Acmeological determinants of experts selections for “mega science” class projects

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Abstract. The article presented is the continuation of the development of psychological and acmeological features of training managers, experts, specialists for projects of the "mega science" class. The need to use the achievement of qualifier science in order to increase the reliability and accuracy of measurement of various parameters, which have a significant impact on the effectiveness of professional activities, is proved. On the basis of a competent approach, a model of the subject of personnel qualifiers - an expert has been developed. The system of competences that an expert should have for "mega science" class projects is described. It is substantiated that the model of the subject of personnel qualifiers should meet, in addition to traditional, a number of additional criteria reflecting the conditions and specifics of professional activities, which are the basis for the formation of key acmeological determinants of the selection of experts for "mega science" class projects. In addition, it is noted that the distinctive feature of the subject of personnel qualifiers is the obligatory achievement of the expert professional "akme" in his professional field, within the framework of "mega science" class projects.

1. Introduction
According to experts (N=21), the preparation and implementation of scientific projects of the "mega science" class is one of the most promising "drivers" of world-class development that can provide our country in leadership positions in the most important areas of scientific and technological progress.

The strategy for scientific and technological development of the Russian Federation, approved by presidential decree No. 642 of December 1, 2016, provides for the creation and development of unique "mega science" class research facilities in Russia, a network of large research infrastructures, and participation of Russian scientists in international "mega science" class projects in the interests of the Russian Federation.

Training of personnel for projects of the "mega science" class, as noted earlier [1], differs from traditional training in that it applies to subjects of professional activity (specialists, experts, managers) there are a high level of requirements. In particular, they must possess a unique set of personal and professional qualities necessary for the successful development and implementation of projects of a class "mega science" [2, 3, 4]. They have a high degree of responsibility for future scientific and applied results, the guaranteed achievement of which should lead Russia to the leaders of world scientific and technological progress [5, 6, 7]. This involves the development and use of exclusive professional training programs for managers, experts, and specialists selected to participate in "mega science" class projects [8, 9]. A special level of responsibility forms the need for psychological and acmeological support for the entire cycle of training for the implementation of scientific projects of the "mega science"
class, the use of valid qualimetric tools, psychological and acmeological technologies for personal and professional development of specialists of various profiles.

The successful development of projects of a class "mega science" defined, on the one hand, the high relevance of the training of highly skilled professionals [10, 11], capable of solving highly complex challenges system challenges and threats of the third Millennium, on the other hand, reliability and high accuracy of the empirical base that reflects the laws, regularities, peculiarities of psycho-acmeological regularities and determinants, providing acmeological level of efficiency of professional activity. In addition, the procedure for using valid tools provided with modern mathematical apparatus can significantly increase the level of efficiency of the implementation of projects of the "mega science" class.

The practical use of the achievements of modern qualimetry is primarily aimed at reducing errors and increasing the level of validity and reliability of the obtained empirical data that reflect the essential parameters of professional performance. At the same time, the category of personnel qualimetry reflects one of the areas of applied qualimetric science, which is engaged in the development of methodological foundations for measuring procedures in solving personnel issues [12].

2. Acmeological model of expert for "mega science" class projects

The study of the phenomenology of the modeling process (from lat. modulus - measure, sample, norm) shows that scientific sources interpret it as a procedure for constructing an object of material or ideal properties, which reflects the system of the most essential parameters of the original object and is developed in order to implement theoretical or practical, while acting as a quasi-object. In other words, the basis of applied modeling technologies is the process of constructing ideal images that reflect the key qualitative and quantitative parametric characteristics of the phenomenon under study. At the same time, the procedure for forming and using the model in practice is interpreted as modeling.

The use of scientific practice, proven simulation technology solves a number of methodological tasks aimed at the study of the phenomenological features of the structural composition of the studied object; identifying patterns that reflect the formation, evolution and Genesis of the studied objects of study; the ability to control the object of research with the most successful algorithms in terms of goals and criteria; a forecast of the consequences of implementing tools, techniques, methods of influence on the object of direct or indirect nature; optimization of management processes in relation to the studied object of research.

Based on the functional features and implemented goals used in the study, meaningful models are divided into descriptive, explanatory and predictive, since they describe the object of modeling, highlighting cause-and-effect relationships. At the same time, the developed models ideally reflect the parameters of the object, probabilistic qualitative and quantitative [13].

Qualimetric procedures based on expert assessments are successfully used by various fields of human activity and are reflected in the works of G. G. Azgaldov, S. D. Beshelev, L. G. Evlanov, F. G. Gurvich, O. I. Larichev, B. G. Litvak, D. A. Novikov, A. I. Orlov, I. P. Reichman, Yu.V. Sidelnikov, and many other authors dealing with this problem.

The practice of conducting qualitative assessment uses a variety of approaches in addressing the issue of selection of experts. Thus, in the work of L. G. Evlanov, the following requirements are imposed on an expert: competence, creativity, attitude to expertise, conformism, constructive thinking, collectivism, self-criticism [14].

Competence, as the degree of qualification of an expert in a particular field of knowledge, can be determined based on the analysis of the effectiveness of the specialist's activity, the level and breadth of familiarity with the achievements of world science and technology, understanding of the problem and prospects for development. The expert's competence should be divided into the object of quality assessment (professional competence) and the assessment methodology (qualimetric competence).

Creativity is the ability to solve creative problems. At present, apart from qualitative judgments based on the study of experts' activities, there are no proposals for evaluating this characteristic.
Conformism is exposure to authority. Attitude to expertise is a very important characteristic of the quality of an expert in solving this problem. A specialist's negative or passive attitude to solving a problem, high employment, or other factors significantly affect the performance of their functions by experts. Therefore, participation in the examination should be considered as planned work.

Constructive thinking is a pragmatic aspect of thinking. The expert should give solutions that have the property of practicality. Taking into account the real possibilities of solving the problem is very important when conducting an expert assessment.

Collectivism should be taken into account when conducting open discussions.

Self-criticism of an expert is shown when self-evaluating the degree of their competence. In the work of E. P. Reichman and G. G. Azgaldov, the following requirements are imposed on the quality of an expert: competence, interest, efficiency, objectivity [15, 16].

The expert's competence should extend to the object of quality assessment (professional competence) and the assessment methodology (qualimetric competence). Professional competence includes knowledge of the history of development of the evaluated product (changes in its properties and quality indicators); production (research, design, manufacturing); values of quality indicators of its various modifications, including the best analogues; prospects for product development; research works and patent materials that may lead to changes in properties and quality indicators; consumer requirements, conditions and nature of consumption.

Qualimetric competence provides: a clear understanding by the expert of the approach to assessing the quality of products as to how it meets the needs of people; knowledge of quality assessment methods, especially expert methods; the ability to use different types of evaluated scales, while distinguishing a sufficiently large number of their gradations. Additional information necessary for improving the qualimetric competence can be provided to the expert during the preparatory work. However, the relatively short duration of the preparatory stage makes it difficult to perceive, which reduces the effectiveness of the expert's work.

The interest of the expert in the outcome of the examination depends on many factors: how busy the expert's main work, which usually involves examination of the possible use of the results; examination purposes; the nature of the conclusions that can be made based on the results of quality evaluation; the individual characteristics of the expert.

The expert's efficiency includes concentration, mobile and elastic attention, which allow you to quickly switch from evaluating one indicator to evaluating another; contact, i.e. the ability to work with people when solving problems in a conflict situation; motivation of the assessments made.

Analysis of most scientific sources shows that the model of the subject of expert evaluation should be represented by the following main qualities, namely: 1) academic degree in this subject area; 2) positive experience in previous examinations in this subject area; 3) work in the specialty for at least 10 years; 4) objectivity; 5) continuous improvement of their knowledge, etc.

In our opinion, these qualities are of a formal and speculative nature and do not correspond to the system of competencies that were proposed by the European community [17] as the basic competencies of a specialist of the twenty-first century.

For the subject of qualimetric procedures of the twenty-first century, in our opinion, the following five of the eight proposed basic competencies are important, namely: 1. communication in the native language; 2. communication in foreign languages; 3. mathematical abilities and basic competencies (skills) in science and technology; 4. information competence; 5. ability to learn. This should include another point-the availability of basic education in a specific subject area.

Core competencies of continuing education – European recommended framework (competencies). Competencies are defined here as a combination of knowledge, skills, and attitudes specific to a particular situation. Core competencies are those that all people need for personal improvement and development, active citizenship, social inclusion, and application. By the end of primary education and training (upbringing), young people's core competencies should be developed to a level sufficient for adult life and develop further, be preserved and modernized, as part of continuing education. Many of the competences overlap and intersect: the aspects that are required in one area, help the development
of competence in another. Competence in basic language skills, literacy, computing skills, and knowledge of information and computer technologies is an essential foundation for learning, and the ability to learn supports all learning activities. Topics that belong to this framework and play a role for all eight competencies include critical thinking, creativity, initiative, problem solving, risk assessment, decision making, and feeling management.

Communication in the native language is the ability to express and explain thoughts, feelings and facts both orally and in writing (listening, speaking, reading and writing), as well as to linguistically influence a number of social and cultural situations in an appropriate way – education and upbringing (training), work, home and leisure. The necessary knowledge, skills and attitudes related to this competence. Communication in the native language requires the individual to know the basic vocabulary, functional grammar, and functions of the language. It includes awareness of the main types of verbal interaction, a number of literary and non-literary texts, the main features of different styles and registers of language, language variability, and communication in different situations. People should have the ability to interact verbally and in writing in a variety of communication situations, as well as to control and adapt their own communication to the necessary conditions of the situation. Competence also includes the ability to write and read various types of text, find, collect and process information, use auxiliary tools, and formulate and express your own arguments in a convincing way according to the situation. A positive attitude to communication in the native language implies a willingness to engage in a critical and constructive dialogue, a recognition of ethical qualities and a willingness to fight for them, as well as an interest in interacting with other people.

Communicating in a foreign language has the same basic skill as communicating in your native language: it is based on the ability to understand, express and interpret thoughts, feelings and facts both orally and in writing (listening, speaking, reading and writing) in accordance with the social situation – at work, at home, during leisure, in education and upbringing (training) – in accordance with someone’s desires or needs. Communication in a foreign language requires (provides for) also skills such as mediation and cross-cultural understanding. The human level of experience (competence) varies between four dimensions: different languages and their respective backgrounds, the world around them, and needs / interests. The necessary knowledge, skills and attitudes related to this competence. Competence in additional or foreign languages requires knowledge of vocabulary, functional grammar and an awareness of the various types of verbal interaction and registers of language. It is important to know the customs of society, the cultural aspect and the variability of the language. Basic skills consist of the ability to understand spoken language, initiate, maintain, and end a conversation, and read and understand texts that meet human needs. People should be able to use additional resources accordingly, as well as learn foreign languages informally, and in the course of continuing education. A positive attitude in languages and cross-cultural communication implies an understanding of cultural differences and diversity, interest and curiosity.

Mathematical competence is the ability to use addition, subtraction, multiplication, division, and proportions (coefficients) in mental and written calculations to solve a number of problems in everyday situations. The emphasis is on both process and activity, as well as knowledge. Mathematical competence includes – to varying degrees: the ability and willingness to use mathematical forms of thought (logical and spatial thinking), and representations (formulas, models, constructions, graphs, diagrams). Scientific competence implies the ability and willingness to use the basis of knowledge and methodology necessary to explain the natural world in order to identify questions and draw conclusions based on the obvious. Competence in technology is represented as the application of knowledge and methodology in response to conscious human desires or needs. Both areas of this competence imply an understanding of the changes caused by human activity and the responsibility of each citizen for this. Necessary knowledge, skills and attitudes related to this competence.

The necessary knowledge in mathematics includes a deep knowledge of numbers, measures and structures, basic operations and basic mathematical representations, an understanding of mathematical terms and concepts, and the questions that mathematics can answer. A person must have the ability to apply basic mathematical principles and processes in everyday situations at home and at work, to
determine and evaluate the chain of arguments. People must be prepared to reason mathematically, understand mathematical proof, and communicate in mathematical language using appropriate means. A positive attitude in mathematics is based on respect for the truth and a willingness to look for reasons and recognize their validity.

For science and technology, the necessary knowledge includes the basic principles of the natural world, fundamental scientific concepts, principles and methods, technologies, technological products and processes. People should have an understanding of the successes, shortcomings, risks of scientific theories, the application of scientific technologies in society as a whole (in relation to decision-making, values, moral issues, culture, etc.); use in such a specific field of science as medicine, as well as an understanding of the impact of science and technology on the natural world. Skills include the ability to use and apply technical tools and machines to achieve a goal, along with scientific data based on the obvious. People should be able to recognize the necessary signs of scientific research and be able to discuss the conclusions and reasoning that led to them. Competence includes an attitude of critical evaluation and curiosity, interest in ethical issues, respect for security and constancy – in particular, it concerns scientific and technological progress in relation to oneself, family, society and global values.

Information competence implies confident and critical use of Information Society technologies (IST) for work, leisure and communication. It is supplemented by basic skills in information and computer technology: using computers to find, evaluate, store, produce, present and exchange information, and to communicate and participate in collaborative networks over the Internet. The necessary knowledge, skills and attitudes related to this competence. Information competencies require a deep understanding and knowledge of the nature, role and capabilities of IST in everyday situations: in personal and public life, at work. It includes the following computer applications: automation and processing of information, dissemination, creation of databases, storage and management of information, awareness of the possibilities of the Internet and communication through media (mailbox, network tools) for organizing leisure activities, information exchange, through the network, training and search. People should understand how IST contribute to creativity and innovation, as well as be aware of the results, the validity and reliability of available information, and the ethical principles of interactive use of IST. The necessary skills include: the ability to collect and process information, its critical and systematic use, recognition of its relevance, the difference between real and virtual information, and awareness of their relationship. People should have the skills to use tools to produce, present, and understand complex information, and be able to access, search, and use Internet resources. They must also have the ability to use tio in critical thinking, creativity, and innovation. The use of IST requires a critical and reflective attitude to available information and responsible use of interactive media; an interest in engaging in communication and networking for cultural, social and / or professional purposes also contributes to competence.

"Learning ability" is the ability to engage and persevere in your studies. People should be able to organize their learning through effective time management and management, either individually or in groups. Competence includes awareness of your own learning process, needs, identification of available opportunities, and the ability to remove obstacles in order to successfully learn. This means acquiring, processing, and assimilating new knowledge and skills, as well as striving. The ability to learn offers students to build on previous learning and life experience in order to use and apply knowledge and skills in various situations-at home, at work, in education and upbringing (training). The decisive conditions for personal competence are motivation in all cases, the ability to learn implies an individual's knowledge and understanding of preferred learning strategies, strengths and weaknesses of their skills and qualifications, and readiness to search in education and upbringing. The ability to learn, first of all, requires the acquisition of such basic skills as literacy, the ability to calculate, which are necessary for further training. Based on them, a person should be ready to extract, acquire, process and assimilate new knowledge and skills. This requires effective management of the learning process, the ability to persevere, concentrate for a long period, and think critically about the goals and objectives of learning. People should be willing to devote time to independent learning, self-discipline, but also to work together as part of the learning process, benefiting from diverse groups; be able to share what they have
learned. They should be able to evaluate their work, ask for advice, and seek information and support. A positive attitude includes motivation and confidence in what you do to achieve success throughout your life. The desire to apply previous training and life experience, the desire to find opportunities to learn and apply knowledge in a variety of life situations - these are the most important elements of a positive attitude.

3. Conclusions
We conducted a theoretical study of qualitative activities showed that the model of the subject of quality control personnel must meet a number of additional criteria that reflect the conditions and specifics of professional activities, including relevant basic education; professionalism in the field of professional activity, which evaluates a subject; recognition of the subject in a professional environment; academic degree, academic title on the profile of professional activity; training in the basics of quality control personnel; presence of positive experience in expert activities; availability of necessary and sufficient socio-psychological and professional properties and qualities.

It should be emphasized that the fundamental difference between personnel qualimetry and other applied areas of qualimetric science is a whole set of specific parametric characteristics of the model of the subject of personnel qualimetry involved in the procedures for diagnosing acmeological parameters. At the same time, the fundamental feature of the subject of personnel qualimetry is that the expert must necessarily achieve the highest level of professionalism, professional "Acme" in their professional field. At the same time, the expert community, using technologies specially developed for this purpose, determines whether a particular subject has reached this level of professionalism or not. And only after this procedure it can be admitted as an expert in the use of technology the personnel of quality control.

This is especially true of projects of the "mega science" class.

The solution to the fundamental problem of increasing the accuracy of diagnostic procedures in the draft class "mega science" possibly through the development of human qualimetry at the expert level.

Selection, professional training and provision of experts with valid tools of personnel qualimetry, using modern mathematical tools, determines practical prospects:
1. significant reduction of personnel risks in projects of the "mega science" class;
2. more fruitful use of mathematical models and increase the accuracy of measurement procedures in solving personnel issues of projects of the "mega science";
3. to increase the level of safety of the draft class "mega science"
4. forming a real basis for drawing up a verified expert forecast of personal and professional development of specialists of various profiles;
5. more accurate planning of the trajectory of their personal and professional development;
6. effective management of acmeological professional development processes;
7. building accurate models of highly effective professional activity of specialists of the "mega science" class projects.

At the same time, the main component of this process is a verified model of an expert who acts as a subject of personnel qualimetry of professional activity in the framework of the "mega science" class projects.

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