

Information Support of the Higher Educational Institutions Unique Scientific Objects

V.E. Moiseenko, A.V. Kostenko and A.A. Vasin
Moscow State Machine-Building University (MAMI), 38 B. Semenovskaya St., Moscow, Russia

Abstract: In study the developed scope and structure of the higher educational institution system unique scientific objects information support are described. By results of the Unique Scientific Objects (USO) use analysis the characteristics and functional purpose of the higher education institutions USO information support system as well as its improvement possibilities are presented.

Key words: Higher education institutions, Unique Scientific Objects (USO), information support system, scope, objects

INTRODUCTION

In recent years higher education institutions Unique Scientific Objects (USO) including the research equipment, complexes and high-precision scientific devices became an important element of the Russian Federation scientific infrastructure development.

In higher educational institutions high scientific potential for carrying out scientific researches is concentrated. Researches in Higher Education Institutions (HEI) are conducted in the main priority directions of science, technologies and equipment development:

- Life sciences
- Nano-systems industry
- Information and telecommunication systems
- Rational environmental management
- Energy efficiency, energy saving, nuclear power (Kachak and Maslennikov, 2014; The Russian Federation, 2006, 2011)

Thus, for example, on priority direction of “life sciences” at the Moscow State University of M.V. Lomonosov researches on studying human and animal pathologies are conducted with application of the Biospectromotography machine. In the priority direction of “nano-systems industry” at St. Petersburg State University by means of the synchrotron radiation unique installation and certification and research experiment stands the nuclear and electronic power nano-objects structure and the nano-structured materials are studied by spectroscopic and diffraction methods. In the “rational environmental management” direction with the use of

the “high-rise Polarizing Lidar (light radar) for the Atmosphere Sounding” complex (Tomsk ionospheric station “LIDAR-IONOZOND”) at Tomsk State University complex the climate physical and meteorological fields in the Earth atmosphere characteristics and properties researches are conducted by remote optic-radio physical methods.

Relevance of the HEI USO researches and development, the obtained scientific and practical results are confirmed by demand in various spheres, including: obtaining new solutions of fundamental and applied nature scientific problems, development of the new scientific directions in carrying out researches, development and improvement of research methods, tests and measurements, creating specialized scientific and technological complexes and systems, etc. (Kachak *et al.*, 2013).

The unique scientific objects created in HEI demand necessary effective use conditions, receiving timely, full and reliable information on condition of the USO scientific, professional and technical potential, functionality level, availability to carrying out research works and rendering services to various organizations and certain researchers (Kachak *et al.*, 2013; Yermolaev *et al.*, 2013; Moiseenko and Kostenko, 2015).

SCIENTIFIC RESEARCH SCOPE

Currently the scientific research and development scope carried out in higher education institutions by means of unique scientific objects including various scientific devices and equipment (Fig. 1 and 2) (Kachak *et al.*, 2013) is highly extensive and includes the following subjects.

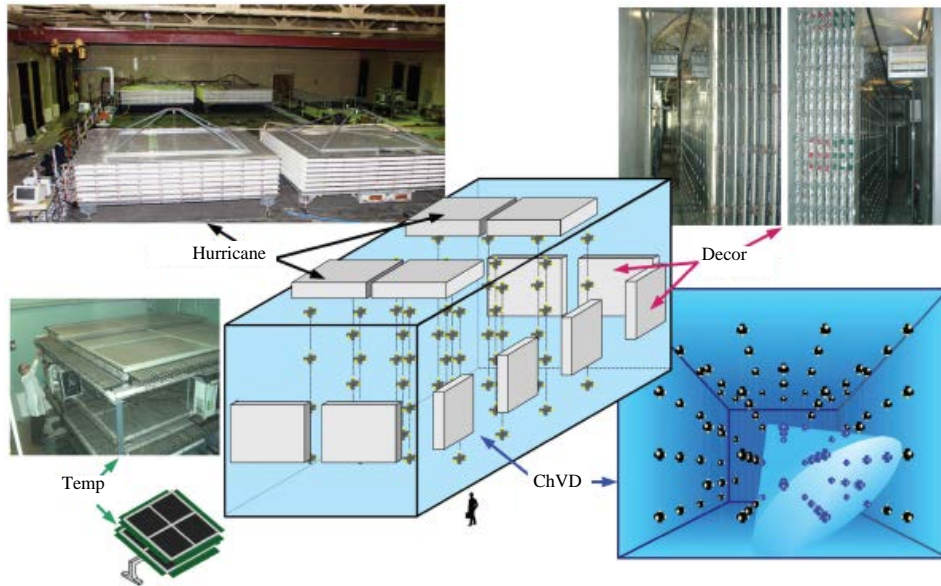


Fig. 1: Experimental NEVOD complex (EC NEVOD) of the National Nuclear Research University MIFI: HURRICANE: muonic hodoscope, providing continuous temporary ranks of a muons stream pictures matrixes; DECOR: the track coordinate detector for space beams muonic components research under big antiaircraft angles; ChVD: the Cherenkovsky water detector for charged particles registration; TEMP: muonic hodoscope on a rotary frame for registrating high-vigorous solar space beams

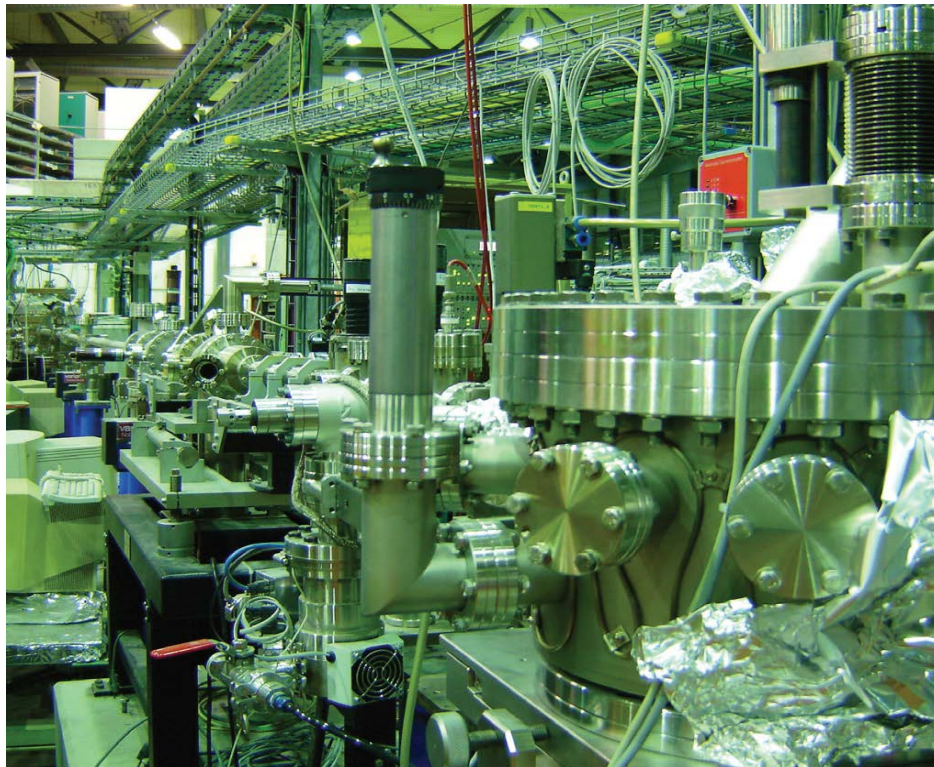


Fig. 2: Unique complex with certification and research stands of experiment preparation at St. Petersburg State University

Basic and applied researches in the field of particle physics for super-accelerating energy of the earth atmosphere and near-earth space nuclear-physical monitoring by methods of muonic diagnostics (the NEVOD Experimental Complex (EC NEVOD) of the National Nuclear Research University MIF).

Researches for optical, heat-physical, gas-plazma-dynamic and optic-mechanical multiple-factor processes of the accelerated plasma streams interaction, characteristics of the difficult chemical and ionization composition dense plasma (a cluster of experimental and diagnostic electro-physical Puchok-M modules of the Moscow State Technical University of N.E. Bauman).

Development of methods, devices and equipment for researches in the field of physical and chemical fundamentals for biology and biotechnology, cell structure, mathematical models in biology (unique scientific installation for brain information processes research using the opto-genetics methods of the Nizhny Novgorod State University of N.I. Lobachevsky).

Researches in the field of elementary particles physics, solid body radiation physics, nuclear physics; radiation and plasma materials processing technologies (the research reactor standard-Tomsk (IRT-T reg. No. 06-13) of the National Research Tomsk Politechnical University).

Studying the structure, origin and development of the Galaxy and its subsystems, physics of stars and interstellar environment, solar activity and its terrestrial manifestations (Kourovsky Astronomical Observatory of the Ural Federal University (autonomous area UrFU)).

Researches of the perception neuro-physiological mechanisms and speech information processing as well as mechanisms of brain neural activity, development of new data processing mathematical algorithms of MEG (center of neuro-cognitive researches (MEG-center) of the Moscow Psychology and Pedagogical University), etc.

In regions over half of HEI USO are concentrated in Central Federal District. Under 20% of USO are in the Volga Federal District, even less in the Northwest Federal District and also in Siberian, North Caucasian and Uralsk Federal Districts.

HEI USO INFORMATION SUPPORT SCOPE AND STRUCTURE SYSTEM

For obtaining data on scientific researches conducted by means of HEI USO the information on character and maintenance of the studied scientific problems, methods, approaches and ways of solving them, the importance of the conducted researches, the available scientific reserves, scientific novelty of research

results, quantity and the characteristic of intellectual activity results is important (Moiseenko *et al.*, 2015). The created databases for providing data on HEI USO, information and analytical system for the analysis of information on use of HEI unique scientific objects the uniform internet portal allows to assess condition of higher education institutions unique scientific objects www.ckp-rf.ru. The above-named components of providing information on unique scientific objects of the high school educational sphere form structure of information support system of HEI USO which besides, comprises of:

- Regulatory base of HEI USO
- Internet sites (pages) of HEI USO
- Materials of scientific and practical meetings, conferences, seminars, exhibitions concerning development of the HEI USO network
- Presentations of HEI USO
- Articles, reports, monographs published on scope of the conducted researches with use of HEI USO
- The documents confirming results of intellectual activity
- Information on the competitions announced by the customer within federal target programs
- Information on actions of HEI USO monitoring
- Other information materials

In interrelation of all components the block diagram of HEI USO information support will have the appearance presented in Fig. 3 (Kachak *et al.*, 2013).

All interconnected components of HEI USO information support system carry out an important role in effective use of HEI scientific infrastructure objects.

CHARACTERISTIC AND FUNCTIONAL SYSTEM DESIGNATION FOR INFORMATION SUPPORT OF HIGHER EDUCATION INSTITUTIONS USO

Information support as set of uniform data classification and coding system, the unified systems of documentation, schemes of higher education institution on unique scientific objects of higher education institutions.

The information support system of HEI USO is focused on formation and maintenance of an actual information field. Each of 3 components of information support system presented in Fig. 3 has to be updated and filled in due time with actual information including specially created databases divided into two main types. These are the databases developed for unique scientific objects which for example, allow to fix, sort, form reports

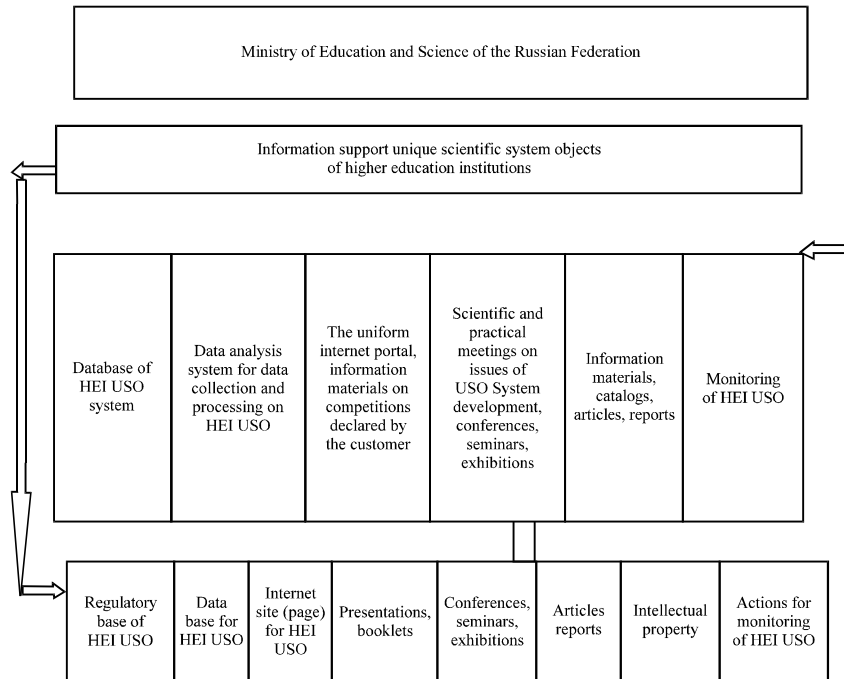


Fig. 3: Block diagram of HEI USO information support system

and store data on the conducted researches, tests and measurements, especially if data recording (parameters) were taken in the automatic mode and demands registration of values set for output parameters. Introducing database parameters in such a way as well as creating various schedules and charts, preparing reports, allows to simplify significantly the large volume input data performance.

The second type of databases on HEI USO are bases for storing and systematization of the available HEI USO (both on certain region and across Russia in general) information allowing to estimate the resource potential of USO and define possibilities of unique object for carrying out researches, tests and measurements. The internet portal can be an example of this database type www.ckp-rf.ru. On the basis of the internet portal database an opportunity to get access to the main information on USO is given, for example: surname, name, middle name of the USO head, contact information, appointment and the research branches with use of USO, USO location and other data.

Besides the HEI USO database placed on the Internet, creating the separate base located on the local computer with limited information access is possible.

The significant role in information support of higher education institutions unique scientific objects belongs to the Internet sites (pages) about HEI USO.

The Internet sites (pages) about HEI USO give research teams, scientists and researchers an opportunity to access information on scientific objects as well as allows to estimate the resource potential of HEI USO for research works performance and rendering services to receive information on results of the conducted researches in various science and equipment areas to find new opportunities of USO resource potential use.

It should be noted that among the Internet sites on HEI USO there are sites located on their own domain and having their own individual design. Among them are:

- Moscow Aviation Institute (National Research University) (PP-2 stand installation) www.spp2.ru
- Moscow State Psychology and Pedagogical University (MEG-center) www.megmoscow.ru
- Moscow State Construction University (research equipment complex of NOC NT MSCU) www.nocnt.ru/index.php/ru/

Use of such components as scientific and practical meetings, thematic conferences, seminars, “round tables” for live, collective discussion form of organizational and legal, financial and other issues of the USO network and prospect development condition is important for information support system development. The main distinctive feature of such discussion form is that heads

of the USO organizations, representatives of the interested ministries and departments, scientific community and mass media can take part in it. The direct exchange of opinions on the HEI USO activity issues solution, including the question-answer mode, enables the participants of meetings, conferences and seminars to receive necessary information to achieve effective work of separate USO and development of the USO network in general. Verifying this it is the “Centers of Collective Use and Unique Scientific Installations in the Organizations Subordinated to RAS of Russia” conference organized on October 20-21, 2015 in Presidium by the Russian Academy of Sciences within which “the round table” on the subject was carried out: “Unique scientific objects” (www.ckp-fano.ru).

Achievement of the information exchange objectives on the scientific equipment, devices and their use for the specific tasks solution is served by specialized exhibitions including international. On exhibitions the latest devices and the various profile equipment (analytical, control and measuring, test, etc.) with representation of their technical characteristics, functional purposes, application ranges are shown, the contact information of producers is provided giving the exhibition participants to receive most demanded information on specific device units (equipment) for carrying out own researches, tests, measurements, including the collective use mode. Remarkable feature of specialized exhibitions, first of all, international is that their programs as a rule, include carrying out special conferences, seminars, round tables on topical issues of these actions with orientation to practical application for the shown samples of scientific devices and equipment. For example, the held annually international specialized Laboratoriya Ekspo exhibition.

Information sources carrying out important function of the HEI USO network information support are the published catalogs and information materials containing information on HEI USO on various directions such as: general information about USO, scope of researches, international action, the used techniques, the rendered services, the equipment.

The integral element of information support are publications in the form of monographs, articles in scientific magazines, release of brochures, booklets and other publications. The demand in such information is caused, first of all, by possibility of its use by the interested users in territories for which the Internet and modern information technologies are still inaccessible.

Productivity of HEI USO information support is determined by annually monitoring carried out by the Ministry of Education and Science of the Russian Federation for results of unique scientific objects use on such parameters as:

- The name of the organization and USO created in it, year of establishment and the location of unique scientific object
- Uniqueness of USO: degree of its compliance to world analogs
- USO cost
- Development programs of USO
- Programs of the scientific researches conducted with use of USO
- Existence of publications and results of intellectual activity and their quantity
- Personnel potential of USO including number of candidates and PhD
- The directions and inter-disciplinarity of the conducted researches, degree of their compliance to the priority development directions of science, technologies and equipment in the Russian Federation and to the directions of world science
- International cooperation and other parameters

On the basis of the above it is possible to draw a conclusion that the interconnected components of HEI USO information support system in Russian regions by scope and structure are characterized by functional heterogeneity of sources providing information on HEI USO for carrying out scientific researches, tests and measurements. Information support of HEI USO possesses an important role in effective use of scientific infrastructure objects of the educational sphere.

CONCLUSION

Thus, the created information support system of HEI USO allows to assess them objectively not only by condition of their resource potential but also by possibility of granting reliable information to the interested users on unique scientific objects of higher education institutions. It is possible to draw a conclusion on prospects of HEI USO information support system use for carrying out scientific researches on various development directions of science, technologies and equipment in the Russian Federation.

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