

“the author of the unique technology” of cognitive modeling” Vetrov Anatoly Nikolaevich  
www.vetrovan.(spb.)ru  
RF, Saint-Petersburg city

## THE APPLIED SCIENTIFIC RESEARCHES DIRECTION

“COGNITIVE MODELING IN THE NATURAL SCIENCES” (“NEN”)

OF “SIO "ACADEMY OF COGNITIVE NATURAL SCIENCES"” (PART 1)

The developed “The applied scientific researches direction “Cognitive modeling in the natural sciences”” (“NEN”) treats to the applied scientific researches divisions of “SIO "Academy of cognitive natural sciences"” (“SIO "ACNS"”) as the main component of the system of science and education of the modern country for the creation, distribution and use of the main and derivative scientific results of the cognitive modeling technology (CMT) (www.vetrovan.(spb.)ru) [see the applied scientific researches directions and departments of “SIO "ACNS"”]:

- 1) it is executed by the principle of “administrative-economy submission”;
- 2) works in the several main directions, which allow to provide the development of the applied main and derivative scientific results (my second report on SRW from 2006-2008(9) y. was submitted to “SPbSETU "LETI"” and “The Government of RF” for the translation, carrying out of int. action and receiving of “The Nobel prize”);
- 3) includes the several various main divisions:  
I. “The applied scientific researches department “Applications of (cognitive) informatics, cybernetics, automatics, computer engineering, data transmission and connection” (“SIC”) (\*) [*the applied scientific researches in the area “Applications of informatics (theory of information)”* – usage of theory of informatics (theory of information), usage of theory of organization of information work, usage of theory of documentary information sources, usage of theory of analytical-synthetical processing of the documentary information sources, usage of theory of information search, usage of theory of information service, usage of theory of the technical means of support of information processes, usage of theory of the cognitive modeling technology in the applications of informatics (theory of information);

*the applied scientific researches in the area “Applications of cognitive informatics” (\*)* – usage of theory of the modified stratified-step model of perception (psycho-physiology of perception), processing (cognitive psychology) and understanding (cognitive linguistics) of the information fragments content, usage of theory of the cognitive modeling technology in the technical, economic, physical-mathematical and other sciences, usage of theory of the parametrical cognitive models block for the system analysis of the information-educational environments (the cognitive models of the subject of training and the means of training), usage of theory of the parametrical cognitive models block for the financial analysis of the (credit) organizations and enterprises (the cognitive models for the vertical, horizontal and trend financial analysis of the managing subjects of the economic system), usage of theory of the parametrical cognitive models block for the complex analysis of the difficult objects, processes and phenomena, usage of theory of the ways of representation of the structure of the cognitive models and difficult problem environments: the formal classical of the 0<sup>th</sup> generation (the logical and production models), the nonformal classical of the 0<sup>th</sup> generation (the semantic network, the frame network and ontology), the formal new of the 0<sup>th</sup> generation (the calculus of theory of sets and corteges on domains and the innovative calculus of theory of sets and graphs), the nonformal new of the 0<sup>th</sup> generation (the multi-level structural scheme and the multi-level encapsulated pyramids combining theory of graphs and theory of sets), the flat of the 1<sup>st</sup> generation (the cognitive circle and the cognitive disc), the volumetric of the 1<sup>st</sup> generation (the cognitive cylinder, the cognitive cone and the cognitive sphere), the flat and volumetric of the 2<sup>nd</sup> generation (the one-, two-, three-, four-, five- and more cognitive circle, cognitive disc, cognitive cylinder, cognitive cone and cognitive sphere), the hybrid of the 3<sup>rd</sup> generation (the combinations of the existing cognitive models), usage of theory of the adaptive automation means of the information-educational environment (the basic and applied diagnostic module, the electronic textbook, the laboratory practical work, the electronic dean, the electronic library and others), usage of theory of the technical means of support of the adaptive information interaction (the adaptive representation of sequence of information fragments processor, the question-answers structures sequence processing processor, the linguistic processor and other processors), usage of theory of the technical means of support of the financial analysis (the automation means of formation of the working plan of accounts based on the normative-regulated plan of accounts of the accounting, the automation means of formation of the accounting balance and the report about profits and losses of the (credit) organization, the automation means of the vertical, horizontal and trend financial analysis based on the analytical coefficients system), usage of theory of the technical means of support of the complex analysis (the automation means of formation and research of the cognitive circle, cognitive disc, cognitive cylinder, cognitive cone, cognitive sphere, one-, two-, three-, fore-, five- and more cognitive sphere and others);

*the applied scientific researches in the area “Applications of cybernetics”* – usage of theory of automatic control systems, usage of theory of modeling, usage of theory of cybernetic control systems, usage of theory of information, usage of theory of artificial intelligence, usage of theory of final automatic-devices and formal languages, usage of theory of reliability of the objects, processes and systems, usage of theory of the system analysis of the objects, processes and phenomena, usage of theory of the cognitive modeling technology in the applications of cybernetics;

*the applied scientific researches in the area “Applications of automatics and computer engineering”* – usage of theory of automatic control, usage of theoretical bases of programming, usage of theory of computer engineering, usage of theory of elements, units and devices of automatics and computer engineering, usage of theory of input-output devices, usage of theory of memory devices, usage of theory of technology and equipment for the manufacture of the means of automatics and computer engineering, usage of theory of keyboard and calculating-tabulating machines, usage of theory of analog computers (APC), usage of theory of digital computers and computer complexes (DPC), usage of theory of analog-digital (hybrid) computers and computer complexes, usage of theory of computer centres (PCC), usage of theory of computer networks (PCN), usage of theory of software of computers, complexes and networks, usage of theory of automatic measurement, regulation and control systems, usage of theory of the systems of tele-control and tele-measurement, usage of theory of the automated control systems of technological processes (technological stages), usage of theory of the automated systems of organizational management, usage of theory of automation of designing and scientific researches, usage of theory of the cognitive modeling technology in the applications of automatics and computer engineering;

*the applied scientific researches in the area “Applications of data transmission and connection”* – usage of theory of data transmission and connection, usage of theory of designing and constructing of connection devices, usage of theory of technology and equipment for the assembly and adjustment of connection equipment, systems of data transmission, communication lines, multi-channel connection, networks and communication centres, services and facilities of connection, usage of theory of telegraph (cable) connection and equipment, usage of theory of the systems and equipment of data transmission, usage of theory of tele-information services and equipment, usage of theory of phone connection and equipment, usage of theory of the systems of transfer of moving images and sound, usage of theory of facsimile connection and equipment, usage of theory of radio-connection and radio-broadcasting, usage of theory of hyber-optic (LED) connection and equipment, usage of theory of television (TV), usage of theory of optical connection in the free space and equipment, usage of theory of post connection, usage of theory of the cognitive modeling technology in the applications of data transmission and connection].

II. "The applied scientific researches department "Applications of mathematics, mathematical physics, mechanics, metrology, astronomy, space researches, the complex system analysis based on the cognitive modeling technology and complex problems of natural sciences" ("SMMF") (\*)  
*[the applied scientific researches in the area "Applications of mathematics" –*  
 usage of theory of mathematical logic and applied bases of mathematics, usage of theory of numbers, usage of theory of algebra, usage of theory of topology, usage of theory of geometry, usage of theory of the mathematical analysis, usage of theory of the functions of valid variables, usage of theory of the functions of complex variables, usage of theory of ordinary differential equations, usage of theory of differential equations with private derivatives, usage of theory of integrated equations, usage of theory of mathematical models of natural and technical sciences, usage of theory of the equations of mathematical physics, usage of theory of variation calculation, usage of mathematical theory of optimum control, usage of theory of the functional analysis, usage of theory of calculating mathematics, usage of theory of probability and mathematical statistics, usage of theory of the combinatory analysis, usage of theory of graphs, usage of theory of mathematical cybernetics, usage of theory of the cognitive modeling technology in the applications of mathematics;  
*the applied scientific researches in the area "Applications of mathematical physics" (\*) –*  
 usage of theory of the general problems of mathematical physics, usage of theory of the mathematical models of physics of elementary particles, usage of theory of fields (united theory of field), usage of theory of the mathematical models of physics of high energies, usage of theory of nuclear physics, usage of theory of physics of gases and liquids, usage of theory of the mathematical models of thermo-dynamics and statistical physics, usage of theory of physics of firm bodies, usage of theory of physics of plasma, usage of theory of physics of atom and molecule, usage of theory of optics, usage of theory of physics of lasers, usage of theory of radio-physics, usage of theory of the mathematical models of physical bases of electronics, usage of theory of acoustics (theory of distribution of waves in the environment), usage of theory of the cognitive modeling technology in the applications of mathematical physics, usage of theory of the cognitive models of the interaction between the elementary particles and firm bodies, fields, liquids and gases, usage of theory of the cognitive model of the modified volumetric planetary model of atom n. a. Bohr N.H.D., usage of theory of the cognitive models of the temperature areas of plasma of atom and molecule, usage of theory of the cognitive model of the optical environment of eye, usage of theory of the cognitive model of the acoustical environment of ear, usage of theory of the cognitive model of the waves distribution in the environment;

*the applied scientific researches in the area “Applications of mechanics”* (\*) – usage of theory of the general tasks and methods of mechanics, usage of theory of mechanics of liquid and gas, usage of theory of mechanics of deformable firm body, usage of theory of the complex and special sections of mechanics, usage of theory of the cognitive modeling technology in the applications of mechanics, usage of theoretical bases of formation of the parametrical cognitive models block for the complex system analysis of the objects, processes and phenomena of mechanics, usage of theory of the ways of representation of the structure of the cognitive models and difficult problem environments (the formal and nonformal classical and new of the 0<sup>th</sup> generation, the flat and volumetric of the 1<sup>st</sup> generation and the 2<sup>nd</sup> generation and the hybrid of the 3<sup>rd</sup> generation), usage of theory of the adaptive automation means of research of the objects, processes and phenomena of mechanics, usage of theory of the technical means of support of research of the objects, processes and phenomena of mechanics, usage of theory of the technical means of support of the complex system analysis of the difficult objects, processes and phenomena of mechanics (the automation means of formation and research based on the cognitive circle, cognitive disc, cognitive cylinder, cognitive cone, cognitive sphere, one-, two-, three-, fore-, five- and more cognitive sphere and others);

*the applied scientific researches in the area “Applications of mechatronics (theory of hygroscope-building)”* – usage of theoretical bases, general tasks and methods of mechatronics, usage of theory of general mechatronics, usage of theory of mechatronics of liquid and gas, usage of theory of mechatronics of deformable firm body, usage of theory of the complex and special sections of mechatronics, usage of theory of the automation means and devices of mechatronics, usage of theory of the cognitive modeling technology in the applications of mechatronics (theory of hygroscope-building);

*the applied scientific researches in the area “Applications of metrology (theory of measurement)”* – usage of theory of the scientific bases and technical means of metrology and metrological support, usage of theory of the state, national and international systems and services of metrology, usage of theory of measurement of separate sizes and characteristics, usage of theory of standard samples of the structure and properties of substances and materials, usage of theory of the cognitive modeling technology in the applications of metrology (theory of measurement);

*the applied scientific researches in the area “Applications of astronomy”* (\*) – usage of theory of astronomy, usage of theory of heavenly mechanics, usage of theory of astrometry, usage of theory of astrophysics of The Solar system, The Sun, stars, fogs, interstellar environment and star systems, usage of theory of cosmology, usage of theory of observatories, tools, devices and methods of astronomical supervisions, usage of theory of the cognitive modeling technology in the applications of astronomy, usage of theory of the cognitive models of the relative positioning of 1, 2, 3, 4, 5 and more planets and satellites, The Earth, The Sun and others);

*the applied scientific researches in the area "Applications of space researches"* – usage of theory of the devices and methods of applied scientific researches of the space environment, usage of theory of planning and realization of starts of the space vehicles and artificial heavenly bodies, usage of theory of uncontrol movement of the space vehicles and artificial heavenly bodies, usage of theory of control of movement of the space vehicles and artificial heavenly bodies, usage of theory of space technics and technology, usage of theory of space safety and medical-biological problems of space flights, usage of theory of the usage of space systems for the connection and navigation, usage of theory of problems of development of extraterrestrial territories and prospects of astronautics, usage of theory of applied scientific researches of the astronomical objects by the space means, usage of theory of geo-physical applied scientific researches by the space means, usage of theory of research of The Earth from the space, usage of theory of the cognitive modeling technology in the applications of space researches;

*the applied scientific researches in the area "Applications of the complex system analysis" (\*)* – usage of theory of tendencies, dependences and laws of the complex system analysis of the objects, processes and phenomena, usage of theory of the cognitive modeling technology with dynamic cloning, verification and subverification, usage of theory of the iterative cycle and the technique of use of the cognitive modeling technology for the complex system analysis of the difficult objects, processes and phenomena, usage of theory of the parametrical cognitive models block for the complex system analysis and the increase of efficiency of functioning of the difficult objects, processes and phenomena, usage of theory of the structure of the cognitive models of the 0<sup>th</sup>, 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> generations, usage of theory of the ways of representation of the structure of the cognitive models and difficult problem environments (the formal and nonformal classical and new of the 0<sup>th</sup> generation, the flat and volumetric of the 1<sup>st</sup> generation and the 2<sup>nd</sup> generation and the hybrid of the 3<sup>rd</sup> generation), usage of theory of the algorithms of formation of the difficult cognitive models of the 0<sup>th</sup>, 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> generations, usage of theory of the techniques of research of parameters of the difficult cognitive models of the 0<sup>th</sup>, 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> generations, usage of theory of the algorithms of processing of a posteriori data of the complex system analysis of the problem spheres, usage of theory of software for the automation of research tasks, usage of theory of the statistical substantiation of practical use of the received results, usage of theory of the factors influencing to the efficiency of functioning of the difficult objects, processes and phenomena, usage of theory of organization and plan of carrying out of the experiment, usage of theory of research of the cognitive models parameters, usage of theory of preliminary processing of a posteriori results of diagnostics, usage of theory of choice of the statistical analysis methods of the generated data sets, usage of theory of the analysis of dynamics of the productivity of training, usage of theory of the dispersion, regression, discriminant, cluster analysis, multivariate scaling, factor analysis and bibliographic lists, usage of theory of the applied complex system analysis of the basic rocket engine, the first, the second, the third and the fourth rocket engine of the launch vehicle, the multivariate code device, the modified model of reduced eye for the research of acuity of vision, field of vision, color perception and other parameters in the Descartes space of 2 and 3 coordinates, the modified model of reduced ear for the research of absolute sensitivity and thresholds of sensitivity in the Descartes space of 2 and 3 coordinates, the chemical element with 1, 2, 3, 4, 5 and more nucleuses, the difficult multivariate hurricane];

The applied scientific researches directions and departments of "SIO "ACNS"" allow to develop the main and derivative scientific results of CMT.