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THE FUNDAMENTAL SCIENTIFIC RESEARCHES BRANCH
“THEORY OF MATHEMATICS AND MATHEMATICAL TECHNOLOGIES IN MEDICINE” (“TMATH AND MATHT IN M”)
OF “SEC "SFA CMT" OF "RA(M)S" N. A. ACAD. BURDENKO N.N.”

The developed “The fundamental scientific researches branch "Theory of mathematics and mathematical technologies in medicine"” (“TMATH and MATHT in M”) treats to the fundamental scientific researches divisions of “The scientific-educational centre "System and financial analysis based on cognitive modeling technology" of "RA(M)S" named after acad. Burdenko N.N.” (“SEC "SFA CMT" of "RA(M)S" n. a. acad. Burdenko N.N.” – SEC) as the first SEC in the structure of “SIO "Academy of cognitive natural sciences"” (“SIO "ACNS"”) as 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 scientific researches branches and departments of SEC]:
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 scientific researches department "Theory of medical mathematics and the complex system analysis based on the cognitive modeling technology"” (“TMMATH and DSAB on CMT”) (*) [***the fundamental scientific researches in the area “Theoretical medical mathematics” (*)*** – the theoretical bases of medical mathematics, general questions of theoretical medical mathematics, theory of mathematical logic and theoretical bases of mathematics in medicine, theory of numbers in medicine, theory of medical algebra, theory of medical topology, theory of medical geometry, theory of the mathematical analysis in medicine, theory of the functions of valid variables in medicine, theory of the functions of complex variables in medicine, theory of ordinary differential equations in medicine, theory of differential equations with the private derivatives in medicine, theory of integrated equations in medicine, theory of mathematical models of the objects, processes and phenomena of natural sciences and technical sciences in medicine, theory of the equations of mathematical physics in medicine, theory of variation calculus in medicine, the mathematical theory of optimal control in medicine, theory of the functional analysis in medicine, theory of calculus mathematics in medicine, theory of probability and mathematical statistics in medicine, theory of the combinatory analysis in medicine, theory of graphs in medicine, theory of mathematical cybernetics in medicine, theory of the ways of representation of the cognitive models and problem environments in medicine, theory of the parametrical cognitive models block in medicine and the cognitive modeling technology in the theoretical medical mathematics;

the fundamental scientific researches in the area "Theoretical complex system analysis in medicine" (*) – the theoretical bases of the complex system analysis in medicine, general questions of the theoretical complex system analysis in medicine, theory of tendencies, dependences and regularities of the complex system analysis of the objects, processes and phenomena in medicine, theory of the cognitive modeling technology with the dynamic cloning, verification and subverification in medicine, theory of the iterative cycle of the cognitive modeling technology in medicine, theory of the technique of use of the cognitive modeling technology for the complex system analysis of the difficult objects, processes and phenomena in medicine, theory of the parametrical cognitive models block for the complex system analysis and the increase of functioning efficiency of the difficult objects, processes and phenomena in medicine, theory of the structure of the cognitive model of the 0^{th}, 1^{st}, 2^{nd} and 3^{rd} generation in medicine, theory of the ways of representation of the structure of the cognitive models and problem environments in medicine: the formal classical of the 0^{th} generation (the logical and production models), the non-formal 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 non-formal 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 algorithms of formation of the structure of the difficult cognitive models of the 0^{th}, 1^{st}, 2^{nd} and 3^{rd} generations in medicine, theory of techniques of research of parameters of the difficult cognitive models of the 0^{th}, 1^{st}, 2^{nd} and 3^{rd} generations in medicine, theory of algorithms of processing of a posteriori data of the complex system analysis of the problem spheres in medicine, theory of software for the automation of the tasks of research in medicine, theory of the statistical substantiation of practical use of the received results in medicine, theory of factors influencing on the efficiency of functioning of the difficult objects, processes and phenomena in medicine, theory of organization and plan of carrying out of the experiment in medicine, theory of research of the parameters of the cognitive models in medicine, theory of preliminary processing of a posteriori results of diagnostics in medicine, theory of choice of the methods of the statistical analysis of the formed data sets in medicine, theory of the analysis of dynamics of the resultativity of training in medicine, theory of the dispersion, regression, discriminant, cluster analysis, multidimensional scaling, factorial analysis and bibliographic lists in medicine, theory of the complex system analysis of the modificated model of reduced eye for the research of acuity of vision, field of vision, color-perception in Descartes space of the 2 and 3 coordinates and the cognitive modeling technology in the theoretical complex system analysis in medicine].

II. “The fundamental scientific researches department "Theory of medical cybernetics and (cognitive) informatics"” (“TMCYB and (CONG)INF”) (*)

[***the fundamental scientific researches in the area “Theoretical medical cybernetics”*** – the theoretical bases of medical cybernetics, theory of the automatic control systems in medicine, theory of modeling in medicine, theory of the cybernetic control systems in medicine, theory of information in medicine, theory of artificial intelligence in medicine, the applied theory of discrete (finite) automats and formal languages in medicine, the applied theory of reliability in medicine, theory of the applied system analysis in medicine and the cognitive modeling technology in the theoretical medical cybernetics; ***the fundamental scientific researches in the area “Theoretical medical informatics”*** – the theoretical bases of medical informatics, theory of medical informatics, theory of the organization of information activity in medicine, theory of the documentary sources of information in medicine, theory of analytic-synthetic processing of the documentary sources of information in medicine, theory of information search in medicine, theory of information service in medicine, theory of the technical means of support of the information processes in medicine and the cognitive modeling technology in the theoretical medical informatics; ***the fundamental scientific researches in the area “Theoretical medical cognitive informatics” (*)*** – the theoretical bases of medical cognitive informatics, theory of the layer-step model of perception (psycho-physiology of perception), processing (cognitive psychology) and understanding (applied linguistics) of the content of information fragments in medicine, the theoretical bases of the parametrical cognitive models block for the system analysis of the information-educational environments in medicine (the cognitive models of the subject of training and the means of training), the theoretical bases of the parametric cognitive models block for the financial analysis of the (credit) organizations in medicine (the cognitive models for the vertical, horizontal and trend financial analysis), the theoretical bases of formation of the parametrical cognitive models block in medicine, theory of the structure of the cognitive model of the 0^{th}, 1^{st}, 2^{nd} and 3^{rd} generation in medicine,

theory of the ways of representation of the structure of the cognitive models and problem environments in medicine: the formal classical of the 0th generation (the logical and production models), the non-formal classical of the 0th generation (the semantic network, the frame network and ontology), the formal new of the 0th generation (the calculus of theory of sets and corteges on domains and the innovative calculus of theory of sets and graphs), the non-formal new of the 0th generation (the multi-level structural scheme and the multi-level encapsulated pyramids combining theory of graphs and theory of sets), the flat of the 1st generation (the cognitive circle and the cognitive disc), the volumetric of the 1st generation (the cognitive cylinder, the cognitive cone and the cognitive sphere), the flat and volumetric of the 2nd generation (the one-, two-, three-, four-, five- and more cognitive circle, cognitive disc, cognitive cylinder, cognitive cone and cognitive sphere), the hybrid of the 3rd generation (the combinations of the existing cognitive models), theory of the algorithms of formation of the structure of the difficult cognitive models of the 0th, 1st, 2nd and 3rd generations in medicine, theory of the techniques of research of the parameters of the difficult cognitive models of the 0th, 1st, 2nd and 3rd generations in medicine, theory of the adaptive automation means of the information-educational environment in medicine (the basic and applied diagnostic module, the electronic textbook, the laboratory practical work, the electronic dean's office, the electronic library and others), theory of the technical means of support of the adaptive information interaction in medicine (the adaptive representation of sequence of information fragments processor, the question-answers structures sequence processing processor, the linguistic processor and others), theory of the technical means of support of the financial analysis in medicine (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 organization, the automation means of the vertical financial analysis of the organization, the automation means of the horizontal financial analysis of the organization, the automation means of the trend financial analysis of the organization, based on the analytical coefficients system), theory of the technical means of support of the complex analysis in medicine (the automation means of formation and research of the cognitive circle, the automation means of formation and research of the cognitive disc, the automation means of formation and research of the cognitive cylinder, the automation means of formation and research of the cognitive cone, the automation means of formation and research of the cognitive sphere, the automation means of formation and research of the one-, two-, three-, fore-, five- and more cognitive sphere and others) and the cognitive modeling technology in the theoretical medical cognitive informatics].

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