from games in computer toys on a workplace before distribution of viruses, etc.

The code of ethics and professional work in the field of program engineering It is recommended ACM/EEE-CS Joint Task Force on Software Engineering Ethics and Professional Practices also it is in common approved ACM and IEEE-CS as the standard Training and work in the field of program engineering.

Program engineers should adhere to following eight principles firmly:

- To operate strictly in interests of a society;
- According to interests of the client and the employer if they do not contradict interests of a society;
- To provide conformity of quality of the products and their updatings to the highest possible professional standards;
- To support integrity and independence of the professional estimations;
- To adhere to ethical approaches to management of working out and support of the software and to advance these approaches;
- To lift prestige and reputation of the trade in interests of a society;
- To be fair in relation to the colleagues, to help them and to support;

§46 Engineering management, its structure and functions

Management is the kind of professional work directed on maintenance of economic activities of firm, operating in the market conditions, the planned purposes by rational use material and a manpower.

As management enters:

- Studying of the market for the purpose of the manufacture organisation, or its modernisation (marketing and forecasting);
- Production with the minimum expenses and its realisation with the maximum profit;
- Management of the personnel.

Engineering management practically is always connected with innovative activity in the form of an innovative cycle (full and incomplete).

The full cycle of an innovation is connected with creation of essentially new kinds of scientific and technical production, incomplete – its new generations and lineups, being some kind of a derivative full. From the point of view of the qualitative characteristic of the novelty, a full cycle it is possible ассоциировать with reception of radical innovations, and incomplete – трансформационных and modification. At last stages of industrial and operational phases the innovation becomes a part артефактной and the technological environment.

The strongly pronounced approach to the engineer as to the manager is shown by Anglo-American philosophy of technology (technics). The ancestor of this tradition is T.Veblen, written that in conditions technik realities should be engaged in management questions engineers. It is a question of the experts, capable to combine конструкторские a plan with organising abilities. One of the important indicators of this ability is shown at level of working out of the business plan of the innovative enterprise including a part, connected with formation of potential of the innovative enterprise (the characteristic of the enterprise and strategy of its development, production description, capacities and the areas, the organizational plan, the plan of the cost price of production, technical and economic indicators of formation of potential of the innovative enterprise), a part connected with realisation of potential of the innovative enterprise (the analysis of commodity markets, an estimation of a technological level of products and technology at the enterprise, forecasting of financial indicators of the enterprise, financial efficiency of current activity of the enterprise, the plan of attraction and credit repayment, financial efficiency of investments, budgetary efficiency of the project, an estimation of sensitivity and stability of the investment project, technical and economic indicators of the project).

Management shows activity in the light of a technocratic paradigm of activity. As a result of similar activity by victims of the transnational companies there is political elite of developing countries, ecology of large regions. So, failure on oil chisel in Gulf of Mexico, belonging British corporation, has led to huge losses экосистемы. The second Chernobyl name a situation on the Japanese atomic power station Fukushima where measures of safe operation of nuclear reactors taking into account seismicity of area and possible tsunami have not been thought over. All it demands a humanisation of the administrative activity which is carried out in commercial conditions.

In Belarus engineering management has arisen on the basis of the management case of the domestic enterprises and the organisations. The majority of these people are graduates of technical colleges. For short time these people have learnt to supervise over the enterprises in commercial conditions of activity. Their problems are connected with increase in an export potential of the enterprises, modernisation, attraction of investments. The Engineer-manager cannot be confused to office worker. He/she is the expert which operates the personnel, labour collective in industrial, market conditions of activity. It is engineers-system engineerings which supervises all stages of innovative process. The special place in its activity occupies labour collective which represents the national human capital.

§47 Philosophy and futurology

Problems of philosophy are defined by us in section 1 (a question 1). Therefore we can concentrate on a part of the question, concerning futurology.

The futurology as a science oversteps the bounds of philosophy as, forecasting laying in its basis, modelling, future scenarios, expert estimations of the future concern various areas of human activity and corresponding sciences.

Actually scientific bases of futurology have been developed in the end of XIX centuries on the basis of the theory of probability, statistical methods of processing of the information. In the XX-th century editions of thematic reports on global problems of mankind in which on the basis of a complex estimation of economic, geopolitical, ecological, scientific and technical tendencies, activity level dynamics of processes in the future is predicted were generated the international practice filled with the Roman Club. Basically till 2025.

The philosophy periodically resorts to tactics of the futurological analysis социокультурной dynamics, but these scenarios have ambiguous character. So, from end XIX of a century there were insolvent futurological concepts of scientific communism, the end of history, destruction of civilisations. Therefore the philosophy aspires to keep separate from the future description in an ideological context and focuses the efforts to the analysis of scientific methods of forecasting.

The philosophy on a boundary of centuries represents to mankind a scientific picture of the world of the Universe, biosphere, a noosphere, a social reality. Two cores of methodology of display of an objective reality - dialectic and sinergetik are offered. In social sphere the philosophy is accented on modernisation of a society, innovative problems of development of mankind. The philosophy ascertains also presence in social dynamics of geopolitical interests of the various regional centres of force. Belarus considers this feature and operates as the representative of the Euroasian regional community having own military-political, economic, information, cultural interests and features.

The philosophy constantly studies the person from the point of view of its personal, spiritual, sincere, psychological, individual qualities, internal experiences. In this case the science and theology supplement each other as it is important to know the real, live person who is in constant process of search of internal balance.

§48 Methodology of social forecasting

The forecast is likelihood, based on scientific data, the assumption.

Standard forecasting is an achievement of desirable conditions on the basis of in advance set norms, ideals, stimulus, the purposes.

Search forecasting is under construction on a certain scale (a field, a spectrum) possibilities on which then degree of probability of the predicted phenomenon is established.

Target forecasting assumes construction on a certain scale (a field, a spectrum) possibilities of especially estimated function, i.e. function of distribution of preference: it is less desirable, it is more desirable, it is most desirable, it is optimum (at the compromise by several criteria).

Planned forecasting represents processing search and standard прогнозной to the information for selection of the most expedient planned specifications, tasks, instructions with revealing of undesirable alternatives subject to elimination and with careful finding-out of the direct and remote, indirect consequences of accepted planned decisions.

Program forecasting formulates a hypothesis about possible interferences of various factors, specifies hypothetical terms and sequence of achievement of the intermediate purposes in ways to the main.

Design forecasting urged to promote selection of optimum variants of perspective designing on which basis it should be developed then real, current designing.

Organizational forecasting of current decisions (with reference to management sphere) for achievement of the provided desirable condition of the phenomenon, objects in view.

On the anticipation period — to a time interval on which the forecast is calculated, — differ operative (flowing), short - sredne - long - and дальнесрочные (superlong-term) forecasts. Operative, as a rule, it is calculated on prospect on which extent it is not expected essential changes of object of research — neither quantitative, nor qualitative. Intermediate term covers prospect between short - and long-term with prevalence of quantitative changes over qualitative, дальнесрочный (superlong-term) — prospect when so considerable qualita-

tive changes are expected, that in essence it is possible to speak only about the most general prospects of development of the nature and a society.

Operative forecasts contain, as a rule, in details-quantitative estimations, short-term — the general quantitative, intermediate term — quantitatively-qualitative, long-term — is qualitative-quantitative and дальнесрочные — the general quality standards.

The time gradation of forecasts is relative and depends on character and the purpose of the given forecast. In some scientific and technical forecasts the anticipation period even in long-term forecasts can be measured by days, and in geology or космологии — millions years. In social and economic forecasts in compliance with economic plans and according to character and rates of development of the predicted phenomena the following time scale is empirically established: operative forecasts — till one year, short-term — from one till five years, intermediate term — for five-ten years, long-term — for the period to fifteen — twenty years, дальнесрочные — outside of long-term.

However here again there are the distinctions connected with features of separate branches of social and economic forecasting. So, in sphere of a policy the range between is short - also is long-promptness narrowed to limits of the next decade, in town-planning — is stretched for the whole century (as the next decades the most part of objects already it is possible only operative forecasting), in economy — adapts to ranges of economic plans etc.

On object of research distinguish accordingly scientific, scientific and technical and social in forecasts.

Natural-science forecasts are divided on:

- Meteorological (weather, air streams and other atmospheric phenomena);
- Hydrological (sea excitements, a mode of a drain of water, high waters, a tsunami, storm, freezing and water area opening, others гидросферные the phenomena);
- Geological (deposits of minerals, earthquakes, failure of avalanches and others литосферные the phenomena);
- Biological, including phenological and agricultural (productivity, disease and other phenomena in vegetative and fauna, in general in biosphere);
- Medical and biologic (nowadays mainly to illness of the person);
- Physical and chemical forecasts of the phenomena of a microcosm.

Scientific and technical forecasts cover prospects of a condition of materials and an operating mode of mechanisms, cars, devices, the electronic equipment, all phenomena of a technosphere. In sense of prospects of development of scientific and technical progress — they cover problems of development of a science, its structure, comparative efficiency of various directions of research, development of scientific shots and establishments, technics (system «the person — the car»), operated aspects of scientific and technical progress in the industry, building, city and agriculture, on transport and communication, including information system.

Social forecasts share on:

- Socially-medical (public health services, including physical training and sports);
- Socially-geographical (prospects of the further development of a terrestrial surface, including the World ocean);
- Socially-ecological (prospect of preservation of balance between a condition of an environment and society ability to live);
- Socially-space (outer space exploration prospect);
- Economic (prospect of development of a national economy, in general economic relations);
- Sociological, or social in narrow sense (prospect of development of social relations);
- Psychological (the person, its behaviour, activity);
- Demographic (growth, population shift);
- Ethnographic, or lingvo-ethnologic (development of language, writing, personal names, national traditions, customs, customs);
- Architecturally-town-planning (social aspects of moving, development of a city and village, dwelling, in general the manned environment);

- Education and training, development of schools and establishments in the field of national education — from a children's day nursery and gardens to universities and postgraduate study, including subsystems of improvement of professional skill and retraining of personnel (self-education of adults, formation of parents, an additional education, etc.);

- Cultural-aesthetic (material base of art, the literature, all culture; the art information, development of schools and culture establishments — book, journal, newspaper business, radio and TV, cinema and theatre, museums and parks of culture, clubs and libraries, culture monuments etc.);

- State-legal, or legal (development of the state and the legislation, the right and криминологии, in general legal relations);

- Internal political (internal policy of and other country);

- Foreign policy (foreign policy of and other country, the international relations as a whole);

- Military men (military-technical, military-economic, military-political, strategic, military-tactical, military-organizational forecasts).

At forecasting methods are used:

- Questioning (interviewing, interrogation) – interrogation of the population, experts on purpose to order. Expert estimations have great value.

- экстраполирования and интерполирования (revealing of intermediate value between two known moments of process) – construction of dynamic numbers of development of indicators of the predicted phenomenon throughout the periods of the basis of the forecast in the past and forecast anticipations in the future;

- Modelling – construction of search and standard models taking into account probable or desirable change of the predicted phenomenon for forecast anticipation on available direct or indirect data about scales and a direction of changes.

RECOMMENDATIONS FOR POST GRADUATE STUDENTS

The abstract is the basic document defining the right of the admission to delivery of candidate examination in philosophy and methodology of a science. The abstract theme is defined on the basis of a theme post graduate students works with the account, applied post graduate student in researches of methods. If, for example, researches assume experiments the abstract theme will sound as follows «Experiment, its status and functions».

Structurally the abstract includes a table of contents, the introduction, three questions, the conclusion, the list of the used literature. The total amount should not exceed 20 pages. The abstract surrenders on chair of philosophical doctrines where it is registered in special magazine with assignment of a corresponding serial number and remains on chair before examination. On abstract check 10 days are taken away. The competitor can familiarise with the review directly on chair. The abstract on hands thus does not stand out. It remains at the disposal of examination board which spends additional interview under the abstract at examination in the form of specifying questions. After examination the abstract is stored on chair.

The abstract should be handed over on chair of philosophical doctrines till May, 15th. At an abstract writing it is possible to use not only the scientific literature on the paper carrier, but also other scientific materials, including electronic resources with corresponding references.

Candidate examination in philosophy and science methodology is spent to the terms defined by the order of the rector and as a part of the commissions, confirmed by the special order. During examination the competitor extends the ticket and has at the disposal of 45 minutes on written preparation of answers after which termination and the information it certifies authenticity of the reflexions the signature. It is necessary for avoidance of disputable situations following the results of the examination board answer. Following the results of examination the report of the established sample which is transferred in corresponding control is made out.

The questions offered for preparation for candidate examination in philosophy and methodology of a science:

1. Philosophy in the conditions of a postmodern (a postmodern epoch): a subject, the purposes, problems. The status and mission of philosophy in a society life.
2. Philosophical traditions of the East and the West (comparative the analysis).
3. Philosophy of transboundary cooperation. Nonclassical and postclassical philosophy: a pragmatism, analytical philosophy, phenomenology, existentialism, structuralism, a postmodernism.
4. The metaphysical bases of life: materialism and idealism in classical and nonclassical philosophical systems. Understanding of life in classical and postclassical philosophical systems.
5. Existential structure of a material world in the light of modern concepts of natural sciences and mathematics. Substantive and relational concepts of space and time.
6. The nature as a subject of philosophical and scientific knowledge. Biosphere. A noosphere. A technosphere. Coevolution.
7. Philosophical concepts of the person. Multidimensionality of a phenomenon of the person. A problem of essence and existence of the person. Ekzistentsionalno-phenomenological, социокультурная, psychoanalytic traditions in consciousness researches. A personal choice, self-actualisation and a problem of meaning of the life. The person and values of a mass culture.
8. Modern concepts of research of a technogenic reality. Specificity of a social reality and society structure. The Marxist concept of society. Models of a society of M. Veber, T. Parsons, J. Habermas.
9. Globalisation as object of philosophical judgement. A globalisation phenomenon.

10. Coevolution and a sustainable development social systems and nature. The nature of social contradictions, conflicts, revolutions and reforms. Humanism as a measure of spiritual and valuable measurement of public progress.
11. Globalisation and preservation problem civilization identity. Culture philosophy. Methodology of a science and cultura.
12. Dialectic and sinergetik development methodology social lives. The dialectic logic as methodology of scientific knowledge: contradictions and philosophy categories.
13. Science as the form of public consciousness and social institute. A science as a globalisation phenomenon.
14. Integration tendencien in science development.
15. Scientific rationality and its types (classical, nonclassical, postnonclassical). Revolutions in a science as change of types of rationality. Three types of rationality and change of paradigms in natural sciences.
16. Evolution of organizational forms of a science from the academic structures to technoparks. Genesis of scientific knowledge from a protoscience to modern technologies.
17. Science as system fundamental and applied researches. Structure of scientific knowledge: empirical and theoretical levels, the fact, the theory, the science bases. A substantiation problem in a science.
18. Science language as a semiotics subject. Science language: objective, a metalanguage, definitions and terminology.
19. Possibilities and science borders: gnosticism, agnosticism, scepticism. Forms of reflective judgement of scientific knowledge: logic, gnoseology and methodology.
20. Social values and norms scientific etos.
21. Ethics of a science and its role in formation of modern type of scientific rationality.
22. Creative freedom and socially-moral responsibility of the scientist.
23. Tool, world outlook, heuristic and innovative value of a science. A science and innovative development in a modern society.
24. Science and social technologies in a modern society: business, a policy, management, formation.
25. Scientific and technological revolution. Concept of scientific revolution. The nature and types of scientific revolutions.
26. Scientific and technological revolution and activity modernisation: filosofsko-methodological aspect. Genesis of scientific knowledge from a protoscience to modern technologies.
27. Social mobility of the scientist in a modern society.
28. Science methodology in Belarus (the Minsk school). A science in culture of Belarus.
29. The argument, its structure, kinds and role in scientific discussion. Forms of scientific communications.
30. Concept of methodology and method in natural and engineering science. Methodology of scientific research. A subject, the purposes, problems, means and methods of structure scientific research.
31. Specificity of the system approach.
32. Methods of theoretical research. Concept of the scientific theory: abstract and ideal objects. The metatheoretical bases of a science: a scientific picture of the world, ideals and norms, style of scientific thinking.
33. Methods of empirical research.
34. Technics philosophy, its subject and problems. Presumptions of a technogenic civilisation. Technics and technics philosophy.
35. Laws of functioning and technics development. Natural sciences and technics.
36. Philosophy of engineering activity. Concept and features of constructive methodology. The engineering approach and constructive methodology.
37. Designing methodology. Concept of design activity. A science and designing parity.

38. Methodology systematic engineering activity. Priorities and problems of development of high technologies in Belarus.
39. Methodology of scientific and technical researches. The quantum mechanics and nonclassical methodology. Natural sciences and the humanities. Specificity of language of natural sciences.
40. Heuristics and creative methods in engineering activity. A substantiation of constructive methodology through деятельностный the approach.
41. Modern concepts of natural sciences and their application in engineering. Development of natural sciences and revolution in a science. Formation of methodology of a nonclassical science in the relativity theory. The quantum mechanics and nonclassical methodology.
42. Sotsiotekhnichesky innovative activity of mankind and problem of modernisation of a technosphere. Natural sciences and the humanities. A science and innovative development in a modern society. Constructive methodology and cultura.
43. Modelling on the computer of functions of human thinking. Concept of an artificial intellect. Specificity of language of natural sciences. Priorities and problems of development of high technologies in Belarus.
44. Virtual designing and design. Concept of a virtual reality. A virtual reality and a modern information society.
45. Ethics of program engineering. Social values and norms scientific etos.
46. Engineering management, its structure and functions. A technocratic paradigm and a humanisation.
47. Philosophy and futurology. Philosophy and science XXI of a century.
48. Methodology of social forecasting and science role in the decision of global problems of the present. Priorities of modern philosophy and methodology of social forecasting.
49. Freud Z. Psihology of the unconscious.
50. Stepin V. S. Theoretical knowledge.
51. Broil L. Revolution in the physic.
52. Vernadsky V. I. Biosphere and a noosphere.
53. Lukashevich V. K. Bases of methodology of scientific researches.
54. Mitchem K. What such technics philosophy.
55. Modelling of difficult systems and virtual reality.
56. Mamford L. Mif of the car.
57. Prigozhin И, Stengers I. Order from chaos.
58. Uwarov L. V. Simvol in knowledge.
59. Natural sciences philosophy, retrospective sight.
60. Technics philosophy in Germany.
61. Xaken G. Sinergetika.
62. Loiko A. I. Course on technics philosophy.
63. Starzhinsky V. P. Gumanizatsija of an engineering education.
64. Berkov V. F. The general methodology of a science.
65. Bek U. What such globalisation.
66. Wallerstein I. Analiz of world systems and a situation in the modern world.
67. High technologies and modern civilisation.
68. Globalisation sides.
69. Kozlovsky P. Kultura of a postmodern.
70. Panarin A. S. Temptation globality.
71. Loiko A. I. Modernisation of activity.
72. Huntington S. Thri a wave. Democratisation in the end of the XX-th century.

Since 49 questions, preparation for candidate examination by post-graduate students it is carried out, competitors in the form of independent work with primary sources. Work with primary sources forms skill

of independent work with the scientific literature. It is necessary to prepare for such questions as follows. There is acquaintance with the primary source on following parametres. It is necessary to tell is short about the author of the primary source as the philosopher and методологе sciences. Then it is necessary to stop on the key theses spent by the author of work. In the end it is necessary to explain, how analyzed work has affected a modern science, administrative culture.

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