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THE FUNDAMENTAL DEVELOPMENTS BRANCH
"COGNITIVE MODELING IN THE NANO-TECHNOLOGIES
AND INFORMATION TECHNOLOGIES" ("ONIT")
OF "SRI "SFA CMT" OF "RA(N)S" N. A. VENIAMINOV V.N."

The developed "The fundamental developments branch "Cognitive modeling in the nano-technologies and information technologies"" ("ONIT") treats to the fundamental developments divisions of "The scientific-research institute "System and financial analysis based on cognitive modeling technology" of "RA(N)S" named after Veniaminov V.N." ("SRI "SFA CMT" of "RA(N)S" n. a. Veniaminov V.N." – SRI) as the first SRI in the structure of "SIO "Academy of cognitive natural sciences"" ("SIO "ACNS"") and the add. 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 fundamental developments branches and departments of SRI]: 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 fundamental 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 fundamental developments department "Theory of electronics, radio-engineering and communication"" ("SVLTSEB") [*the fundamental developments in the area "Theoretical electronics and radio-engineering"* – theoretical bases of electronic technics, theory of radio-engineering, theory of the materials for electronics and radio-engineering, theory of technology and equipment for the electronic and radio-engineering manufacture, theory of designing and constructing of the electronic devices and radio-electronic equipment, theory of the electrical-vacuum and gas-discharge devices and units, theory of the accelerators of charged particles and plasma, theory of solid-state devices, theoretical bases of quantum electronics, theory of holography, theoretical bases of crio-electronics, theory of radio-electronic circuits, theory of the distribution of radio-waves, theory of antennas, theory of wave-transports, theory of the elements of over-high-frequency techniques, theory of the radio-transmission and radio-receiving devices, theory of the radio-engineering systems of sounding, location and navigation, theory of television (TV) technics, theory of record and reproduction of signals, theory of electrical-acoustics, theory of ultra-sonic and infra-sonic technics, theory of infra-red technics, theory of the units, details and elements of radio-electronic equipment, theory of the devices for the radio-engineering measurements, theory of the systems and units of display of the information, theory of the cognitive modeling technology in the theoretical electronics and radio-engineering;

***the fundamental developments in the area "Theoretical communication"*** – theory of communication, theory of designing and constructing of the devices of communication, theory of technology and equipment for the assembly and adjustment of the equipment of communication, the systems of transfer and the lines of communication, theory of the multi-channel communication, theory of the networks and centres of communication, theory of the services and facilities of communication, theory of the telegraph communication and equipment, theory of the systems and equipment of data transmission, theory of the tele-information services and equipment, theory of the telephone communication and equipment, theory of the systems of transfer of the moving images and sound, theory of the facsimile communication and equipment, theory of radio-communication and radio-broadcasting, theory of the light-guiding communication and equipment, theory of television (TV), theory of the optical communication in the free environment and equipment, theory of the post communication, theory of the cognitive modeling technology in the theoretical communication and terminal equipment of data transmission].

II. "The fundamental developments department "Theory of automatics, computer engineering and the system analysis based on the cognitive modeling technology"" ("SITA") (*) [***the fundamental developments in the area "Theoretical automatics and computer engineering"*** – theory of automatic control, theoretical bases of programming, theoretical bases of computer engineering, theory of the elements, units and devices of automatics and computer engineering, theory of the devices of input-output, theory of the memory devices, theory of technology and equipment for the manufacture of the means of automatics and computer engineering, theory of the keyboard and counting-perforating machines, theory of the analog calculating machines (ACM), theory of the digital calculating machines and calculating complexes (DCM), theory of the analog-digital (hybrid) calculating machines and calculating complexes, theory of calculating centres (CC), theory of calculating networks (CN), theory of the software of calculating machines, complexes and networks, theory of the systems of automatic measurement, regulation and control, theory of the systems of tele-control and tele-measurement, theory of the automated control systems of technological processes, theory of the automated systems of organizational management, theory of the automation of designing, theory of the automation of scientific researches, theory of the cognitive modeling technology in the theoretical automatics and computer engineering;

*the fundamental developments in the area "The theoretical system analysis" (*)* – theory of tendencies, dependences and laws of the system analysis of the objects, processes and phenomena, theory of the cognitive modeling technology with dynamic cloning, verification and subverification, theory of the iterative cycle and the technique of use of the cognitive modeling technology, theory of the parametrical cognitive models block for the system analysis of the information-educational environments and the increase of efficiency of functioning of the automated training system with the properties of adaptation based on the cognitive models (the cognitive models of the subject of training and the means of training), theory of the ways of representation of the structure of the cognitive models and problem environments: the formal classical of the $0^{th}$ generation (the logical and production models), the nonformal classical of the $0^{th}$ generation (the semantic network, the frame network and ontology), the formal new of the $0^{th}$ 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 $0^{th}$ generation (the multi-level structural scheme and the multi-level encapsulated pyramids combining theory of graphs and theory of sets), the flat of the $1^{st}$ generation (the cognitive circle and the cognitive disc), the volumetric of the $1^{st}$ generation (the cognitive cylinder, the cognitive cone and the cognitive sphere), the flat and volumetric of the $2^{nd}$ generation (the one-, two-, three-, four-, five- and more cognitive circle, cognitive disc, cognitive cylinder, cognitive cone and cognitive sphere), the hybrid of the $3^{rd}$ generation (the combinations of the existing cognitive models), theory of the algorithm of formation of the cognitive model structure, theory of the technique of research of the cognitive model parameters, theory of the algorithm of analysis of a posteriori results of research, 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), 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), theory of the statistical substantiation of practical use of the received results, theory of the factors influencing to the efficiency of knowledge formation in the information-educational environment and the efficiency of functioning of the objects, processes and phenomena, theory of organization and plan of carrying out of the experiment, theory of research of the cognitive models parameters, theory of preliminary processing of a posteriori results of diagnostics, theory of choice of the statistical analysis methods of the generated data sets, theory of the analysis of dynamics of the resultativity of objects, processes and phenomena, theory of the dispersion, regression, discriminant, cluster analysis, multidimensional scaling, factor analysis and bibliographic lists].

III. "The fundamental developments department "Theory of nano-technologies for the mechanical-engineering, instrument-making, polygraphy, reprography and photo-cinema-technics, the easy and food-processing industry, transport, architecture and construction"" ("SNT") (*)
[*the fundamental developments in the area "Theoretical nano-technologies for mechanical-engineering"* – theory of nano-technologies for the machine-science and details of machines, for the machine-building materials, for the technologies of mechanical-engineering, for the foundry manufacture, for the forge-stamp manufacture, for the assembly manufacture, for the cutting of materials, for the electrical-physical-chemical processing, for the thermal and strengthening powder materials, for the manufacture of nonmetallic products, for the machine-tool-construction, for the robotics, for the tool manufacture, for the mining mechanical-engineering, for the metallurgical mechanical-engineering, for the reactor-construction, for the turbine-construction, for the special power-engineering installations, for the chemical and oil mechanical-engineering, for the locomotive-construction and carriage-building, for the engine-construction, for the motor-car-industry, for the ship-building, for the aircraft-building, for the space technics and rocket-building, for the hoisting-transport mechanical-engineering (industry), for the building and road mechanical-engineering, for the municipal mechanical-engineering, for the tractor and agricultural mechanical-engineering, for the mechanical-engineering of light industry (by the kinds of production), for the polygraphic mechanical-engineering, for the mechanical-engineering of food-processing industry, for the mechanical-engineering of trade and public catering, for the household machines and devices, for the manufacture of weapon, for the other branches of mechanical-engineering, theory of the cognitive modeling technology in the theoretical nano-technologies for mechanical-engineering;
*the fundamental developments in the area "Theoretical nano-technologies for instrument-making"* – theory of nano-technologies for the theoretical bases of instrument-making, for the general technology of production and equipment in instrument-making, for the designing and constructing of devices, for the devices of measurement of the electrical and magnetic sizes, for the devices of measurement of the mechanical sizes, for the devices of measurement of the time and frequency, for the devices of measurement of the structure and physical-chemical properties of substances and materials, for the devices of heating-technical and heating-physical measurements, for the devices of measurement of the acoustical sizes and characteristics, for the devices of measurement of the optical and lighting-technical sizes and characteristics, for the devices of measurement of the ionization radiations, for the devices of non-destroying control of the products and materials, for the general structural elements, the units of measuring devices, the systems and means of office equipment, theory of the cognitive modeling technology in the theoretical nano-technologies for instrument-making;

*the fundamental developments in the area "Theoretical nano-technologies for polygraphy, reprography and photo-cinema-technics"* – theory of nano-technologies for polygraphy, reprography and photo-cinema-technics, theory of the cognitive modeling technology in the theoretical nano-technologies for polygraphy, reprography and photo-cinema-technics; *the fundamental developments in the area "Theoretical nano-technologies for light industry"* – theory of nano-technologies for the textile industry, for the knitted industry, for the clothing industry, for the tanning industry, for the fur industry, for the industry of artificial leather and film materials, for the shoe industry, for the leather-haberdashery industry, for the bristle-brush manufacture, for the manufacture of furniture, theory of the cognitive modeling technology in the theoretical nano-technologies for light industry; *the fundamental developments in the area "Theoretical nano-technologies for food-processing industry"* – theory of nano-technologies for the food raw materials and auxiliary materials, for the processes and devices of food manufactures, for the (grain-)elevator and flour(-grinding)-sereals(croup) industry, for the mixed-fodder industry, for the baking of bread and macaroni industry, for the confectionery industry, for the sugar industry, for the starched-treacle industry, for the barmy industry, for the brewing industry, for the spirituous industry, for the industry of high-alcohol drinks, for the wine-making (vinous) industry, for the industry of without-alcohol (soft) drinks, for the canning, vegetable-drying and food-concentrate industry, for the food-gustatory industry, for the tobacco industry, for the meat and bird-fancier-processing industry, for the manufacture of eggs and egg products, for the dairy (milk) industry, for the butter-fatty (creamery) industry, theory of the cognitive modeling technology in the theoretical nano-technologies for food-processing industry; *the fundamental developments in the area "Theoretical nano-technologies for transport"* – theory of nano-technologies for the railway transport, for the motor-car transport, for the water transport, for the air transport, for the pipeline transport, for the industrial transport, for the urban (municipal) transport, for the interaction of the different kinds (types) of transport, for the mixed transportations, for the other kinds (types) of transport, theory of the cognitive modeling technology in the theoretical nano-technologies for transport;

*the fundamental developments in the area* ***"Theoretical nano-technologies for architecture and construction" (\*)*** – the engineering-theoretical bases of construction, architecture, building materials, products and building constructions, theory of technology of building-installation works, theory of technology of production of the building materials and products, machines, mechanisms, equipment and tool, used in the construction and industry of building materials, theory of engineering researches in construction, theory of architectural-building designing, theory of district lay-out, theory of town-planning, theory of the objects of construction and engineering support of the objects of construction, theory of tendencies, dependences and laws in architecture and construction, theory of the cognitive modeling technology with dynamic cloning, verification and subverification, theory of the iterative cycle and the technique of use of the cognitive modeling technology, theory of the parametrical cognitive models block for architecture and construction (the buildings and constructions based on the cognitive circle, cognitive disc, cognitive cylinder, cognitive cone and cognitive sphere), theoretical bases of formation of the parametrical cognitive models block, theory of the ways of representation of the structure of the cognitive models and problem environments (the formal and nonformal classical and new of $0^{th}$ generation, the flat and volumetric of the $1^{st}$ generation and $2^{nd}$ generation and the hybrid of the $3^{rd}$ generation), theory of the algorithm of formation of the cognitive model structure, theory of the technique of research of the cognitive model parameters, theory of the algorithm of analysis of a posteriori results of research, theory of the adaptive automation means of architecture and construction (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), theory of the statistical substantiation of practical use of the received results, theory of the factors influencing to the efficiency of construction of the buildings and constructions, theory of organization and plan of carrying out of the experiment, theory of the research of parameters of the parametrical cognitive models block, theory of preliminary processing of a posteriori results of diagnostics, theory of choice of the statistical analysis methods of the generated data sets, theory of the analysis of dynamics of the resultativity of construction, theory of the dispersion, regression, discriminant, cluster analysis, multidimensional scaling, factor analysis and bibliographic lists].

The fundamental developments branches and departments of SRI allow to develop the main and derivative scientific results of CMT.