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# Psycho-akmeologikal peculiarities training for projects of the class of “mega science”

A V Kirichenko<sup>1</sup> and A I Zhuk<sup>2</sup>

<sup>1</sup>National research nuclear University "MEPhI", Russia, Moscow, 115409, 31 Kashirskoe sh.

<sup>2</sup>Ranepa under the President of the Russian Federation, Russia, Moscow, 119606, 84 prospect Vernadskogo

E-mail: [AVKirichenko@mephi.ru](mailto:AVKirichenko@mephi.ru)

**Abstract.** The article is devoted to psychological and akmeologikal characteristics of professional training for projects of a class "megascience", which must be considered when implementing them. It proves the necessity of using achievements of psychology and akmeology in the training of leaders, experts, specialists involved in projects of a class "megascience". A number of psychological and akmeologikal features are noted, in particular, a high level of requirements for them, professional uniqueness, a high degree of responsibility for future scientific and applied results, the exclusivity of their training programs. Emphasizes the need for psychological and akmeologikal support of the entire cycle of training for the implementation of scientific projects class "megascience", a valid use of qualitative tools, psycho-ecological technologies personal and professional development of specialists of different profile. It proves the urgent need in mastering new techniques, methods and technologies of quality control personnel in research projects of a class "megascience". It is proved that the use of personal qualimetry in research projects of a class "magicians" valid tools provided modern mathematical apparatus allows to reduce human risks, more effective use of mathematical models in solving personnel issues, aimed at improving the level of efficiency of implementation of scientific projects class "megascience". The proposed model of measuring the competencies of a specialist through the use of expert estimation. The description of the computer model is given, which allows to obtain the necessary information regarding the process of training a specialist and to build a verified trajectory of his professional development.

## 1. Introduction

The solution of strategic tasks of ensuring Russia's leadership positions at the international level, taking into account the interests of national security, intensification of development is impossible without the use of modern "drivers" of world-class development.

One of the most promising "drivers" for the development of the world level able to ensure our country's leadership position in all important areas of scientific and technological development is, according to experts (N=21), the preparation and implementation of scientific projects class "magicians".



In accordance with the Strategy for scientific and technological development of the Russian Federation approved by the decree of the President of the Russian Federation No. 642 from 1 December 2016, provides for the establishment and development of Russia's unique scientific installations of a class "megascience", a network of large research infrastructures, the participation of Russian scientists in international projects class "megascience" in the interests of the Russian Federation.

The entry of Russia into the global network of class "megascience" backed by serious organizational and scientific input to international scientific and technological cooperation. For example, the modern nuclear power industry of the Russian Federation, being, in fact, the product of an innovative process that combines all stages from scientific discoveries to high-tech industrial production, General and special orientation, relying on the existing innovative potential as a set of different types of material, financial, intellectual, scientific and technical and other resources used for innovation, successfully develops in the organizational and innovative form of the scientific and industrial complex.

The available innovation potential in the nuclear power industry in modern conditions allows to solve scientific and industrial problems at the strategic level and consists primarily in the provision of security and defence, as well as creating conditions for sustainable growth of the economy, provided the breakthrough the emergence of high technology, developed on the basis of scientific discoveries in physics of nucleus and elementary particles, nuclear materials science.

## **2. Psycho-akmeologikal peculiarities training for projects of a class "megascience"**

Our country takes an active part in several international mega-level projects. Russian scientists are conducting joint nuclear research with scientists from European countries at the Large Hadron Collider (CERN) in Switzerland, are involved in the development of the thermonuclear reactor ITER in France, as well as the European free electron laser and heavy ion accelerator in Germany.

In addition, in 2012 the Commission under the Ministry of education and science of the Russian Federation were selected and recommended for implementation on the territory of Russia six megascience projects class leading world level installations of tomorrow, without which it is impossible to create competitive advantages in the development of science and breakthrough technologies.

These include designing a network of unique scientific installations of a class "magicians", not having analogues in the world: the tokamak Ignitor (Italy – Russia on equal terms with the possibility of accession by other countries), Troitsk Institute for innovation and fusion research "Rosatom" in the Troitsk.

High-flow beam research reactor PIK (with the participation of Germany and the possible involvement of the Baltic States or Northern Europe), St. Petersburg Institute of nuclear physics SIC "Kurchatov Institute", in Gatchina.

Source of specialized synchrotron radiation of the fourth generation, presumably at the main site of the Kurchatov Institute in Moscow.

The complex of superconducting rings on counter beams of heavy ions is the nica/ MPD accelerator-experimental complex, joint Institute for nuclear research in Dubna.

International research centre for extreme light fields based on laser complex subactivities power, presumably for development work in the Institute of applied physics RAS in Nizhny Novgorod.

Accelerator complex with colliding electron-positron beams at the Institute of nuclear physics SB RAS in Novosibirsk.

The development of this strategic direction has a number of akmeologikal features of training unique personnel that contribute to the development of scientific and technical potential of our country. The creation of world-class scientific complexes is a strategically important area on which the level of ensuring the national technological security of our country depends. Participation in projects of a class "megascience", according to experts, it allows us to focus resources to obtain the scientific discoveries of the world level and development on their basis of breakthrough technologies.

This provides an opportunity to gain access to a new system of professional competencies and international resources, based on the interests of our country.

In addition, as the experience of a number of countries and recommendations of the expert community for the implementation of megaprojects whole clusters are formed of an innovative infrastructure capable of transforming the "megascience" in a competitive, innovative technologies and commercial products of the world level.

At the same time, active work on megaprojects, as practice shows, helps to solve the problem of "brain drain", providing opportunities for self-realization of young scientists in Russia, as well as attracting scientists from other countries to the development.

Central to the successful implementation of megaprojects both within the country and abroad, is the solution of psychological-akmeologikal problems of training (managers, experts, specialists) for projects of a class "magicians".

Training (managers, experts, specialists) for projects of a class "magicians" has a number of psycho-akmeologikal peculiarities.

Training for projects of a class "megascience" differs from the traditional training that the subjects of professional activity are very high level 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 "megascience". They are entrusted with 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. This involves the development and use is not widespread, and exclusive programs of training of managers, experts, specialists, selected to participate in the projects class "megascience". Special level of responsibility creates a need for psychological and akmeologikal support of the entire cycle of training for the implementation of scientific projects class "megascience", a valid use of qualitative tools, psycho-ecological technologies personal and professional development of specialists of different profile.

Traditionally used psychological and psycho-physiological methods, techniques and technologies are not fully valid tools for solving personnel issues in the nuclear power industry, as they do not differ in high accuracy. For example, the analysis of the estimates of the experts interviewed by us showed that the level of accuracy of instruments of this kind was distributed in the interval 0,2–0,4 [1; 4; 5].

Even the technology used in the akmeologikal science, and, as a rule, consisting of psychological test methods, case studies and model-gaming techniques are currently the diagnostic tools akmeologikal parameters of specialists in different subject areas fully are not. For this reason, currently used akmediagnostic [3], in accordance with the requirements of the measuring procedures and instruments. Requires substantial high-quality finishing of this kind of diagnostic tools to the level of required compliance.

This fact generates a contradiction between the high level requirements for HR projects class "magicians" and the lack of valid diagnostic tools resolve personnel issues in determining the properties and qualities potential subjects professional activities.

In this regard, we propose the use of the draft class "megascience" personnel of quality control, which is able to resolve this contradiction through the development of new tools capable of obtaining valid results, the measuring procedures.

Thus, the strategic direction, providing increase of accuracy of measurement procedures in personnel issues in the draft class "megascience" is the development of human qualimetry. Application in the projects class "megascience" personnel of quality control, provided valid instruments and modern mathematical apparatus, will contribute to:

- to improve the accuracy of measurement procedures in human resources management in projects of a class "megascience";
- a significant reduction in the level of personnel risks in the solution of personnel issues;
- increased level of safety projects class "megascience";

- more productive use of mathematical models to solve personnel issues of the draft class "megascience";
- the creation of expert systems that evaluate the dynamics of the development of personal and professional parameters of the draft class "megascience";
- preparation of adjusted forecast of personal and professional development of specialists of the projects class "magicians" in various fields;
- accurate planning of the trajectory of personal and professional development training projects class "magicians»;
- effective management of the processes of professional development of personnel projects of a class "magicians»;
- to build a more accurate acmeological models of highly professional activities of personnel projects of a class "magicians" in various fields.

Under qualimetria (lat. qualitas-quality, metria-measurement) we understand the interdisciplinary scientific discipline, the subject of which is the methodological basis of a comprehensive assessment of the qualitative parameters of objects of any nature [2; 3; 6]. The main qualitative characteristic of qualimetry is to reduce the error and increase the reliability of measurement procedures.

As a scientific discipline, qualimetry originated in our country in the 1960s and was used mainly in management. It consists of General qualimetry, solving the problems of methodology, as well as special areas, including expert, probabilistic-statistical, index and taxonomic direction of qualimetry [1].

Currently, the professional request of various branches of science and practice to develop accurate measuring instruments initiated the differentiation of the development of qualimetry and led to the creation of new applied areas of qualimetry, including sociological, pedagogical, logistic [1; 2; 4].

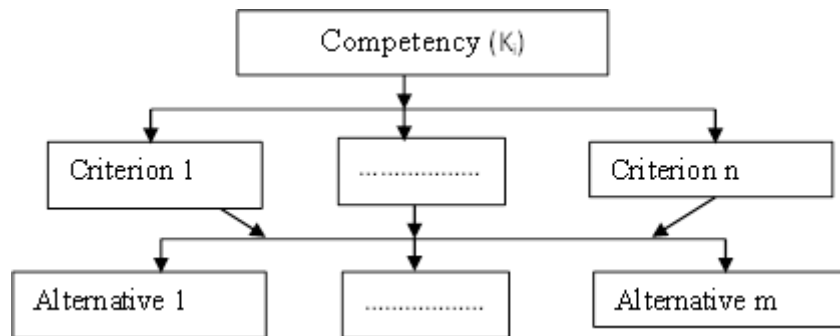
Personnel qualimetry can be considered as the direction of the applied qualimetry, which is developing a methodology for measuring procedures in the work with personnel, including in the draft class "megascience". For example, to solve practical problems of quality control personnel can be used a model of expert assessment of competences of project class "megascience" expressed by the formula:

$$M = \sqrt[n]{K_1 \cdot K_2 \cdot \dots \cdot K_n},$$

Where

- M-competency measurement model;
- $K_i$  – i- I competence that can be assessed by an expert.

As a tool for the assessment of competencies may be used analytic hierarchy process (AHP) proposed by T. Saaty [7]. The method of analysis of hierarchies allows to study the system of specific competencies that form the basis of professionalism, as well as to develop a system of evaluation criteria and alternatives. The evaluation procedure is that the criteria are evaluated first among themselves, and then with respect to each alternative criterion, using a nine-point scale [8]. On the basis of this procedure, each expert prepares an opinion on the assessed competence (Fig. 1).



**Figure 1.** Competency measurement model based on the application of expert assessment

The principal distinguishing feature of personnel qualimetry in comparison with other applied areas is the system of specific parametric characteristics of the subject model, indicating that it has reached the heights of professionalism in its development. Moreover, it must be confirmed by estimates of the expert community. This condition is fundamental in the decision on the admission of expert to participate in the measurement procedures of quality control personnel, particularly for personnel projects of a class "megascience".

The process of building the trajectory of personal and professional development of a professional specialist, as one of the fundamental problems of working with staff, can be solved from the moment of its selection and passing the training cycle. In this regard, on the basis of modern information technologies, as part of the solution of this complex problem, we have developed and tested a computer model that reflects all stages of professional training of a particular specialist[4].

Summary:

1. The application of the proposed methodological approaches, models and technologies in solving fundamental problems in personnel work will improve the accuracy of the measuring procedures in personnel matters draft class "megascience".
2. Significantly reduce the level of personnel risk personnel matters draft class "megascience" ". It will increase the security level of project implementation.
3. Will contribute to a more fruitful use of mathematical models to solve personal problems in projects of a class "megascience"; creation of expert systems that evaluate the dynamics of the development of personal and professional parameters; more accurate planning of the trajectory of personal and professional development training projects class "megascience"
4. The use of psycho-akmeologikal support will increase the efficiency of management of processes of formation, development, formation and improvement of Cadro projects class "megascience", meeting modern requirements, based on the adjusted forecast of personal and professional development, build a more accurate akmeologikal models of highly professional business leaders, experts and specialists.
5. Enrich science with new methodological approaches, more sophisticated qualitative tools and ensure a scientific growth of knowledge based on valid empirical data in relation to projects of a class ""megascience" in various fields.

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