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*Materials of Conferences***WORLD UNIVERSITY RANKINGS 2011/2012
(CONCERNING EDUCATIONAL QUALITY)**

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Educational quality is the urgent and extensively discussed problem. The current Russian educational state standard based on ISO 9000 doesn't include any management system requirements. However, a lot of it's articles can be used at universities. One of the most important exponents of educational quality at the university is a spot it assumes in the authoritative world rankings. Various aspects taken into account in them have an influence upon developing of university's strategy. Accreditation agencies that work out flexible performance criteria of educational quality are of inestimable value in this process. Reasonable aims, resources and developmental potency of university are appreciated. It's very prestigious for a university to fall in an authoritative rating, such as the QS World University Ranking and the THE World University Rankings. There are six US and four British universities in the top 10 in 2011.

Table 1

The QS World University
Ranking 2011/2012 Top 10 Universities

Rank	Institution	Country	Score
1	University of Cambridge	United Kingdom	100,0
2	Harvard University	United States	99,3
3	Massachusetts Institute of Technology (MIT)	United States	99,2
4	Yale University	United States	98,8
5	University of Oxford	United Kingdom	98,0
6	Imperial College London	United Kingdom	97,6
7	UCL (University College London)	United Kingdom	97,3
8	University of Chicago	United States	96,1
9	University of Pennsylvania	United States	95,7
10	Columbia University	United States	95,3

Two leading Russian universities Lomonosov Moscow State University and St. Petersburg State

University didn't fall in the top 100 and assume № 112 and 251 spots respectively.

Table 2

Point scale

Number	Indicator	Points (%)
1	ACADEMIC REPUTATION	40
2	EMPLOYER REPUTATION	10
3	CITATIONS PER FACULTY	20
4	FACULTY STUDENT Ratio	20
5	Proportion of INTERNATIONAL STUDENTS	5
6	Proportion of INTERNATIONAL FACULTY	5
7	Total	100

According to this table it is possible to contest the statement of the rector of Moscow State University Victor Sadovnichiy that educational quality isn't taken into account in world university ratings.

Asian universities assumed high spots in the QS World University Ranking 2011/2012: 17 of them fell in the top 100.

Table 3

Asia in the 2011/2012 QS World University
Ranking Top 100

Rank	Institution	Country	Score
22	University of Hong Kong	Hong Kong	87,0
25	The University of Tokyo	Japan	85,9
28	National University of Singapore (NUS)	Singapore	84,1
32	Kyoto University	Japan	82,9
37	The Chinese University of Hong Kong	Hong Kong	79,5
40	The Hong Kong University of Science and Technology	Hong Kong	79,1
42	Seoul National University	Korea, South	78,7
45	Osaka University	Japan	77,5
46	Peking University	China	77,4
47	Tsinghua University	China	76,3
57	Tokyo Institute of Technology	Japan	72,7
58	Nanyang Technological University (NTU)	Singapore	72,5
70	Tohoku University	Japan	69,7
80	Nagoya University	Japan	68,0
90	KAIST – Korea Advanced Institute of Science & Technology	Korea, South	66,0
91	Fudan University	China	65,7
98	Pohang University of Science And Technology (POSTECH)	Korea, South	65,1

Table 4
Regions in the 2011/2012 QS World University Ranking Top 100

Number	Region	Number of Universities
1	Europe	38
2	North America	36
3	Asia	17
4	Australia and New Zealand	9

English-speaking countries have an advantage because most of research papers that catch the eye of experts are published in English.

Table 5
Countries in the 2011/2012 QS World University Ranking Top 100

Number	Country	Number of Universities
1	United States	32
2	United Kingdom	19
3	Australia	8
4	Japan	6
5	Canada, Germany	4 each
6	China, Hong Kong, Netherlands, South Korea, Switzerland	3 each
7	Denmark, France, Singapore, Sweden	2 each
8	Belgium, Finland, Ireland, New Zealand	1 each

Another authoritative rating the THE World University Rankings is compiled by Thomson Reuters jointly with Times Higher Education that is hairy in the educational scope. All the indicators are combined into 5 groups there. These indicators are: academic reputation (worth 40% of the point score used to determine a university's rank), employer reputation (10%), faculty student ratio (20%), citations per faculty (20%), the number of international faculty members (5%), and the number of international students (5%).

Table 6
The THE World University Rankings 2011/2012 Top 10 Universities

World Rank	Institution	Country/Region	Overall Score
1	California Institute of Technology	United States	94,8
2	Harvard University	United States	93,9
3	Stanford University	United States	93,9
4	University of Oxford	United Kingdom	93,6

World Rank	Institution	Country/Region	Overall Score
5	Princeton University	United States	92,9
6	University of Cambridge	United Kingdom	92,4
7	Massachusetts Institute of Technology	United States	92,3
8	Imperial College London	United Kingdom	90,7
9	University of Chicago	United States	90,2
10	University of California Berkeley	United States	89,8

There are 7 US universities in the Top 10. American universities also prevail in the Top 100.

Table 7
Regions in the 2011/2012 THE World University Rankings Top 100

Number	Region	Number of Universities
1	North America	56
2	Europe	31
3	Asia	9
4	Australia and New Zealand	4

Table 8
Countries in the 2011/2012 THE World University Rankings Top 100

Number	Country	Number of Universities
1	United States	51
2	United Kingdom	12
3	Canada	5
4	Australia, Germany, Netherlands	4 each
5	France, Sweden, Switzerland	3 each
6	China, Hong Kong, Japan, South Korea	2 each
7	Belgium, Singapore, Finland	1 each

There are no Russian universities in the top 100 again, although Lomonosov Moscow State University assumed №35 spot in this ranking last year. In some analysts' judgment, one of the main reasons of this is the lack of prerequisites to the development and use of human capital, especially in the economy.

Language barrier traditionally remains the weak point of Russian university, consequently most of research works are ignored by the foreign experts. However, it concerns the universities of some non-English speaking countries, for example, France. Another reasons are the low percentage of foreign students and disadvantages of point system.

In the authoritative world university rankings Russia is inferior to not only such leaders as the UK and the US, but also to the Asian countries that were not regarded as competitors a couple of decades ago, for example, China, Hong Kong, Singapore and Taiwan.

The experts think that Russian universities will unlikely assume higher positions in World University Rankings in the near future.

Although some people complain of the imperfection of rankings, in practice Russian graduates enjoy the employers' confidence. It's very important because this problem concerns not only the respect for any university, but also national prestige.

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HISTORICAL ASPECT OF PROCESS OF INTEGRATION OF SUBJECTS AT MODERN SCHOOL

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Development of pedagogical idea of process of integration is influenced essentially by progress of scientific knowledge. Integration is close, connected with differentiation. These processes are reflected in construction of system of subjects and search of ways of generalization of knowledge of pupils. «Integration – is process of rapprochement and communication of the sciences, occurring along with differentiation processes. Integration process represents the high form of an embodiment of inter-subject communications at qualitatively new step of training».

Proceeding from the aforesaid, it is possible to notice that roots of process of integration lie far back in the past classical pedagogies and are connected with idea of inter subject communications. At the heart of the idea of inter-subject communications was born during search of ways of reflection of integrity of the nature in the teaching material maintenance. Great didactic Jan Amos Komensky underlined: «Everything that is in an interconnection, should be taught in the same communication». To idea of inter-subject communications many teachers address later, developing and generalizing it. So, at D. Lock the idea is interfaced to definition of the maintenance of formation in which one subject should be filled with elements and the facts of another. I.G. Pestalotcii on the big didactic material has opened variety of interrelations of subjects. It started with the requirement: «Result in the consciousness connected subjects all in essence among themselves in that communication in which they really are in the nature». Pestalotcii marked special

danger of a separation of one subject from another. In classical pedagogies the fullest psychology-pedagogical substantiation about the didactic importance of inter-subject communications was given by Konstantin Dmitrievich Ushinsky. He considered that «knowledge and ideas informed, any, sciences should be under construction integrally in light and whenever possible, an extensive sight at the world and his life».

On a boundary XIX and XX centuries the idea of integration gets leading character The outstanding reformer of formation of J. Dewey, having proclaimed the child the Sun, the center of the pedagogical Universe, has put forward also a new principle of construction of curriculums: «From the child – to the world and from the world – to the child». The Kazakhstan scientist A.A. Bejsenbaeva proves a complex of signs and functions of inter-subject communications:

- * the basic signs of inter-subject communications as major means of formation of informative interest at schoolboys are integrative, selectivity, variability;

- * inter-subject communications is rather steady pedagogical phenomenon of the organization and interaction of elements in which result new qualities are shown, such personal quality, as informative interest is born certain new whole, in particular;

- * as a part of whole inter-subject communications carry out set of functions, such, as: educational, developing, bringing up, constructive.

Educational function of inter-subject communications consists that with their help of the teacher-subjects such qualities of knowledge of pupils, as systems, depth, sensibleness and flexibility form. Inter-subject communications here act as means of development of the general scientific concepts, promoting mastering of communications between the general natural-science and humanitarian concepts. In the Kazakhstan pedagogics the special importance from positions of our research get think of M. Zhumabaeva, concerning problems of inter-subject communications. The scientist in the textbook «Pedagogics» for the first time published in the Kazakh language in 1923 puts forward a principle of inter-subject communications on which, in M. Zhumabaeva's fair opinion, any teacher should lean at giving of new knowledge by the pupil. Now the great attention in the course of the training and formation organization again is given to an integration problem. However, judging by the aforesaid, integration as the phenomenon has appeared, first of all, in the Big science, in fundamental and its applied branches. And now integration at modern school is understood as one of directions of active searches of the new pedagogical decisions promoting improvement of affairs in it, to development of creative potentials of pedagogical collectives and separate teachers for the purpose of more effective and reasonable influence on pupils.

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INTEGRATION OF SUBJECTS AT MODERN SCHOOL AS THE PEDAGOGICAL PHENOMENON

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Integration as the pedagogical phenomenon has old traditions. First of all some school subjects have integrative character. In what the integration essence consists in training? With reference to system of training «integration» as the concept can accept two values: first, this creation at schoolboys of complete representation about world around (here integration is considered as the training purpose); secondly, this finding of the general platform of rapprochement of subject knowledge (here integration – a tutorial). Integration of subjects at modern school – one of directions of active searches of the new pedagogical decisions promoting improvement of affairs in it, to development of creative potentials of pedagogical collectives and separate teachers for the purpose of more effective influence on pupils. Integration as the phenomenon has appeared, first of all in “the big” science, in fundamental and its applied branches. Thus, integration between subjects doesn't deny subject system. It is a possible way its perfection, overcoming of lacks and is directed on deepening of interrelations and interdependence between subjects. The problem of a pedagogical science – to help the teacher to carry out the integration directed on restoration and association of separate elements and parts of different subjects in a single whole at uniformity of the purposes and functions of training. Long-term supervision show that pupils of initial classes, and later graduates of high school, having received preparation in those or other subjects, find it difficult to apply «private» knowledge, abilities at studying of other subjects in practice. They have not enough independence of thinking, ability to transfer the received knowledge in similar or other situations. All it occurs because of mutual inconsistency of employment on various subjects of elementary school. Integration at mod-

ern school goes in several directions and at different levels. We will note these levels:

- The intrasubject;
- The intersubject.

Now various ways of integration are used. It is first of all association of several subject matters in a uniform subject. Also it is necessary to mean that various ways of realization of integration can't be abstractly good or bad. A problem essence in to rejecting one of them and to apply another, and to enter system of integration measures taking into account age features of pupils of all educational levels. Introduction of such system which is not rejecting differentiation in training, and supplementing it, can, to be in a greater degree, than traditional subject training, to promote education of widely erudite young man possessing complete outlook, ability independently to systematize knowledge available for it and non-conventionally to approach to the decision of various problems. Creation at the schoolboy of complete representation about world around is considered as the training purpose. Integration as the purpose should give to the pupil the same knowledge which reflects coherence of separate parts of the world as systems, to teach the child to represent from the training first steps the world as a unit in which all elements are interconnected. Realization of this purpose should begin already at elementary school. Integration also – means of reception of new representations for a joint of traditional subject knowledge. Integration at elementary school has quantitative character, i.e. «it is a little about all» and it means that children receive all new and new representations about, concepts, regularly supplementing and expanding a circle of already available knowledge. Ability to synthesis of isolated knowledge and abilities is for this purpose necessary. As a result of training necessity, to know «all about the little» and it already specializes at new integration level acts. Finally, integration should promote reunion of integrity of attitude – unities of the world and the person living in it and its learning, unity of the earth and space, the nature and the person. The general-humanistic basis of process – statement in the center of the modern person, with its place and a role in the natural and social environment here takes place.

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MAINTENANCE OF EDUCATION COMPETITIVENESS BY MEANS OF IMPLEMENTATION OF QUALITY MANAGEMENT SYSTEM

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Alternative to development of the modern industrial civilization is transition to the sustainable development, which has proclaimed a principle of equal possibilities for all future generations. Such transition means basic change of the established forms of relations between modern people and environment, management of social development [2].

In the concept of steady society there is a convergence of values and ways of a life. «If our present system will not be corrected by recognition of the general interests, which should be preferred before private interests – J. Soros writes, – so this system, in spite of all imperfections, appropriate to requirements of open society – risks to collapse» [3, p. 9].

Instability is stretched far beyond the market, generated destructive passions and struggle. Rationalism ceases to be effective too, and instead of it, fallibility principle is offered to be guided. As a result, «... instead of usual dichotomy between the open and closed society, I see, – J. Soros says, – the open society somewhere in intermediate territory, where the human rights are protected, but thus there are definite common values, which provide integrity of a society ...» [4, p. 24].

What is the definition of sustainable development? One of most often used definitions especially marks economic aspects, defining it as the economic development, capable to satisfy need of present generation, not depriving the future generations of ability to satisfaction of their own needs [5].

The sustainable development of human society is determined by external (environment, influence), material, ecological, social, economic, legal, cultural, political and psychological parameters, each of them demands steadfast attention. One of such directions is research of conditions and factors of education system competitiveness.

Nowadays there is active integration of Russia in the world community, including entering to the world educational space. The international activity of the leading universities of the country is defined by level of cooperation with foreign countries in the field of scientific and educational activity. The question of recognition of Russian education quality abroad becomes actual.

The present stage of Russian education reforming is characterized by the following processes, closely interconnected among themselves:

– a wide circulation in universities of the country of researches on creation, introduction and certification of interuniversity quality management systems, according to requirements and recommendations of the international standards of qual-

ity management of series ISO 9001:2000 (SSS P ISO 9001-2001), standards and instructions for the higher education quality assurance in the European region (ENQA) and other models of quality management;

– transition to the complex estimation of university activity, combining procedures of licensing, certification and state accreditation on the base of the confirmed list of university activity indicators, including, in particular, indicators of presence and efficiency of interuniversity systems of education quality management;

– strengthening of competition between domestic universities on the labor resource market;

– education internationalization and necessity of Russian education harmonization, including criteria of its quality with other education systems (within the bounds of the Bologna declaration) with the purpose of attraction of additional internal consumers and transition to the international educational space [1, p. 54-61].

In Omsk institute (branch) of the Russian state university of trade and economy (RSUTE) quality management system (QMS) is developed and implemented in 2006. Within the bounds of the given system and according to the development concept of Omsk institute (branch) of RSUTE till 2015, methods of planning and control, the organization and motivation of management processes of scientifically-innovative activity on the basis of target programs and monitoring of structural divisions activity with use of the developed estimated criteria are developed and realized .

Council of Omsk institute (branch) of RSUTE regularly analyzes the activity of structural divisions and, if necessary, actualizes target indicators of activity within the bounds of target programs realization.

QMS of Omsk institute (branch) of RSUTE is certificated on equivalence to requirements of international standard ISO 9001:2008 by Association on certification «the Russian Register». Innovative activity also is included in range of application.

In its activity the institute bases on staff official instructions , documented procedures, quality manual, where all processes of university activity in whole (supplement K) and each structural division and its activity process are determined. All above is developed by education quality management department.

Annually staff of education quality management department participates in the conference devoted to «International day of quality», organized by the Omsk centre of standardization, metrology and certification. The Omsk institute (branch) of RSUTE participated three times in the competitive program «100 best goods of Russia» in nomination «Services in higher education system». In 2011 within the bounds of the competitive program «100 best goods of Russia» the institute became the winner of regional competition in nomination

«Teaching aid» with the «Quality management». In 2008 the Omsk institute (branch) of RSUTE was awarded by reward «High achiever of quality» by Academy of quality problems. In April of 2010 the institute became the winner of 1st Russian competition in the field of quality management. In May of 2010 the self-estimation of Omsk institute (branch) of RSUTE was done. Its realization allowed to comprehensively estimate the state of quality management system, to determine its weakness and strength, and also identify the processes of institute, requiring to improvement.

As the technique of self-estimation «Methodical recommendations for universities and colleges on organization of self-estimation of efficiency and functioning of management systems in the field of quality management on the basis of model of activity perfection» were accepted, which were developed by St.-Petersburg State Electro-technical university (SPSETU).

The self-estimation revealed, that functioning efficiency of QMS of Omsk institute (branch) of RSUTE has enough high level of development. First of all, it concerns such fields of activity, as «The leading role of management» (7,9 points), and also «Policy and strategy» (7,9 points).

The system of interuniversity maintenance of specialists quality training represents the sum of factors (components) of quality, indicators of the quality estimation and their criterion values, realization terms of educational programs and the mechanism of control, creation and fulfillment of them, also university structural divisions, co-operating with each other in the process of specialists training. The whole system of quality maintenance and its components could be effective on the stipulation, that combination of accurate planning and obligatory fulfillment of their functions by institute corresponding structural divisions. The staff must fulfill its job responsibilities under the constant control; establishment of the obligatory feedback allows operatively correct the system.

For concretization of policy in the field of quality and definition of its level fulfillment Omsk institute (branch) of RSUTE formulated Mission and determined specific aims in the field of quality, which reflected in development strategy. Development strategy of Omsk institute (branch) of RSUTE is based on realization of the concept, that university is training, scientific and innovative complex. The university, on the one hand, trains specialists of new generation for the brain work market, and, on the other hand, it becomes the full subject of market economy as the developer, supplier of intellectual property objects, production and services with the new quality, demanded by consumers. Thus, the Omsk institute (branch) of RSUTE is considered as one of the components of innovative sector of region economy.

Within the bounds of the international cooperation concerning education quality management and

perfection of the educational process organization, the Omsk institute (branch) of RSUTE co-operates with the Czech university of Pardubitsy, Mediterranean university (Montenegro), Huddersfield university in England, Montclair State University in the USA, the French resource centre (branch of Omsk), the international department of cooperation and the academic mobility in Omsk state pedagogical university. It takes part in the international assembly, dealing with problems of ecology and world economic development in Hungary. The management of Omsk institute (branch) of RSUTE was signed the Memorandum of cooperation in the field of science and education with the East Kazakhstan regional university.

The mutual exchange of experience helps the institute to successfully adapt to educational space on the terms of world globalization. So, concrete results of participation in following projects are reached:

- the International project with participation of Czech Republic, the Great Britain, Russia (Omsk institute of RSUTE) for project «Influence of ecological and demographic factors on stability of social and economic development of Russian region (for example, Southwest Siberia)».

- the International competition of minigrants in social sphere «Management of migration processes», holding by the British consulate in Yekaterinburg.

- the International project in the field of economy «Free Malsev algebra on three generators».

- the International student's program «SIFE Russia» (Students in Free Enterprise).

- the Memorandum of cooperation in the field of science and education with East Kazakhstan regional university.

The university carries out import-export of educational services. Lecturers from the far abroad under separate contracts are involved in realization of educational process, lecturers of Omsk institute (branch) of RSUTE go abroad for lecturing and working on probation.

The quality management system urged to solve problems of increase of university competitiveness. Components of university competitiveness (financial and economic, marketing, material, personnel, graduates competitiveness) are main development guidelines, supposing level decomposition, provided with long-term and short-term programs.

Just competitiveness is the base factor, focusing pedagogical collective of institute on innovative search and constant development.

Quality of education is the integrated characteristic, concerning all university activity cycle, including projecting, realization and control of educational process, infrastructural maintenance (on the basis of info-communicational technologies), and also university self-estimation. Such practical understanding of education quality demands special technologies of monitoring, which is the important

instrument of control and estimation of efficiency of the implemented education content, increasing of university management efficiency, perfection of education processes. Objects of monitoring are both separate university divisions, and various processes of management and education levels, certain aspects of activity (for example, pedagogical and psychological monitoring; monitoring of students training quality, pedagogical staff quality, educational process, material and technical base, etc.).

Quality of education at the present stage is the main competitive advantage of educational institutions along with the price.

Quality of education is closely connected with normative legal indicators (presence of the license and the state accreditation of professional educational programs, conformity of curricula to federal state educational standards etc.), strict observance of which is necessary term of university educational activity. Implementation of innovative forms of training becomes one of main factors of university competitiveness in recent times.

In Omsk institute (branch) of RSUTE active nonconventional methods of training (game technologies, trainings, master classes, problem situations, colloquiums, training on the enterprises, computer programs, etc.) are used. For lecturing of the basic educational programs disciplines representatives of business sphere and practicing lectors are involved.

Annually the department of education management quality in Omsk institute (branch) of RSUTE holds questioning «the lector by students eyes».

The purpose of the given questioning was revealing of satisfaction degree of lecturing and practical training by students of 2–4 courses. For questioning of students the questionnaire, containing questions, directing on various aspects of training activity, and also questions, mentioning personal qualities of lectors is developed. As a result of processing of the received questionnaires, data about students satisfaction by the teaching staff both in whole, and separately by each specialty and lector is revealed.

One of the important problems of university activity is the analysis of satisfaction of the basic educational service consumers. For realization of the given problem in May and in June of 2011 the Department of education quality management conducted the questioning «Satisfaction of students by education quality in Omsk institute (branch) of RSUTE».

The created questionnaire was directed on analysis of students satisfaction by training terms, quality of educational process, quality of training results, satisfaction by system of knowledge estimation criteria and objectivity of knowledge and abilities estimation during the current control and in session. And also the students point of view, concerning the most convenient form of expression of their own opinion about quality of providing ser-

vices, mission and policy of institute in the field of quality has been studied. As a result of processing of the received questionnaires the positive tendency of students satisfaction by level of educational process quality at institute has been revealed.

Quality of training is the set of consumer characteristics of the educational service, providing possibility of satisfaction of range of requirements for all-around personality development of the student. Students of Omsk institute (branch) of RSUTE, besides reception of the basic educational services, actively participate in the scientific life of institute through regional, all-Russian and international conferences, are involved for participation in external and internal research works. They are participants and winners of the all-Russian Olympiad, competitions, forums. The all-around personality development of students is promoted also by the educational work, taking place in the institute: formation of civil-patriotic position of students, their participation in competitions (KVN, «Miss», «Mister», competition of orators, song competitions), participation in students groups, encouragement of the best and active students with trips to other cities, countries and many other things.

One of the components of university competitiveness is conformity of graduates to requirements of professional activity, employers and labor market in whole. With defined periodicity the Center of professional career development, being structural division of institute, holds a questioning of employers and graduates, concerning their satisfaction by knowledge and skills, received during education in Omsk institute (branch) of RSUTE. Results of monitoring allow to increase the quality of training in whole and separate specialties.

The given competitive advantages provide to graduates higher professional status and steadily great demand for their services, allow them to apply for a definite position, to participate and win in competitive struggle and to reach stable demand on the labor market in the future.

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THE FORMATION OF THE SCIENTIFIC COMPETENCE BACHELORS IN STUDYING PHYSICS

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At present, the radical changes are being undergone in the society – the processes and the technologies increased growth rates in the world, that it is resulted in the industrial society into the informational one.

Thus, to the higher professional and the vocational education in Russia the following goals and the tasks are being defined:

- the emphasis and the shift change from the content and the disciplinary – subject side (e.g. at the simultaneous maintaining and the preservation its advantages) upon the competences and the expected results, having come from the educational process student – centered orientation and its further direction;

- the reflection the dominant perspectives in the basic educational program, having permitted to be orientated the graduates' preparation and the school – leavers' training for the efficient activity in their future occupation and their vocation;

- the basic educational programs modular organization usage;

- the learners' and the pupils' freedom degrees increasing, concerning the different and the various individualized educational and the vocational trajectories choice by them.

So, the possibilities in the graduating students' and the graduating seniors' general competences formation will have to be defined, and also the conditions will have to be created, which are quite necessary for the personality's all – round development, the general (e.g. the general scientific, the instrumental, the personality – socially ones), and the professional, and the occupational competences formation in the Institutes of higher education, in the Universities, in the Colleges, and in the High schools.

For all this, it is quite necessary to be organized the student's activity, the most suitable to his interests that can be achieved and may be provided by the quality improvement, having used in the technologies and the methodologies professional and the occupational education, as the traditional, well as the innovative ones, and also the methodological – educationally materials development, having permitted the students' independent work to be organized the most efficiently.

In this respect, the students' research activity organization has the great significance, which is promoted to the motivation increase of the academic subject's study; this is resulted in the scientific activity elements formation that is quite significantly, in terms of the general scientific competences

development, as well as the career – oriented bachelor's preparation and the further training.

Therefore, the classroom studies can and should be organized in a manner, that the necessary competences were laid, formed, and thoroughly developed at them.

So, the research laboratory works carrying out is one from the general scientific competences formation methods. The undoubted advantages of the cognitive activity this type use are the following:

- the students' high degree of their activity and their independence during the experiment carrying out;

- the abilities and the skills working out of the observations and the measurements results processing with not only the conventional means, but the new information technologies usage.

In our turn, we suggest the students the following: it is necessary to be singled out **the object and the subject**, in connection with the scientific cognition logic, and also to be formulated the carried out research **hypothesis**, the reliability of which will be checked out in the course of the work carrying out.

Besides, the laboratory work name is being changed. For example, it is made from «The Brewster Law Verification» to «The Light Polarization Phenomenon Research». However, not simply the name is being changed; the bachelors' cognitive – educationally activity accents are being shifted: the research is carried out, in the course of which the students are received the subjectively new knowledge, instead of the step-by-step user manual, which is corresponded to the reproductive cognitive activity. And this is already the completely different cognitive activity level.

So, the lecturer, as necessary, is carried out the dosage help to the students at such kind of work carrying out. As not all the students can handle with this kind of the task fully themselves.

Moreover, the study may be imposed that theoretical material, that is not being covered at the lectures. That, in its turn, is allowed the students' independent work to be well – organized one.

Thus, the bachelors' research activity is the effective and the efficient method of the general scientific competences formation, that it is allowed to be developed the students' the thinking independence; the ability to be formulated and to be solved the challenges with the knowledge usage from the different areas and the various fields; the ability to be proposed the hypothesis, to be predicted the outcomes; the ability to be critical to the results obtained, to be tested the hypothesis, to be drawn the conclusions; the various research methods possession (e.g. the observation, the experiment, the analysis, and the synthesis); the ability to the self – conscious theoretical material study.

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**DEVELOPING EXPERT SYSTEMS
TO EVALUATE AN EFFECTIVENESS
OF APPLICATION OF INFORMATION
TECHNOLOGIES FOR TEACHING
UNIVERSITY-LEVEL COURSES
IN ECOLOGY**

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Ecology is currently booming. Ecological knowledge is expanding exponentially. One of the most important criteria to evaluate the quality of teaching of current students in ecology is their ability and desire to improve and quickly acquire new knowledge and skills. An essential quality of the educational process is its adaptability to new requirements of the labor market. The development of the educational process should precede the development of the labor market for at least the time required for training the specialists of new type.

Training of specialists is based primarily on defining the choice of criteria of assessment of trainees' professional level. Educational standard sets the desired values for these criteria whereas testing system determines the actual performance achieved over time. Training uses resources determining both quality of education and its costs. Therefore, an educational routine can be designed to address either getting the best possible quality of training the specialists using limited available resources or achieving the required quality with minimal resources. The first scenario may be illustrated by preparation of an athlete to set up a world record. The second case represents training a quality worker for performing some specific operation at a plant. Training ecologists refers rather to the first scenario than the second. Training requirements are constantly changing. Resources needed for the educational process are steadily increasing. In these circumstances, an evaluation of the effectiveness of learning technologies is very important.

The quality of education can be determined by the model methods using established algorithms to compute numeric values of evaluating criteria or by the expert methods using qualified experts to determine the choice and relative importance of evaluating criteria. Mismatch between the model and expert estimates is a basis for the modernization of the educational process. Constantly changing requirements for specialists-ecologists result in an increasing importance of an expert evaluation of the effectiveness of the educational technologies used for training ecologists at universities.

Currently, ecologists and environmental managers have to deal independently with large amounts of poorly structured information. This fact points out need in their competence in information technologies (IT) and, consequently, need

in using IT as the most important resource for their training.

We propose assessing of the effectiveness of educational technologies with the help of expert systems. Expert systems are designed to facilitate tasks in different fields. Typically, the problem area is complex enough that a simpler traditional algorithm cannot provide a proper solution. The foundation of a successful expert system depends on a series of technical procedures and development that may be designed by technicians and related experts. As such, expert systems do not typically provide a definitive answer, but provide probabilistic recommendations [1, 2].

In our case, expert evaluation of educational technologies, including IT, may require involvement of various experts from different geographical locations. Thus, to ensure the quality of expert evaluation of educational technologies used at the Department of Ecology at Saratov State Technical University, we are developing the computer-aided information system allowing us to make a comparative evaluation of several objects resulting in establishing a priority sequence of evaluated objects. Objects to be evaluated in the course of an expertise can be compared in a pair-wise manner (better - worse), or they can be assigned numeric weights, or else they can be placed in a quality-level sequence. Evaluation is to be carried out in the following order:

1. First, experts evaluate each other. Each expert receives a weight reflecting his or her competence level. This stage results in a prioritized sequence of experts.

2. Experts evaluate the relevance of criteria used for evaluation of the objects of an expertise. The stage results in a prioritized sequence of their quality levels. Creating this series takes into account weights of experts.

3. Experts evaluate the objects of expertise. This creates priority series for each quality of the object.

4. The program automatically creates the final priority series of evaluated objects taking into account weights of the experts and relative weights of evaluating criteria.

We are developing the software allowing, through a meeting in a computer class, to obtain the results of expert evaluations immediately. It also makes possible expert evaluation to be conducted via the Internet. In the latter case, the resulting score is formed gradually as experts answer the questions.

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THE EDUCATION IN CONTEXT OF CULTURE

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The Analysis of the scientific literature of the last years, dedicated to questions of the education, shows that given sphere of the development and upbringing of a person turned out to be in complex position since transition of society into a new cultural measurement has changed the traditional belief about essence and function of the education.

As result, quite often happens to face the artificially-narrow to interpretation of the education, when under importance of this term is understood only reception of the set of the knowledge, worse, diploma about completion of the education. The substitution of whole essence question occurs only one of its quotients of the manifestations. And here, unfortunately, words Gogol's character are recalled from «Auditor», noticed that «save God to serve on scientific area. Everyone imagines the scientist, clever persons, but nobody gives money». And not accidently on Worldwide conference UNESCO in Budapest «Science for XXI century: new obligations» initiative about need of the acceptance of oath (like Hippocratic oath) for all scientific workers was brought, which took obligation never and in no case concern with the pseudoscience.

Present-day in hierarchical structure of the functional duties of the educational process priority position is given to the questions, connected with education and resulting from it utilitarian problem: formation of the knowledges, skills, and habits. For upbringing in most cases pertain as to «side» product of education process. The Loss of upbringing aims, in turn, has caused the loss of the main aim of the education – a holistic person as member of society in its own social space and time.

The scientists note that many teachers of the educational institutions do not consider themselves as a teacher, being identified as a physicist, economist, mathematician, and lawyer. The similar situation could be observed in any school: «biologist» and «historian» who has never concerned with this professional activity, but not considering themselves as a teacher.

It is necessary to realize that teacher work – is to enter student into culture, to provide him the adjuistance of its space, to form the system of the relations «individual-culture». Each of accustomed scholastic discipline – is the only one of the concrete manifestations of the knowledge. But it (the knowledge) should be transmitted culture-conforming and cultural-activated, by making student a part of mankind and successor of the historical experience. Among the most significant directions

in given aspect we should select the understanding of the education as culture-conforming and cultural-activated environment, small culture, and cultural microcosm.

In this role the teacher needs not as much knowledge of the professional subject, as the ensemble of other knowledges and skills, which are required for the achievement of pedagogical goals. After all, exactly through the education in its unity with upbringing there realizes the most important function of the society – a transfer of the social experience to the growing generations.

Within the cultural approach there is already exists a broad understanding of the education, which comes from that for the productive enabling of a person into the culture it is necessary to form his personality, to develop his natural deposit, assign directivity that is needed in the modern stages of the development. And separate persons, and groups of the people, even scaled, as nation, must be proper educated in order to successfully solve appearing life problems. From this position culture must be as a nucleus of the education, develop the thinking, contact, ethical and aesthetics-artistic value, political and psychological system of evaluation.

Nowadays children are growing in the world, which is unknown for seniors, and teacher has to be an agent between traditional and modern style. Besides, the educational crisis was aggravated by complicated conflict between «father and children», in particular, formation of so-called pre-fishurative culture (i.e. such cultures, where adult «learns» from their own children).

In this situation among teachers, who are the carriers and translators of cultural values, meanings and norms; there intensified the problem of identifications. In order to «culturalize» others, it is necessary to them to assign, interiorize traditions, values and etc of that culture, the formation of which we observe, and, on the other hand, can explain practicability and value of the interaction of the young generation with past by cultural experience.

The problem of the development of the person in connection with development of the culture in society puts the row of the special questions about the essence of the process of the assimilation of the achievements in the historical development of society, which is simultaneously the process of the formation in people the specific human abilities. This process can have different forms. But mainly, it is necessary to emphasize, – that this process always must take place, otherwise the transfer of the achievements in public-historical development of mankind to the following generations would be impossible and, consequently, the receiver-ship of the historical processes would be impossible too.

The peculiarities of cultural-historical process at the end of XX and beginning of XXI centuries,

on one hand, made everyone to speak of united cultural and informational space, about united world community, in which, at first look, there is no place to the ethnic peculiarities, nations and national traditions; on the other hand, they (the peculiarities) have caused the appearance of so-called phenomenon «ethnic rebirth».

As a result, in understanding of cultural phenomenon there was a row of contradictions: between modernism and traditionalism; between «my» and «alien» in the dialogue of the cultures – western and eastern; between global and local forms of the culture; between technical and humanitarian aspects of the culture, etc.

Recently appeared alarm trend on everywhere «plantings» of Western «new culture», as more progressive, efficient and perspective should be attentively evaluated. According to the believes of this ideas the future is for one, who acts with «leading world», not considering with all past cultural heritage. And this «global» striving to level all past cultural traditions poured in the form of the support the west institute of motion of separate ethnic minority in the prejudice of larger geocultural education, including Kazakhstan, creating direct threat to their vital activity.

The solution of this situation can be found. According to the optimistic forecast of scientists, culture can rescue the education if it undertakes the mission of the upbringing the person of the culture. In order to achieve it, the education must be filled with the cultural meaning. The cultural meanings of the education – is a human senses.

Education as socio-cultural phenomena introduces comparatively independent system, which function is to give an education and upbringing to the members of society, that oriented on mastering certain knowledges (first of all scientific), ideamoral values, skills, habits, norms of behaviour, which content, eventually, is defined by a social-economic and political formation of given society and by the level of the material and technical development.

As a proof of our thoughts we brought the quotation of S.I. Gessen, who defined aims of education, showing that «there is an exact correspondence between the education and culture. Education is nothing else than culture of the individual... If purposes of education coincide with purposes of the culture, it's obvious that as a type of education must be as much as in separate values of the culture. As much cultural values, so much types of the education [1, s. 35].

Education «very closely is connected with notion of the culture and eventually means the specific human way of the transformation of natural deposit and abilities», – has claimed the similar thought H.T. Gadamer [2]. That is why in the context of the culture education can be considered and as goal-directed organized way of the joining the person to the culture, t.e. as a tool of cultural

translation and as one of the central phenomenon of the culture with all its typical forms, signs and characteristics. From the specially constructed cultural-educational space depends the success in educational-upbringing process, and fates of social-economic and political transformations in state.

Besides, it is important to create that very socio-cultural space, in which realization and development of abilities is possible in self-determination. The spaces, on one hand, must become the model of a real socio-cultural atmosphere outside of the educational institution, on the other hand, must create the cultural sample desired and/or expected future, so child could created his own cultural sample of the decisions in other socio-cultural circumstances, than past and present.

The main question in modernization of the education is to determine the content of education. For this, the clear understanding of its socio-cultural functions is necessary. It contains:

- optimum ways of the entering the person into the world of the science and culture;
- socialization of the person and receivership of the generations;
- formation of the conditions for person's public and spiritual life;
- translation of cultural executed sample of human activity;
- development of the regional systems and national traditions;
- formation of social institutes, by means of which basic cultural values are sent and incarnated;
- «booster» of cultural changes and transformations in public and person's life.

Today, the whole world has recognized that in new, XXI century as a leader person can be only in that state, which creates the most efficient system of the education, which is capable to provide the unceasing growth of a human potential quality, expressed in knowledge, skills, habits, moralities and spirituality of a society.

While developing new strategy it's necessary to take into account existing contradiction between classical education and modern informational trends, which can be overcome by saving the best traditions alongside with the introduction of the latest informational technologies into educational process. Moreover, we should take into account the possibility of the arising contradiction between the rash development of the scientific knowledge and ability of their assimilation, as well as contradictions between rising volume of the knowledge and period of specialist preparation. Only in this way we can see a new model of the education that promotes forming socio-cultural, informational-educational space as a sphere of spiritual-moral formation of a person, which corresponds to the new paradigm of social-cultural development of society in XX century.

Thereby, modern crisis demonstrated that the model, which is prescribed in the base of modern education, turned out to be only narrow-pragmatic aspect, which does not exhaust cultural problems. There is no upbringing in existing models of the educational process, which should form the valuable attitude towards the world, its fragments, activities, contacts, etc. Without upbringing this translation of scientific data changes into нагаскивание, which is inapplicable in life. We hope that the further researches of these problems will promote the improvement of the modern education as system, value, process, environment and will allow to intensify the heuristic abilities of the

researches in educational reality, including the modeling and designing the education within the culture study's approach.

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TENDENCIES OF THE DEVELOPMENT OF CONSULTING SERVICES IN RUSSIA

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Consulting services in the field of enterprise activity management represent the most important factor Russia's reaching the level of the world standards of management and conducting enterprise activity.

Keywords: consulting services, enterprise activity management, world standards

Looking through tendencies of the development of business consulting activities in the country as a whole, it is possible to make a conclusion that practically in every region, having industrial enterprises there are centers of consulting services (their own or branches of Moscow's ones). Another conclusion is: the larger the city, the greater its business potential – the more numerous consulting service centers are presented in it. There is one explanation to this – a stable demand from the regional enterprises.

The need in consulting arose with the development of the industrial revolution and appearing of the first manufacturing. Consulting was based on scientific management and dealt with the problems of productivity increase and effectiveness, rational organization of work and reducing production costs. At that time such consulting was named – the manufacturing organization, and advisers acted as efficiency experts.

One of the specific characteristics of the Russian market of consulting services on its initial stage was the dominating of services on the realizations of projects directed to institutional developing an infrastructure of market relations (formation of stock market, creation of mechanisms of small-scale business support, mass privatization). The financial support of the international financial organizations acted as the basic mechanism in the Russian market of consulting services. The mentioned organizations annually provided monetary resources for such services for Russian enterprises within the limits of technical support programs.

The specific feature of the formation of Russian consulting services market on the basis of direct foreign investments made by the world leaders in the field of managerial consulting has provided, on the one hand, introduction and development of the advanced methods of servicing and organizing of high standard consulting services and, on the other hand, those world leaders with their wide experiences in the field of professional consulting of business processes have created a high competitive environment for young Russian consulting services centres.

The work of foreign consulting companies was demanded not only by the Russian busi-

ness but the state as well. In the course of time the market has been divided between the foreigners and Russians: nowadays «the big four» (international consulting companies KPMG, Ernst & Young, Pricewaterhouse Coopers, Deloitte & Toucher) serve companies-exporters and big Russian firms which employ them for reporting audit while taxation and enterprise restructuring problems are solved by local auditors and advisers. Besides, national consulting companies serve middle-scale business which doesn't interest international companies because of its low solvency. The cost of a Russian adviser's work is 40-50 \$ per hour, the cost of a foreign expert's work is 150-210 \$ per hour. In their turn foreign investors prefer well-known advisers and auditors and practically never address Russian consulting companies.

After the financial crisis of 1998 various kinds of financial consulting (particularly audit, tax consulting) were in the most favourable position. Legal consulting acted as an accompanying one. In 1999 the companies which had survived after the crisis focused efforts basically on the extensive growth of commodity goods markets. There appeared a need for a development strategy. During this period of time the share of strategic planning consulting made 14,5% of the total amount of the market. The main services of the consulting companies became IS services (system integration, MRP and ERP systems, Internet technologies). Since 2002 the tendency to consumption of services in the field of logistics and streamlining of organizational structure was outlined. Top managers realized the necessity of searching internal resources for further development and reduction of expenses. That caused the reorganization of corporate information systems.

At the present stage of development of consulting services there is a gradual transition from mass production of complex services to step-by-step technologies and individual designing of client's business. Services in the field of stating and automation of budgeting and administrative accounting are becoming the most demanded today. Enterprise activity estimation services have developed considerably, a characteristic tendency in this segment has become a gain in orders for business estimation for the

purpose of merge, absorption and sale earlier an estimation of asserts and material actives prevailed. The raised demand for consulting services is observed from small-scale enterprises which need consulting in organization and running businesses. State and municipal organizations are provided consulting services on working out the strategy of territory development, complex brunch programs, as well as training of managers' stuff engaged in solving the federal, regional and local level problems.

The structure of services of the largest consulting companies in the field of administrative consultation is represented by the most demanded services in modern business:

- Consulting services on problems of management of operation and processes, including questions of reorganization of business and general management (TQM) – 31 %;
- Consultation concerning corporate strategy – 17 %;
- Consultation concerning information-technological strategy – 17 %;
- Consultation concerning business development – 16 %;
- Consultation concerning organizational designing (projecting) – 11 %;
- Financial consultation – 6 %;
- Services on problems of marketing and sales – 2 %.

Judging by the resulted data, the greatest share belongs to the services in the field of management of processes.

In our opinion, the demand for consulting services and their structure are determined by the following high lights:

- a level of the economy development , while the sphere of consulting application may be various: in case of a developed economy – an increase in efficiency of a firm-client activity and gaining additional benefits; in case of a crisis economy – anti-recessionary management, reorganization;
- imperfection of standard-legal and legislative base – in this case consulting can have explanatory character and helps firms-clients to organize their activity in the most effective and optimum way (for example, working out a system of efficient control of the firm finance);
- the sizes and scales of a firm-client activity that assumes, on the one hand, possibility to pay independent advisers and, on the other hand – directions of consultation process, its depth and complexity;
- the accepted management style of a firm-client that is defined by readiness of top-managers to use services of other organizations for solving problems;
- the extent of consulting services market development in a separate region that provides

trust degree towards advisers on the part of client-companies.

The following tendencies in consulting services development can be found in Russia nowadays:

- Growth of volumes of consulting activity and increasing number of those engaged in consultation.
- Appearing of new kinds and markets of consulting services.
- A variety of organizational forms in consultation.
- Increasing the number and types of the consumer (client) organizations.
- Improvement of quality of consulting services.
- Development of methodical toolkit.

In the works of Russian and foreign authors concerning theoretical and practical aspects of organization and functioning of consulting services in business there can be defined some concepts being used while studying questions on consulting activity organization. First of all, they are – consulting, consultation and administrative consultation.

In our opinion, the notion of consulting (consultation) is generalizing, reflecting general direction of this kind of activity and is differentiated depending on the sphere of application (management, marketing, etc.). We suggest to define consulting services as a certain kind of activity, realization of which is based on the process of consultation directed to a firm-client activity improvement and consequently to the development of business infrastructure as a whole.

The characteristic features of consulting services as a necessary element of business infrastructure are the following:

1. Existence of the same problems that clients have doesn't mean that it is possible to apply identical decisions. Each client demands an individual approach that gives him certain advantages in comparison with his competitors. Thus, having the developed methods of work with consumers and analyses of their activities as well as setting problems, it is necessary to search for new non-standard methods and techniques of clients' problems solving.

2. It is not less important to have an opportunity of using modern information technologies, which allows to receive and process information rapidly as well as to interact with clients in interactive mode that considerably reduces geographical and time limits of interaction client – adviser.

3. Advisers should not only possess the information on recent trends in sphere of organization of business and corresponding technologies, but also to have an opportunity to adapt

them and effectively introduce to the client-company activity.

Dynamical development of consulting services in the Russian business promoted the formation of the variety of structural parameters which make the Russian consulting services market to resemble the situation in the market of the developed countries. At the same time, there is an original Russian specificity. In general, these specific features of the development of consulting services in the Russian business can be presented as following:

1. Inability to formulate tasks and problems of prospective projects and criteria of expected successes.

2. Many consulting products actively used by businessmen in the developed countries, remain till now not required in the Russian business. First of all, it is caused by the general level of the development of the Russian economy, in particular, immaturity of key elements of the market system.

3. A high degree of mistrust to external advisers and attempts not to open the

whole information even to the detriment of the efficiency of their own problems solving.

As some experts notice, a domestic consumer will very soon realize the necessity and utility of a professional advice. His life will make him do so, as he and his competitor in the Russian market strive to the same position in the «strategic space» and each of them need competitive advantages.

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*Materials of Conferences***THE PRACTICAL EXPERIENCE
OF CREATION OF SYSTEM OF SERVICES
FOR CONSUMERS ON B2B ENTERPRISE**

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The Russian companies come gradually to understanding that high quality of servicing becomes one of the important tools in competitive fight.

The studied enterprise is the leader in Russia in sale of automobile components for foreign cars on B2B market. The enterprise has the warehouses and the network of branches on all country.

The question of building of the transparent system of description of providing services for customers is appeared. This question is connected with developing of the company and desire to be unique for market. The company doesn't produce to itself. It is the distributor between the producer and buyer. The «goods» of the company are services provided to the clients. Some specifics of services are: the moment of consumption and providing service coincide, it is impossible to estimate its quality before consumption of service or it is possible only indirectly, not in full volume. It is necessary to identify accurately service and to define for whom it is addressed for operating of the quality of service.

The company professes a process approach in the work. But it is not enough to have the registered standards of processes and follow them. The process management can lead to the success only when the enterprise has the specific measured goals [1] in long-lasting period. It is possible to present the mechanism of quality management of service as system from object – the enterprises, the subject – the consumer [2]. Planning of a package deal is not separable from the consumer. The studied enterprise faced that it is impossible to serve all clients with an identical level of quality from the point of view of management of costs and efficiency. There are existing the significant factors of cooperation for each client. These factors have the value and importance for this concrete client. This client is ready to pay for these factors. That's why company should identify the needs of customers and give them what they really want. This way helps managing the costs of service. The company realized that to be good for all it is impossible, attempt to be good for all, means to be bad for all in own way.

The problems of company can be formulated as: the absence of the documentary description of services provided by the company led to gaps between expectations of clients and to actually rendered services; the company couldn't estimate cor-

rect the costs of quality and operate them in the set limits.

How do we could construct the transparent system of services which would be the most considering inquiries of each group of consumers and possibility of the company? The group of heads of sales departments and the staff of department of standardization was created for answering to this question. Work and endurance stages from stages are presented below.

1. The first stage was the working of group with vision, mission and values of the company for finding the answers to the questions: How do we and our clients see the enterprise in the successful future? What are our business processes? How do we operate with our clients and with each other?

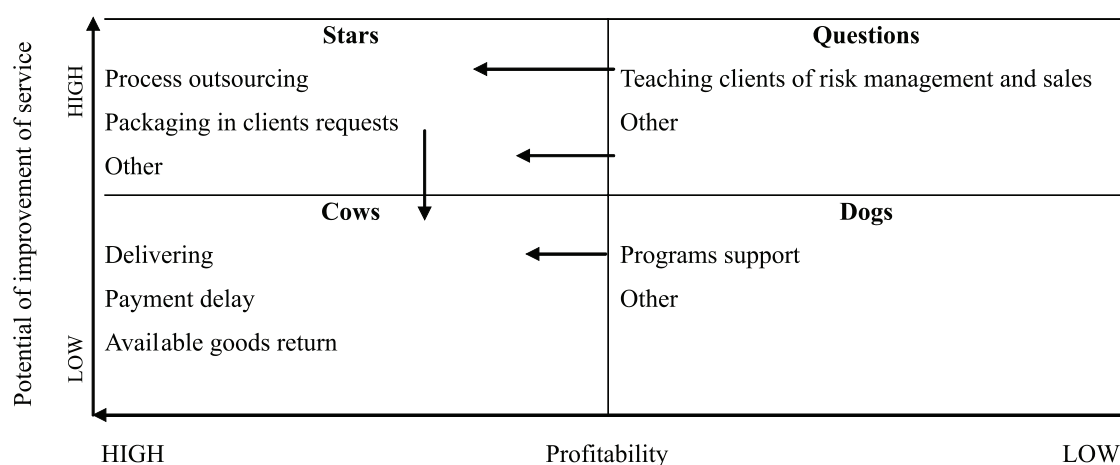
2. The second stage was the working with existing client's classification in accordance of answering of the questions on previous stage and customers specifics. It was the task to make the classification more structured and clear. All clients were analyzed from the point of view of their arrangement, the status, modes of work with them and their kinds of activity. The typology was expanded by the new categories of clients which company wants to see in future. The cluster analysis was used at this stage.

3. After building the classification of clients the project group made analysis of services provided to customers. They answered the questions: What do we do for our customers now? What could we do more? Does it actual in competitive point of view? After answering these questions the set of services was expanded in accordance with the company vision in the future. The brainstorm method was used on this stage. The group found several important criteria and estimated services by these criteria. These criteria were: realization possibility of service in a half of a year; the costs of this service; expected effect from realization; uniqueness among competitors. The estimation also included the separation of the services as basic (main) process/not main process for business and in accordance with the processes model of the company. The results of this work were combined with classification of the clients. In additional all services were ranked by customers importance. Ranging considered the total point reflecting the weighed assessment of service. Table 1 illustrates the part of example of the results (with a view of the confidentiality).

4. The services were estimated by expert group of sales departments. The total results were analyzed by BCG method. This matrix gives understanding to the company management and owners of processes x in making decisions in improvements and developing [3].

Analysis of customer's services

Services	Criteria					Summary
	Realization possibility in a half of a year (0 – no / 1 – yes)	Costs (1 – max, 3 – min)	Expected effect (1 – min, 3 – max)	Uniqueness (0/1)	Main/not (1/0)	
Consultation on processes	0	1	3	1	0	5
Outsourcing	0	1	3	1	0	4
Delivering	1	1	3	0	1	6
Payment delay	1	2	2	0	1	6
Advertizing support for customers	1	2	2	0	0	5
Franchise	0	2	2	1	0	5
Other



BCG example for services

5. The last step of design group working was development of recommendations in creations of document of client service segmentation. BCG analysis results would be including in partners programs with customers.

The reasons of existing of the service package are:

1. This package makes the technology of service transparent for participators and responsible faces. Description of the services allows us to translate services into numbers and then estimate costs of providing of the service with efficiency.

2. This package should be tie with clients' segmentation for evaluation of service cost and optimization. Then enterprise understands clients better

3. This approach makes service more personalized for customers and increases the level of their satisfaction from working with company.

Conclusions: The importance of such approach to formation of system of indicators consists not only in obtaining concrete quantitative data on functioning of processes and increase of appeal of provided services, but also allows to establish ac-

curately formulated and real purposes of business process, considering requirements of the main interested parties, to find adequate criteria for an objective assessment of achievements of the purposes of process.

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INFLUENCE OF INSTITUTIONAL TRANSFORMATIONS ON DEVELOPMENT OF AGROINDUSTRIAL COMPLEX OF REGION

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Functioning of market economy defined by programs of economic reforms, means transformation of agroindustrial complex (AC) on the basis of formation of private property, development of business, support of diverse patterns of ownership and ways of conducting agroindustrial manufacture. As it is known, market is not always capable to provide effective forward development of social production. Certain regulating influence from political, social and economic institutes is necessary, at undoubtedly, significant role of latter. Among all other branches and economy spheres such influence to the greatest degree is required by agroindustrial complex owing to its insufficient social and economic development.

AC has important social and economic function in national economy of West Kazakhstan region on maintenance of food safety and population employment. Its share now is more than 45% working, over 40% of basic production assets, 25% of total gross output of industry and agriculture, 20% of national income of the region are created. Its basis is made by agriculture, it is occupied over third by able-bodied population and formed 3–4% of total regional product. The region share in the volume of agriculture gross output of the country in 2011 was 2,5% [1].

Volumes of output of production of agraroinustrial complex have increased from 27,0 billion KZT in 2005 to 52,2 billion KZT in 2011. Mid-annual rates of development of agrarian and industrial complex were 115,4%. The region AC has passed difficult way of formation with various institutional transformations. At transition from plan-administrative economy to market relations there was an essential transformation of its stem-forming institutes, were generated multistrukture agriculture and branches of processing of agricultural raw materials, where basic subjects of economic activities were enterprises and organizations of various organizational-legal forms – societies, associations, co-operative societies, farms, personal part-time farms of population. In the course of economic reform realization, a number of statutory acts which have fixed basic directions and principles of development of market relations in AC is accepted. Among them certificates about land reform, transformation of agricultural and processing enterprises to commercial organizations which are guided by principles of private property, carrying out of privatization and demonopolization of enterprises have the pivotal value.

Analysis of AC of the region testifies that there is a process of formation of multistrukture system

of property. Among agricultural commodity producers there are not only average and large, but also small enterprises. Share of economy of population in gross output structure has increased from 32% in 1994 to 65% in 2010, share of farms – from 2% to 23% accordingly. Relative density of agricultural productions was reduced from 66 to 12%. Small-scale personal economy of population became the basic manufacturers. They make 87% of meat, 93% of milk, 75% of eggs, about 80% of wool, 86% of potato, 82% of vegetables, 71% melon-growing from total amount of agricultural production [2]. Share of averages and large-scale enterprises in volume of output of agricultural production is insignificant and makes no more than 10%. Prevalence of small-scale and natural manufacture (population economy) negatively affects prospects of development of AC of the region: introduction possibilities in manufacture of achievements of scientific and technical progress, intensification and mechanization of productions are limited, control over quality of agricultural production decreases. In processing and agroservice sphere open joint-stock companies, limited liability companies (55,2 and 65,6% accordingly) prevail. However change of patterns of ownership and reorganization of agricultural enterprises cannot be considered, how institutional transformations to true sense of word as it is necessary to generate still conditions for specification of property rights which are based on certain rules and norms.

It is necessary to consider the change of control system of complex which includes institutes of management and managerial process to significant institutional transformations of AC of the region. Management institutes are presented by regional and regional territorial inspections of Ministry of Agriculture, regional and regional managements of agriculture. Organizations of management sphere take part in working out of plans and programs in the field of AC development, maintenance of branches with experts, assist in organization of regional exhibitions, fairs, wholesale markets, carry out series of measures on stabilization and growth of manufacture and agricultural products processing, participate in working out of projects financially-credit and tax policy, promote interaction between commodity producers and agricultural products consumers, carry out state purchases. In market conditions, agrarian and industrial complex control system should develop and be improved in direction of government and local government with accurately distributed on vertical and horizontal functions.

Effective condition of effective functioning of any economic system including AC is creation of effective economic mechanism representing set of interconnected economic levers and methods of influence on manufacture, exchange, distribution and consumption. Economic mechanism as a whole includes also economic mechanism which

covers a wide complex of economic levers [3]. Action of elements of economic mechanism in AC has specificity connected with combination technical, technological, social and natural factors. Use of economic mechanism in AC demands rational combination of self-regulation of market and state updating as basic principle of functioning of economic mechanism of agricultural enterprises in conditions of market relations [4].

During the last years there were institutional transformations of scientific and technical sphere of regional AC which have allowed to begin formation of innovative infrastructure and have been directed on integration of scientific organizations with complex enterprises structures of small-scale business for service of programs of regional and inter-regional innovative-technological centers were created.

Thus, in effective functioning of AC, positive influence of institutional factors is obvious. Process of formation of agriculture as uniform economic system and its institutional environment

still remains not finished. One of the reasons is general inefficient economic organization of AC, its infrastructural maintenance, general institutional environment, demanding the permission at regional and state level.

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CLASSIFICATION OF LIVING SYSTEMS STATES ON THE BASIS OF A HYBRID APPROACH TO THE ANALYSIS OF DATA ON SYSTEMIC RHYTHMS

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The article describes hybrid technology classification of living systems. The essence of the approach consists that the difficult dynamic system is given in space of parameters of slow waves. With that purpose, the process of analyzing the condition system is breaks into a number of stages. In the first stage the signal, which describes a condition of system, select the available slow waves. Available slow waves are determined by the wavelet -analysis of a signal system. In the second stage define parameters of the slow waves are depend. Used for this purpose are the windows Fourier transformation significant lines of the wavelet -plane. In the third stage, the classification status of the system is carried out by neural network analysis of the spectral factors relevant lines of the wavelet-plane.

Keywords: A hybrid method, informative signs, neural network analysis, living systems, systemic rhythms

Analysis of numerous home and foreign researches in the field of complex systems studying, carried out during the last 10 years, showed that latent components of system processes. System rhythms possess significant information value. Such processes are not distinguished and not processed practically in modern diagnostic systems and this greatly reduces potential possibilities of perspective diagnostic systems [1, 2]. That is why it is necessary to create qualitatively new methods and algorithms that allows distinguishing and analyzing signals in the objects characterized by complex system rhythms.

Experimental studies on test and real signals, That being characterize the states of complex systems, showed that neither frequency nor time-frequency analysis is an effective instrument for distinguishing modulation parameters from quasiperiodic signal.

To distinguish informative features from quasiperiodic low-frequency signal, characterizing parameter of its modulation, there has been proposed hybrid technology which allows, using certain approaches to the analysis of quasiperiodic signal, to obtain such technology of data processing due to which methods, being used, improve ways of processing from stage to stage, compensating disadvantages of former methods.

Block diagram of intelligent system for realization of classification method on the basis of hybrid analysis for slow waves signals is given in Fig. 1. Input signal $X(t)$, defining the state of a complex object, enters into two processing units: selector of system rhythms and synthesizer of wavelet plane.

Selector of system rhythms of unstable signal by means of Furies windowing transformation (FWT) of input signal distinguishes spectral trains, defines their wavelet transform and carries out morphological analysis of benchmark lines in obtained wavelet-plane. Latent

system rhythms, being available for analysis, are defined as a result of this procedure.

Some state or class of states is introduced into states base of living objects, It is necessary to determine belonging to the state of the object, being under investigation on the basis of the analysis of object state vector $X(t)$. It allows you to set a priori a priori those slow waves from set M which are relevant for the given condition.

According to the weaving each selector of line numbers in wavelet-plane, corresponding to low-frequency modulation of distinguished system rhythms, transmits only limited number of lines from wavelet-plane segment, corresponding to this system rhythm, into the input of FWT unit. Maximal number of analysed lines n is limited by 20 in the given system realization. Besides, this number can be reduced up to 1 depending on the code of state A at the input of living objects states base.

Moreover, the selector of system rhythms can not detect all system rhythms available in data base for test state of the object (class A). In this case we deal with dynamic structure of informative features space at the input of the classifier neural network of direct propagation is used as such classifier in the given system. In connection with the fact that space of informative features is dynamic, base of neural network models have been introduced into classification system. This model changes the structure of neural network depending on the fact that rhythms are detected by the selector of system rhythms. Models base of neural network is controlled by binary outputs of the selector.

FWT is fulfilled on every distinguished line in wavelet-plane. If the number of significant lines is less than N , then corresponding FWT units are not used, and this is accomplished by means of commutator of informative features, which turns off outputs of corresponding FWT units from inputs of neural network. In

the same way, units of informative features are not used if corresponding system rhythm is not included into totality defining test state. If the corresponding rhythm is not detected, then all

the outputs of FWT units become disconnected from all the inputs of neural network. The base of neural network models is obtained in medium Matlab.

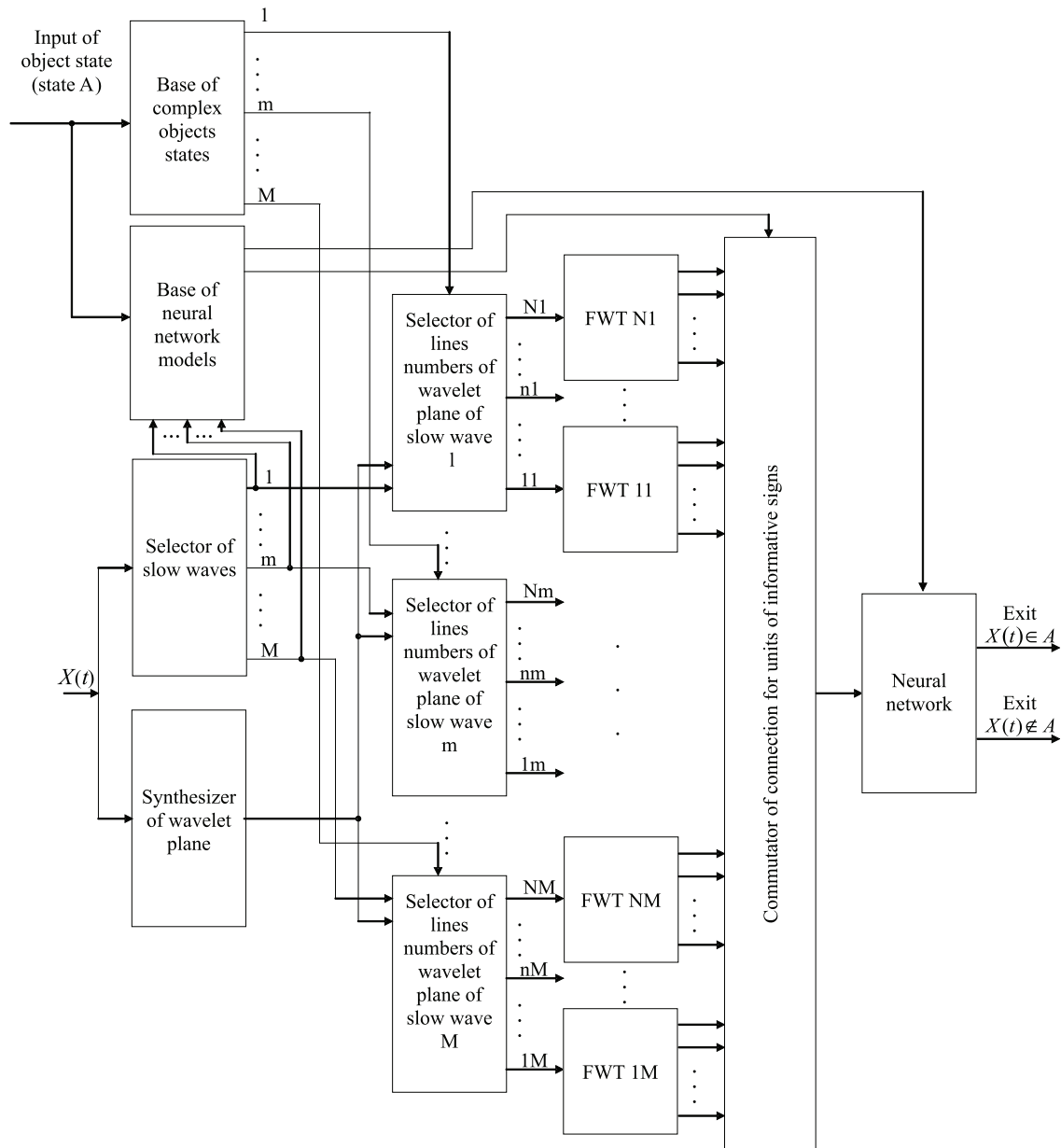


Fig. 1. Block diagram of intelligent system for realization of classification method on the basis of hybrid analysis if slow waves signals

Let us illustrate technology of forming indication space meant for identification of complex system on the example of system rhythms analysis, presented in electrocardiosignal spectrum.

FWT of electrocardiosignals (Fig. 2.) is the sequence of wave trains, coordinates of which on frequency axis correspond to frequencies divisible by main harmonic of electrocardiosignal.

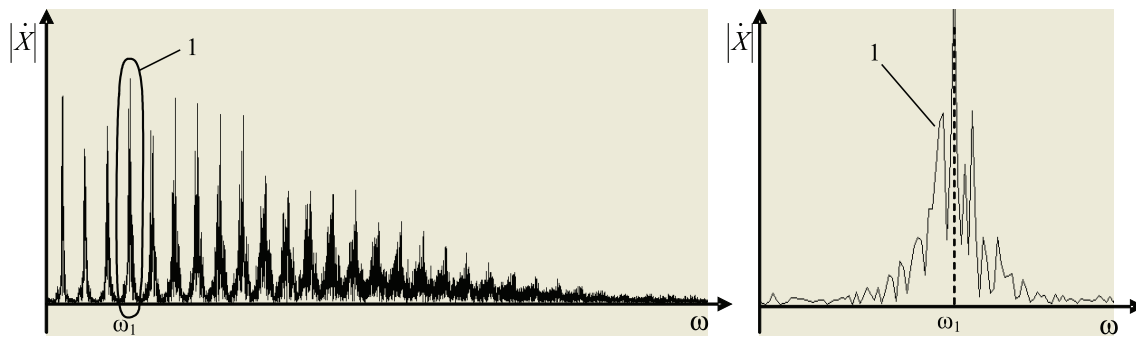


Fig. 2. FWT electrocardiosignal (on the left) and diagram of one train of spectral waves (on the right)

A set of slow waves, relevant for this state, is chosen for each state of a living object, and selector of slow waves determines accessible slow waves. (Fig. 3.) gives the example of wavelet structural analysis – transformation of FWT train of electrocardiosignal in (Fig. 2.)

The least correlated wavelet lines – planes of FWT ECG spectral train (Fig. 2.) are ana-

lyzed for search of accessible slow waves. Fragments of the development of this wavelet-plane of spectral train according to lines and three least correlated wavelet-plane lines are given in (Fig. 3.) Accessible slow waves, being present in the current signal are determined by means of morphological analysis of these signals in slow waves selector.

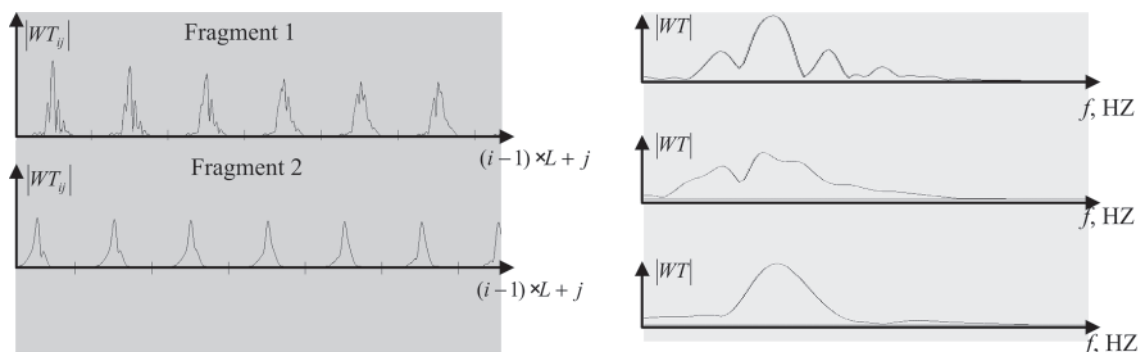


Fig. 3. Fragments of the development of wavelet-plane of spectral train FWT ECG according to lines (A) and three least correlated lines of wavelet-plane (B):

L – Length of wavelet-plane line; i – Number of wavelet-plane line;

j – Number of wavelet-plane column number, $(i-1)L + j$ – Number of WT read-out

(Fig. 4.) Gives electrocardiosignal wavelet-plane, which comes into the input of selectors for lines of slow waves wavelet-plane. It has been obtained according to 11000 read-outs of signal ECG, digitized with the frequency 100 HZ. The plane contains 800 lines and has boundary frequencies 40 HZ. And 0,125 HZ.

For each allocated slow wave the block of informative signs which arrives on corresponding inputs of a neural network of direct distribution is formed. The network acts as a binary classifier for each current vector of system state and given state at the input of objects state base.

Evaluation of efficiency of proposed methods, algorithms and means of intelligent support for decision making was executed on the example of intelligent system for diagnosis of psychosomatic diseases. Coronary disease (CD) has been chosen as a psychosomatic disease.

As a result of carried out researches, there were formed learning and control extracts for checking sufficiency of methods and algorithms for decision making, based on the analysis of system rhythms of living out approbation of proposed methods and means based on representative control sampling on the example of coronary disease diagnosis.

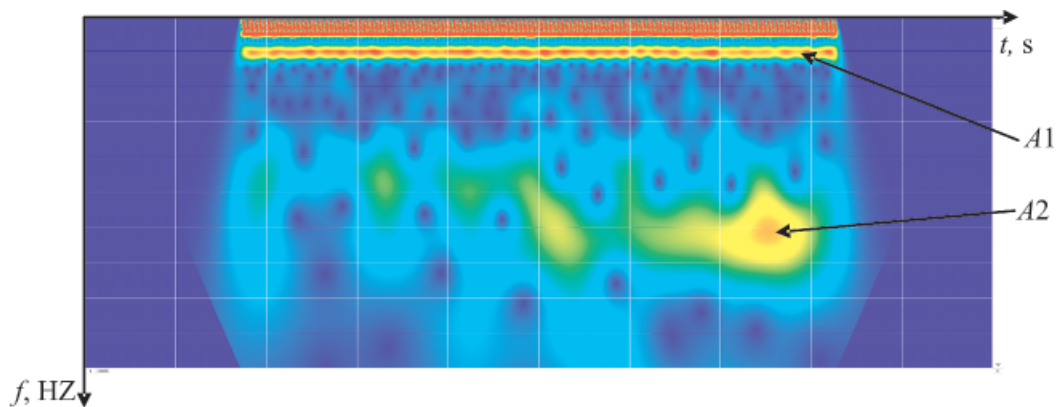


Fig. 4. Wavelet-plane of electrocardiosignal with slow waves sector of the second order A2 (A1 – Area of slow waves of the first order)

The analysis indicators of the quality of classification models of the decision-making based on an offered method showed, that they concede all for two percent to indicators of the quality Received on the basis of an expert estimation. Comparative characteristics of expert assessments of risk of cardio – vascular complications and estimates obtained on the basis of the proposed models of intelligent systems allow us to recommend received technical and algorithmic solution for practical use in diagnostics of functional state of cardio-vascular system.

Work is executed within the limits of realisation of the Federal target program «Scientific and scientific and pedagogical shots of innovative Russia» on 2009–2013.

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MEASUREMENT OF INTERCELLULAR RELATIONS IN PERIPHERAL BLOOD ON THE BASIS OF HYBRID ALGORITHM

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Segmentation of badly structured images is a complex task for different models of artificial intelligence systems. The given work presents algorithmic solutions for intercellular relations measurement in peripheral blood. There has been proposed hybrid algorithm, allowing to distinguish three classes of formed elements: «erythrocyte», «leukocyte» and «not erythrocyte and not leukocyte». Analysis of geometric attributes of image segments and their color characteristics is the basis of the algorithm. Different images, being got by use of morphologic operators «erosion» and «dilatation» to the initial image, are analysis in this article. The process of segmentation is carried out on black-and-white image by gradient method. Information technologies may be used in automated systems of haematologic analysis.

Keywords: segmentation of images, neuronics nets, RGB-codes of pixels, morphologic operators «erosion», «dilatation»

General clinical analysis of blood forms the basis of all diagnostic methods. This analysis reflects organism response to the influence of different physiological and pathological factors. However, detection and classification of a great number of cells manually make this analysis long and laborious. That is why, the task of automation for carrying out general clinical blood analysis is topical.

In practice, while detecting formed blood elements one may be faced with the main obstacle – great variance of images. That is why, methods, based on both aspects of images segments geometric attributes and aspects of their color characteristics, are used to increase accuracy for determination of intercellular relations in smears of peripheral blood [1].

Hybrid algorithm for measurement of intercellular relations in peripheral blood, given in Figure, is proposed in this work. The algorithm has been realized according to two-level scheme and takes into account both color and geometric characteristics of formed elements.

The algorithm distinguishes three classes of formed elements: «erythrocyte», «leucocyte» and «not erythrocyte and not leucocyte».

Different images obtained by using morphological operators – «erosion» and «dilatation» – regarding original image are analysed at each algorithm level [2]. As a result of these two images segmentation we get two images hereinafter called as «image 1» and «image 2».

Three numbers Z_{11} , Z_{12} , Z_{13} , being in the range $0...1$ and characterizing belonging degree of the segment to one of the three distinguished classes, are set in conformity with each segment S_n of «image 1» at the first stage of image processing – blocs 4...11.

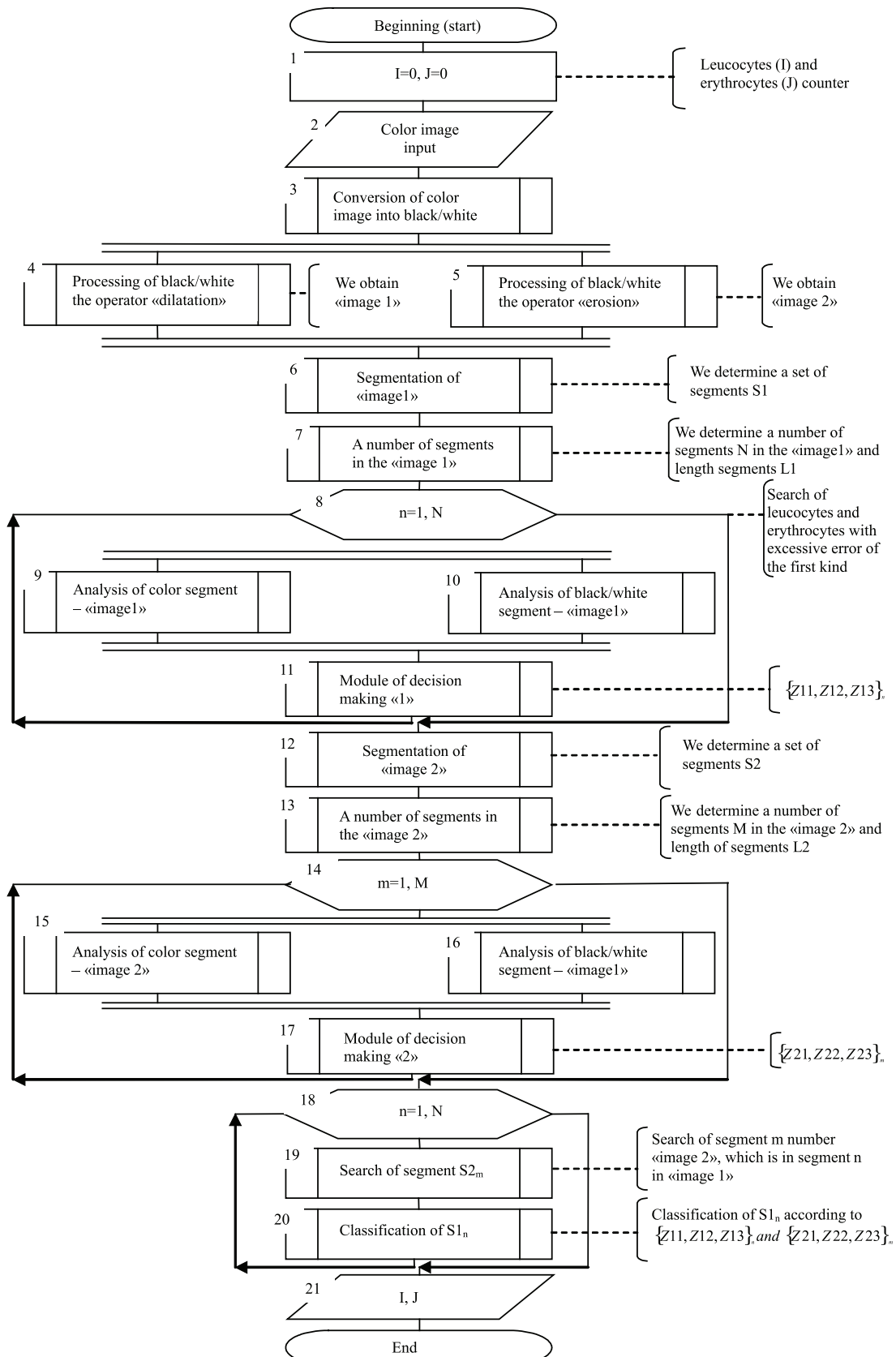
Analysis moduli of «image 1» of the first level – (blocs 9 and 10) – use two groups of decisive rules on the basis of which decision on belonging to classes «leucocyte», «not leucocyte», «erythrocyte», «not erythrocyte» is

made here. The first group of decisive rules is based on the analysis of image color characteristics – (bloc 9). The second group of decisive rules realizes analysis of geometric structure of the formed element contour – (bloc 9). Two sets of four numbers corresponding to two groups of informative features: $\{X_{11}, X_{12}, X_{13}, X_{14}\}_n$ and $\{X_{21}, X_{22}, X_{23}, X_{24}\}_n$ determine belonging degree to these four classes of segment S_n .

Segments sets of input images are the object of analysis at the first and second algorithm levels. The process of segmentation is carried out on black-and-white image by gradient method. Then, distinguished segments are analyzed by two moduli at the first – (blocs 9...11) and second level – (blocs 14...17). As original image is structured, badly distinct boundaries between formed elements are absent. That is why, while using operators «erosion» and «dilatation» we get «image 1» and «image 2», correspondingly, regarding to original image; segment structure of obtained images will be different. In the first case, the number of errors of the first kind increases, besides a part of autorosettes «dissolves» in classes «erythrocytes» and «leucocytes». In the second case, a number of errors of the second kind increases, besides artificial union of formed blood elements is being carried out and a number of autorosettes increases at the expense of leucocytes and erythrocytes.

Such two-level analysis allows to avoid errors of the second kind connected with sintering (sticking together) of erythrocytes.

Images, in which at the expense of artificial sticking of erythrocytes between each other and erythrocytes and leucocytes we get false autorosettes, are analyzed at the second stage. This reduces a number of errors of the first kind while solving the problem of choice between «not leucocyte and not erythrocyte» class (autorosette) and «leucocyte» class.



Pattern of the algorithm for intercellular relations measurement in peripheral blood

Outputs of decision making units of each of analyses are variables $X1...X4$ and $Y1...Y4$, respectively, which are considered as elements of illegible sets, corresponding to terms of divided classes. Units of decision making are constructed according to the principle of macrolayers allowing to unite moduli of neuro-network models. Decisive moduli have two outputs which correspond to two di-

vided classes: «leucocyte», – «not leucocyte» or «erythrocyte» – «not erythrocyte». At their outputs there are numbers in the range from 0 to 1 being interpreted as certainty coefficient in belonging of the segment being analyzed to above-mentioned classes.

Analysis of outputs of decision making units of the both analysis stages is carried out according to the rules of illegible products:

$$\begin{aligned} \text{If } X1 = \text{«leucocyte» and } X4 = \text{«not erythrocyte»}, & \text{ then } Z1 = \text{«leucocyte»}; \\ \text{If } X2 = \text{«not leucocyte» and } X3 = \text{«erythrocyte»}, & \text{ then } Z1 = \text{«erythrocyte»}; \\ \text{If } X3 = \text{«not leucocyte» and } X4 = \text{«not erythrocyte»}, & \\ \text{then } Z1 = \text{«not leucocyte» and «not erythrocyte»}. & \end{aligned} \quad (1)$$

Illegible neuron net of direct spreading is used for realization of illegible products system (1). Neuron net has three outputs corresponding to classes into which formed elements are divided. Choice of corresponding class is carried out according to maximal value of the output. If there given illegible sets corresponding to classes at the output of illegible net, then there is possibility to use method of diffusification, for example, according to mean centre [3].

Thus, there has been developed algorithm of intercellular relations measurement in peripheral blood, using hybrid technologies for analysis of complex structured images. The algorithm provides for two-level processing of the image. The image («image 1»), obtained as a result of segmentation of input black-and-white image after processing by morphological operator – «erosion», is being processed at the first stage. The image («image 2»), obtained after processing of input black-and-white image by means of morphological operator «dilatation», is being processed at the second stage. At each stage decision is made on the basis of

aggregation of two values obtained as a result of analysis of segment color and geometric attributes. Final decision is made on the basis of decision comparing, accepted at the first and second stages of processing.

The article has been prepared according to the results of search scientific work in the direction of «Biomedical and veterinary technologies for life support and protection of a man and animals», being carried out within realization of Federal Special-purpose Programme «Scientific and scientific – pedagogical personnel of innovation Russia» for 2009-2013.

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Short Reports

CALCULATIONS OF HYDRAULIC REGIMES OF HEAT-AND-WATER SUPPLY SYSTEMS IN CONDITIONS OF FAR NORTH

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A normal functioning of heat-and water supply systems of the far north nowadays is not simply or only a necessary level of comfort for each citizen, it is a problem of life support, trouble-free supply of consumers with energy in necessary amounts. Heating season here last for at least nine months a year, and sometimes it comes up to eleven. For example, in Sakha republic (Yakutia) heating period consists of more than two hundred forty days, and in Norilsk – three hundred days! An existing system of heat-and water provision of cities suffers significant alterations. Replacement of parts of conduits with water conduits of different diameter, an emergence of new inserts and broadening of the whole system leads to significant changes in hydraulic regimes of networks. Besides, far north develops, slowly or quickly, and it means a problem of providing new construction objects with energy has to be solved. To meet the needs of consumers in definite points it is necessary to increase work pressure on pumping stations that leads to an increase in electric energy consumption, increase in wearing of technological equipment, increase in possibility of an emergency situations in critical areas, and, therefore, increase in financial costs to maintain systems of heat-and-water supply systems and energetic ineffectiveness of the system work as a whole. What isn't done today will be absolutely necessary tomorrow, but the costs will be significantly higher. A necessity to carry out constant calculations of hydraulic regimes of water and heat networks on existing actual scheme that will allow us to reveal critical areas of the network and form suggestions on their unloading and replacement of them with water conduits of different diameter. Based on these calculations, we can forecast, when is the best time to carry out repairs or reconstructive works.

Making hydraulic calculations allows us to:

- define calculative circular pressure;
- find necessary diameter of a conduit that will allow us to transmit the necessary amounts of hot or cold carrier.

During our hydraulic calculation it is necessary to carry out some operations:

- construct a calculative scheme of water supply, on which a length and diameter of water conduit should be pointed as well as local resistance and calculated consumption of heat carrier at all system points;

- within our calculation we should define a loss of pressure at all sections of conduits in order to choose hydraulic regime correctly in future and define, what pressure we will have at final sections.

The results of hydraulic calculations are used to construct piezometric graphics, choose schemes of service introductions, define capital investments into systems of heat supply, develop exploitation regimes of heat supply systems.

Earlier such tasks for municipal water supply systems were carried out only by project and scientific-research organizations. Having outdated software and carrying out calculations manually makes heat-hydraulic calculations really laborious and low-effective. This is defined by the fact that introducing any, even the slightest changes into the calculation network at this stage requires recalculation that takes a lot of time and energy. And the development of systems of modernization and rationalization stays at the same level. It is necessary to solve all problems that are linked to development, projecting, and exploitation hydraulic systems of different purposes for specific conditions and creation of program-calculative complexes.

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Materials of Conferences

**THE ATMOSPHERIC AIR STATE
IN THE TERRITORIES
OF THE MOTORWAYS
OF THE CITY OF TYUMEN**

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Ecological problems of cities are significantly intensified due to dominating impact of car transport upon the environment. Mechanism of cars' impact upon it has a number of special features. Therefore, evaluation of air pollution level in cities, considering the impact of car transport turns to be an extremely urgent task.

Steadily increasing transport loading in modern urbanized environment is the cause of increased pollution level of the atmosphere air on territories that lay by transport flows and in distant locations. Therefore, utilizing methods of layouts plays a significant part in providing comfortable living conditions in urban environment. Those are measures of developing road-transport complex, and here it is necessary to carry out technological and planning actions, considering ecological requirements.

Studying concentrations of substances in atmosphere air is typical for any city. According to federal requirements, tree groups of substances must be controlled in the atmosphere:

1. Major substances; general weighed matters (dust), nitrogen dioxide, carbon oxide, sulphur dioxide. Studying concentrations of these substances is necessary in all cities.

2. Specific substances: ammonia, benzopyrene, benzol, and other aromatic carbohydrates, cadmium, nickel, quicksilver, lead, carbon bisulphide, hydrogen sulphide, phenol, formaldehyde, hydrogen fluoride.

3. Ozone and small weighed particles. It is also necessary to establish studying of concentrations of these substances.

Analysis of atmosphere condition in the city of Tyumen, according to official information sources, testifies that car transport carries the most of negative impact upon the quality of air in territories that lay by motorways. According to the data of hydro-meteorological services that tracks air pollution levels on the territory of Russia, Tyumen is present in the list of 30 cities, in which extremely high level of atmosphere pollution on carbon dioxide, formaldehyde, and benzopyrene is observed.

The main source of experimental information to define background in Tyumen is the data of stationed centers of monitoring atmosphere pollution. A selection of location of stationed centers within organization of monitoring atmosphere pollution in

the city was carried out by hydro-meteorological bodies in 1967-2004 in accordance to the requirements of regulative documents: State Standard 17.2.2.01-86 «Nature protection. Atmosphere. Rules of air quality control in populated areas»; Regulating Document 52.04.186-89 «Guidance to control atmosphere pollution». According to the functional zoning, there are 5 stationed centers of observation in the city, they are conditionally divided into car, industrial, and city background. These centers, according to specialists of hydro-meteorological service, are representative and reflect the actual situation of atmosphere pollution, which is, regretfully, unfavourable.

Nowadays two posts of «city background» type are located in areas of city car transport impact, and, due to this fact, correct conclusions on a situation cannot be done, and managing measures cannot be taken considering specific impact sources. This condition served as a basis to choose studies of concentration of polluting substances that are contained in car transport emission on territories that lay by city motorways.

Recently, to obtain experimental information on the level of atmosphere pollution on specific territories of Tyumen, route observations of transport flows within street-road network are carried out on foundations of certificated laboratories.

Observations of concentration of polluting substances in the city motorways were carried out by mobile laboratory «LesParkKhoz» during 2008 and 2009. The laboratory was provided with modern equipment that allowed to obtain operative and complete information on the degree of pollution of atmosphere in different city points on: sulphur dioxide, carbon oxide, nitrogen dioxide, nitrogen oxide, carbon-black, phenol, formaldehyde. Observation posts of this laboratory were located near motorways. The number of sample-taking points in transport infrastructure equaled 3 in 2008, and 4 in 2009. Periodicity of taking samples in each controlled point – two times a month. The observations provided us with the following results: insignificant exceed of the utmost limits on nitrogen dioxide – 1,1 MPC one time concentration; on formaldehyde – 1,1 MPC one time concentration; on carbon-black – 1,1 MPC one time concentration on motorway Shirotnaya street – N. Federova street; concentrations of nitrogen oxide, sulphur anhydride, and dust were within and on the limits of standards.

Studies on location were also carried out on bases of analytic laboratory Federal state training center «Center of hygiene and epidemiology in Tyumen region» during 2009-2010. Observations were carried out at observation points on minimal

sufficient indications that allowed us to control ecological-hygienic situation with the least time.

Locational measures of atmospheric air by this laboratory on the city motorways with the most intense motion (6 route observation posts) prove the presence of pollution in atmospheric air. Observations have shown that the following typical results: exceed of the utmost standards on nitrogen dioxide equaled 1,5 MPC one time concentration; on formaldehyde – 1,4 MPC one time concentration; on weighed substances – 3,15 MPC one time concentration on motorway of Kholodilnaya street. Studies of polluting substances in atmospheric air from car transport flows throughout the year showed exceeding of weighed substances and nitrogen dioxide during spring-summer period (May, June, July, August) and autumn-winter period (September).

On the whole, measures of atmospheric air, taken with mobile laboratories at the studied city areas have shown that the highest indexes of harmful substances concentration are registered on territories that lay by motorways, and concentration

decreases as we move away from them. This evaluation is important for projecting and reconstruction of objects, planning micro-districts – making architecture-planning and constructive decisions.

Considering the situation in evaluating levels of atmospheric air pollution, it is important to consider a condition of it in the city on specific constructing district territories. To specify actual condition of the atmospheric air according to polluting substances on such territories with minimal financial and laborious costs it is necessary to use the complex of information on emission sources. The quickest way is the calculative method, but it requires confirmation of calculative data by measure indications. This method allows us to evaluate maximum occasional and average concentration of polluting substances.

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*Materials of Conferences***THEORETICAL AND METHODOLOGICAL
BASIS OF IDENTIFICATION
AND MAPPING OF THE GEODYNAMIC
ACTIVE ZONES INFLUENCING
ENGINEERING-GEOLOGICAL
AND GEOECOLOGICAL PROCESSES**

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One of the priority directions of a science in the Russian Federation is « Environmental management: foresight of forecasting and management of natural and socio-economic systems technologies», within which in NSI PSNRU (Perm) since 2011 researches are carried out: «Development of the theory, methods and technologies of identification and mapping of geodynamic active zones (GAZ), assessment of their influence on engineering-geological and geoecological processes». The purpose of researches – rational environmental management at complex development of territories, ensuring geological and ecological safety of the cities, the industrial enterprises and engineering constructions. Main objectives: development of methods and technologies of identification and a mapping GAZ, application of space geological methods of researches and geoinformation technologies in engineering, ecological and search geology; modeling GAZ, assessment of their influence on engineering-geological and geoecological processes; development of theoretical and methodological bases of the doctrine about geodynamic active zones of Earth, their engineering-geological and geoecological role; approbation of results of scientific researches in educational process of students.

Geodynamic active zones are understood as crust sites, various on volume, a configuration and

the area on a terrestrial surface, active at the present stage of the neotectonic development, being characterized by the lowered durability of a bark, increase in cracks, permeability, and, as a result, manifestations of explosive tectonics, seismicity and other processes. A basis of methodology of studying GAZ can be the system lineament-geodynamic analysis on the basis of remote methods in a complex with geophysical, space geological, structural-geomorphological, hydrogeological, geochemical and biological methods. Criteria of an assessment of geodynamic (neotectonic) activity are various settlement indicators. One their major indicators GAZ is very high density of breaks and tectonic lineaments. The analysis consists in receiving lineament-block model by interpretation of space pictures, territory ranging on degrees of geodynamic activity and creation of its cartographical models of different level of detail. Convergence GAZ with geophysical and geochemical anomalies is noted. Within these zones deterioration of mechanical properties soils, increase in intensity of dangerous natural and technogenic processes is marked. The classification GAZ including planetary, regional, zonal and local levels is developed. Knowledge about GAZ, methods and technologies of their mapping, has big practical value for many fields of activity and economy development, especially for the solution of engineering-geological, geoecological, hydrogeological, mineragenical and seismological tasks.

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Materials of Conferences

**EFFECT OF TRAVELING AND ROTATING
MAGNETIC PULSED FIELDS
ON COGNITIVE
AND PSYCHO-VEGETATIVE DISORDERS
IN PATIENTS WITH DYSIRCULATORY
ENCEPHALOPATHY**

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This article presents a new approach to the treatment of patients with encephalopathy dyscirculatory against atherosclerosis and hypertension, based on the use of traveling and rotating pulsed magnetic fields, which contribute to clinical improvement with normalization of cognitive function, mental and physical state and autonomic tone.

Dyscirculatory encephalopathy (DE) is 67% of the vascular disease of the brain. The core of the clinical picture of DE is the presence of cognitive and psycho-vegetative disorders. Along with the progression of neurologic symptoms with the development of DE occurs and the growth of disorders of higher brain functions. In 60-80% of patients with mild cognitive impairment over 5 years develops dementia. Relevant is the assessment of the degree of cognitive impairment, which should be considered in the tactics of managing patients with DE [1, 2, 3, 4, 5, 6]. In the correction of cognitive impairment of physical therapy techniques are becoming increasingly important, one of which is the total magnetic therapy with the use of the traveling and rotating pulsed magnetic fields [1, 2, 3].

The aim of the study: Assessing the impact of combined treatment with the use of traveling and rotating pulsed magnetic fields on cognitive and psycho-vegetative disorders in patients with DE.

Materials and methods. A survey 110 patients who were treated at the sanatorium «Green Grove» of the Republic of Bashkortostan in age from 47 to 69 years with DE stages I-II on the background of cerebral atherosclerosis and hypertension.

Assessment of cognitive disorders, visual-spatial disorders, psycho-physical state, autonomic tone test was performed using Mini-Mental State Examination (2005), SAN (mood, activity, mood), samples of the «clock», an index Kerdo.

In therapy, patients were divided into 2 groups: basic (56 pers.) and control (54 people). In the study group on the background of basic therapy used magnetic therapy with the use of the general traveling and rotating magnetic fields, pulsed magnetic therapy apparatus of the «Kolibri-Expert»

with a frequency of 100 Hz, the magnitude of the magnetic induction 3,5-32 mT, for 10-15 minutes. In the course 12-10 of daily routines (Russian Federation Patent № 2440833, 01.27.2012). In the control group used only the basic treatment.

Basic therapy included: diet therapy, climato-therapy, intake of mineral water «Nurly», herbal medicine, massage, therapeutic exercise, medication may be needed.

Results and discussion. All patients had predominantly cerebral, cognitive and psycho-emotional disorders. In patients with DE stages I-II (81,8%) dominated disorders such as headaches, impaired concentration, perception, ability to play the new information (76,4%), depressed mood, irritability, anxiety (73,6%), fatigue (71,8%), dizziness, sleep disturbances (65,5%), reducing the memory (57,3%).

Assessment of autonomic tone Kerdo index showed an increase in activity of the sympathetic system with the average of its value $13,1 \pm 0,04$, «vagotonia» – $12,5 \pm 0,03$ and «ayton» – $9,0 \pm 0,05$ points. According to the MMSE test in 52,1% of patients with DE the amount of balls before the treatment was on average $25,9 \pm 0,05$ points, which corresponded to moderate cognitive impairment. In 80,9% of patients with DE stage II rates were reduced the most «attention» and «account».

Memory impairment was observed in 15,1% of patients with DE stage I and 51,1% with stage II DE. In 80,8% of patients with DE had significantly reduced all indices of psycho-physical condition: «the mood» to $3,6 \pm 0,03$, «being» to $4,1 \pm 0,02$, «active» to $4,1 \pm 0,02$.

After the course of treatment in 95,4% patients of the group significantly marked regression of clinical symptoms. Decreased headaches, dizziness, feeling of heaviness in the head (86,4%), improved memory and attention (80,1%), higher efficiency (86,4%), reduced irritability (84,5%) and normal sleep (85,5%). In the comparison group of neurological syndromes, significant changes were observed.

The treatment has helped improve the performance of cognitive functions: attention, account for 14,1% ($p < 0,05$), in memory of 13,1% ($p < 0,05$). Improvements in visual-spatial functions on the results of tests «clock» on 19,5% ($p < 0,05$) in the main group, which indicates an improvement in blood supply to the brain, activation of metabolic processes and improving the stability of the brain to hypoxia. In the comparison group significant decreases in symptoms of cognitive disorders and visual-spatial functions have been identified.

Against the background of complex treatment of patients with normalization of the core group of

autonomic tone observed with the transition to the state of «rayton» with up to $9,0 \pm 0,03$ $12,4 \pm 0,03$.

The high therapeutic efficacy of the traveling and rotating magnetic field pulse shows improvement in mental and physical condition according to the test SAN. A significant increase in the «feel» from 85,5% of patients of the group to 29,8% ($p < 0,05$), «activity» at 24,0% ($p < 0,05$), «mood» by 32, 0% ($p < 0,05$).

Conclusions. General magnetic therapy in patients on the proposed methodology, rendering the action of a systemic nature, is an effective method in treatment of patients with DE stages I-II.

The proposed medical complex with the traveling and rotating pulsed magnetic fields contribute to a more rapid regression of neurological symptoms, improve cognitive and psycho-physical functions of the brain, reduce the manifestations of autonomic dysfunction in patients with chronic brain ischemia.

Spatial heterogeneity of the traveling and rotating pulsed magnetic fields, the combined use proposed by the amplitude modulation of the magnetic field, the frequency reduces the adaptation, reduces the treatment time, increase the therapeutic efficacy and good tolerability.

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STRUCTURAL CHANGES OF LEFT VENTRICULUS IN THE RAT HEART DURING ISCHEMIA AND REPERFUSION UNDER APELIN ACTION

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Myocardium infarction with 40-minute occlusion of front descending coronary artery was mod-

eled among narcotized male rats of Vistar line with body mass of 300-400 grams with further one-hour reperfusion. Apelin-12 in doses of 0,35 mcmmole/kg of body mass was introduced to a part of the animals. It is known that exogenous C-end fragments of apelin-12 can limit the size of myocardium infarction and re-establish the heart function among animals after its regional ischemia (Pisarenko and co-authors, 2011). After the end of physiological test part, hearts were removed from the animals, washed in 0,1 M of phosphate buffer and fixed in 4% solution of paraformaldehyde during 3 days in a fridge. Material was processed in spirits of increasing concentration and primed by epoxide gum like in our publication (Pavlovich, Prosvirnin, 2011). A heart was cut into 4 rings across its longer axis. The second and the third ring from the organ top was cut into smaller pieces that included a free wall of left and right ventricles, myocardium that lies by front and rear inter-ventral furrows, and also an area of inter-atrial and inter-ventral partitions in a single block. Dehydrated material of a heart was accurately placed in capsules for priming and polymerized in thermostat. 1-mkm cuts of heart walls were received from block foundations on ultratome LKB and then colored in toluidine blue. An examination of cuts under microscope in increase of magnification from 150 to 900 showed that expressed alterations in muscle fiber in which destruction of flexing material took place and areas of over-contraction of the rest myofibrils were found in free wall of the left ventricle of an eschemized heart. Cores and mitochondrions in cells looked slightly altered and did not show any divergences in muscle fiber on intercalated discs. The middle part of myocardium was dramatically altered, and areas by endocardium and epicardium looked safe (transversal banding of unaltered myofibrils was observed in myocytes). Contents of some myocytes appeared from cells (including mitochondrions). Usage of apelin-12 decreased damage of contractile apparatus, compared to the control, but zonality of alterations within heart ventricles' walls preserved. It corresponds to the biochemical observations of decrease in reperfusion damage among rats in vivo under decrease in applelin-12 that lowered markers of myocyte necrosis (Pisarenko and co-authors, 2011). Stagnant alterations in blood vessels and accumulation of basophils in them with intensively-colored intracellular granules were observed among experimental animals. An expressed degranulation was observed within mast cells. A quantitative analysis of half-thin cuts and ultrastructure research of material of all heart cells from animals, including tracing myocardium (atriventricular node and fascicle) is required.

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*Materials of Conferences***ABOUT EXPLANATION OF ELABORATION OF ESSENTIAL EREMOTHECIUM OIL BIOTECHNOLOGY**

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One of the high-priority directions of scientific and technical progress is an expansion of the world assortment of natural essential oils produced by industry – which is currently counted to be around 180 names, that which are widely used in pharmaceutical, perfumery, cosmetic, confectionary, soap, alcohol beverage and other productions. The revelation of perspective producers is an actual goal in modern biotechnology of aromatic products, in addition to including the scent of fresh rose flowers. However, the biotechnology of essential oils production in culture of isolated cells and tissues is not capable of competing with the biotechnology based on the microbial synthesis. The estimation was carried out by analysis of accumulation level and composition of essential oil, speed of culture growth and other properties which are important for biotechnological production [1-4]. In addition, nowadays it is worth paying attention to the investigation of mechanisms of aroma forming substances synthesis and the increasing clarification of metabolic methods of influencing this process [5, 6].

The aimed search of perspective objects for aromatic products in biotechnology in the range of genera *Ceratocystis* and *Eremothecium* gives the possibility to characterize differences between species, strains by level of biosynthetic activity and essential oil composition. The component compound of essential oil of *Ceratocystis paradoxa* and *C.pilifera* is presented by lactones, terpene and aromatic alcohols, aldehydes, and ketones. The basic components of *E.ashbyi* essential oil are geraniol, β -phenylethanol, and nerol, citronellol, neral and geranial were also observed. Geraniol, β -phenylethanol and other compounds of essential oil possess anti-inflammatory and antiseptic action [7]. The essential oil synthesized by *E.ashbyi* closely resembles the functions of the essential oil of fresh rose flowers due to its composition and has a scent. The essential oil synthesis reaches 180 mg/l cultural liquid during first two days of growth in fermentative medium. This can be comparable with that of the essential oil content in 500-600 g of rose flowers [2, 3]. The component composition of essential oil of *E.gossypii* is similar, but the monoterpene alcohols ratio is closer to their content in Bulgarian

rose oil. This natural product, whose price on the world market reaches eighty dollars for one gram, is in extreme demand. As more than half of world perfume brand production are based on rose oil. It is also used in medicine and pharmaceuticals. The rose oil possesses moderately antibacterial (bacteriostatic) effects, because β -phenylethanol inhibits macromolecules synthesis, but is not toxic for all microorganisms and strains at the same degree [8]. Its efficiency is compared against a wide range of bacteria, fungi, viruses. The increases of the causative agent's sensitivity to antibacterial medicines are marked by their complex administration. The oil is used as a corrigant of pharmaceutical products for their olfactory and gustatory improvement. The rose oil regulates the adrenal work, possesses antipyretic, is anti-inflammatory, is anti-edematous, is choleric, hepatoprotective action and is used in the treatment of stomatitis, parodontosis, cutaneous and other diseases. The essential oil causes stimulatory or sedative effects on the central nervous system, apparents immunomodulatory action, or regulates oxidative processes in the organism.

The rose oil accounts for 0,025% of composition on average, so for production of 1 kg oil the manual collection and processing of around 4 tonnes of petals is necessary. The rose water remains after oil distillation while oil accounts for 0,02% of its composition. The main supplier of rose water in the world market is Iran, but the oil is not produced there. In the world, rose oil of good quality and volume – which is nowadays around 600 kg/year – is produced just only in four countries: Taif, Saudi Arabia; Kazanlyk, Bulgaria; Istanbul, Turkey; and the Tashkent region, Uzbekistan [9]. Until 1992, the rose oil production by hydrodistillation method in USSR republics (Ukraine, Moldova, etc.) was around four tonnes per year. But since then, it has sharply reduced due to the economical crisis in CIS countries [10]. For instance, in 2005, in Crimea, only 600 kg rose essential oil (extract) was produced. That is less than maximal levels reached in this region by a factor of two [11].

Thus, the comparative analysis of cultures of microorganisms, which are referred to different taxonomic positions, shows that the quantity of synthesized volatile aromatic substances is high enough, and these bio-objects possess the highest growth speed that simultaneously offers them an advantage and increases product outcome yield on useful equipment units. This, now, permits the acknowledgement of the elaborate traits of essential oil, *Eremothecium*, as a perspective.

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