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# The conception of the Park of Russian Innovations and Software in Geological Exploration and Mining

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*Problems of identification, expert reviewing, evaluation testing and implementation of the domestic advanced technologies and software in the field of geological exploration and development of mineral resources, as well as growth of import independency of the Russian Federation in the field of technologies and software in the Fuel and Energy Sector can be efficiently solved trough building a platform of the Park of Innovations and Software in Geological Exploration and Mining. The working results of the Park of advanced technologies and software in the field of independent expert appraisal, pilot testing, and introduction of new Russian technologies and software should be recorded in the public Unified Register of Advanced Technologies and Software, which contains information on developed, marketable and commercially implemented technological and software products having proven efficiency, and a passport created for each technology and software product*

**Keywords:** geological exploration; development of mineral deposits; innovative technologies; software; import substitution; Unified Register of Advanced Technologies and Software; system of the state expert review of mineral reserves

**P**ark of Russian Innovations and Software in Geological Exploration and Mining (PRISGEM) is an integrated system (platform) that comprises the mutually consistent mechanisms and elements of initiation, identification, peer reviewing, pilot testing and introduction of advanced technologies and software in the field of geological exploration, assessment, and development of mineral resources.

Interaction of all mechanisms and elements of the Park of Russian Innovations and Software in Geological Exploration and Mining induces the continuous development of technological and informational branches of fuel and energy sector, which are aimed at:

- Providing the continuous growth of import independence of the Russian Federation;
- Making the up-to-date data and access to the best, proven Russian technologies and software systems in the field of geological exploration and development of mineral resources available to subsoil users;
- Simplifying access of Russian software companies to the facilities for pilot testing of their technologies and software products;
- Efficient involvement into development of all the types of mineral resources (including the reserves of the RF Arctic zone);
- Creation of technological conditions to increase the mineral reserves recovery efficiency and average grade of commercial components in processed ore;
- Growth of the national mineral resources base.

### **Problems**

The amount of “easy” mineral reserves are decreasing annually both in Russia and in the rest of the world. At the same time, mineral reserves recovery efficiency do not grow or the growth slows down. The average grade of commercial components in processed ore also decreases. In turn, involvement of additional reserves (conventional and unconventional) into development and growth of recovery efficiency and average grade of commercial components are necessary to maintain the previously attained production levels and to create a basis for future increase.

There are two negative trends observed in Russian Federation over extended period; they result from the absence of approved available innovative technologies in reserves development of both solid commercial minerals and raw hydrocarbons; these trends are:

- No increase in efficiency of HC reserves recovery and decrease in average grade of commercial

components in processed ore of the conventional mineral deposits;

- Slowing down or stagnation of involvement into development of certain difficult-to-recover reserves (Bazhenov, Domanik, Khadumsky formations, refractory gold ores and rare earth mineral deposits, etc.).

One of the main causes of the mentioned negative trends is an ageing or total absence of Russian technologies and software addressing the modern problems and challenges in the fields of mineral reserves exploration, assessment, and involvement into development. At the same time, access to western technologies related to subsoil use is impeded for Russian companies because of the sanction policy conducted by the USA and European countries since 2014, which, in turn, also revealed the actual risks of negative consequences. They are: higher spending in companies, reduction of the state earnings; failure to perform the subsoil user’s license and contractual commitments; decrease in natural resource endowment in the country; breakdown in mining technological processes; threat to energy and social security of the Russian Federation as a whole.

In addition, unlocking the energy potential of the Russian Arctic containing the considerable hydrocarbon, rare metals, and other mineral reserves, depends directly on innovative solutions. They should ensure not only efficient involvement of minerals into development in harsh weather conditions, but also keep ecological balance in the region.

The direction for import-substituting and breakthrough development of industrial and digital technologies made in Russia for primary industries with the purpose to meet the national development goals, is pointed in the Presidential Executive Order No. 204 dated 07.05.2018 On National Goals and Strategic Objectives of the Russian Federation through to 2024.

Meanwhile, the necessary technologies and software are being developed in Russia, and they cover the wide spectrum of branches, namely: field geophysics; coring, core and PVT analysis; well logging and data interpretation; hydrodynamic logging; well production testing (including perforation and completion); enhanced oil recovery techniques; geological modelling and hydrodynamic simulation; economics; expert appraisal of project solutions, etc. Many operators have their own research and design institutes; the domestic IT sector that does not require considerable materials and technical resources is developing. Moreover, Russia has always been known for its highly skilled scientific, industrial and human potential of the national Fuel and Energy Sector.

### **Obstacles**

A number of obstacles impede the development and large-scale implementation of home technologies and software in exploration, assessment, and development of mineral resources, they are:

- Lacking system of communication between software companies and subsoil users on new technologies and software products being developed, evaluated, tested, and introduced;
- Lacking systematic promotion/implementation of new technologies and software (execution of pilot projects, marketing, etc.), and bringing them to commercial product level;
- Lacking of measures of efficiency and system for independent expert reviewing of new technologies and software;
- Technological (sometimes psychological) addiction of Russian subsoil users to western technologies;
- Subsoil user companies are not confident in domestic technologies and software;
- Software companies do not have the necessary financial and technological resources to prepare, test and introduce commercial prototypes.

### **Decide**

Problems of identification, expert reviewing, evaluation testing and implementation of the domestic advanced technologies and software in the field of geological exploration and development of mineral resources, as well as growth of import independence of the Russian Federation in the field of technologies and software in the Fuel and Energy Sector can be efficiently solved through building a platform of the Park of Innovations and Software in Geological Exploration and Mining.

Strategic targets of the Park of Russian Innovations and Software in Geological Exploration and Mining are as follows:

- Revealing of high-priority and promising trends of developing subsoil, technological and digital problems and challenges of geological exploration and mineral reserves development, as well as tailored demands of subsoil users in development and introduction of innovative technologies and software.
- Independent expert assessment of efficiency of technologies and software products being developed, and the results of their pilot testing;
- Providing conditions for pilot testing of Russian technologies and software systems through the synergy of scientific and technological capabilities of Russian developers of technologies and software products, material and technical resources of subsoil users, and financial resources of investment foundations;

- Fast access for subsoil users to the best domestic technologies and software systems for efficient solving both short-term and long-term problems of mineral resources involvement into commercial development;

- Laying a foundation for regulatory and methodological support of the domestic technologies and software products promotion for the sake of import independence of the Russian Federation.

The working results of the Park of advanced technologies and software in the field of independent expert appraisal, pilot testing, and introduction of new Russian technologies and software should be recorded in the public Unified Register of Advanced Technologies and Software, which contains information on developed, marketable and commercially implemented technological and software products having proven efficiency, and a passport created for each technology and software product.

### **Prerequisites**

In the system of the Ministry of Natural Resources and Environment of the Russian Federation and Rosnedra, the mechanisms created back in the Soviet period for expert appraisal of mineral reserves and detailed development plans for mineral deposits, are still functioning effectively. At the instruction of the President of the Russian Federation, processes of updating the national classifications of mineral reserves and resources launched in 2013 allowed considerable converging of the procedures of resources appraisal and detailed development plans approval. In turn, this gave rise to the powerful centre aimed at identification and expert reviewing of the problems of mineral reserves studies and involving into development, promising engineering trends of field development, and revealing demands of subsoil users in new technological and software solutions necessary raise the efficiency of mineral reserves geological exploration and development.

The basis for such a centre is a system of the state expert appraisal of mineral reserves, which exists under the Federal State-Funded Institution State Commission on Mineral Resources (FBU GKZ) carrying out the expert and technical support of the state expert appraisal of reserves and consideration of detailed development plans for mineral deposits; and the Central Development Committee under the Federal Agency for Subsoil Use (CKR Rosnedra). On the basis of materials presented by subsoil users, FBU GKZ annually conducts more than 3000 expert reviews of reports on reserves assessment (or annual updates to reserves) and detailed development plans for mineral deposits, thus accumulating the maximum amount of knowledge on geologi-

cal studies and development of mineral resources over the country, as well as problems and trends of technological, software and hardware support of mineral deposits studies and development, and also identifying coordinates of growth points.

Every new detailed development plan, report on reserves assessment or information about new technologies or software that subsoil users submit to FBU GKZ, contributes to sustainable development of generation and accumulation of the up-to-date knowledge on geological, physical and chemical, and other features of mineral deposits in the Russian Federation, and also on technical opportunities and challenges of their development, which the subsoil users experience in their practice.

In addition, the Technical-Expert Board under the FBU GKZ (ETS GKZ) provides the independent expert appraisal of quality and efficiency of technical, engineering, hardware and software tools, which are applied and proposed in the field of subsoil geological exploration and sustainable use; these works are conducted upon the request of service and operator companies, research and design organizations.

In the period of 2014-2018, ETS GKZ with the participation of independent experts, reviewed, evaluated, defined the range of application, and also made recommendations on the refinement of more than 27 Russian technologies and software products (including the indicators of correspondence with foreign analogues) used in the assessment, design and development of mineral reserves. In 2019, more six Russian companies are expected to submit the materials on innovative technological solutions and software systems for consideration and testing in ETS GKZ. Over the past 5 years, the ETS GKZ mechanism has been actively sought-for by all major Russian oil and gas companies, including NK Rosneft, LUKOIL, NOVATEK, Tatneft, Gazprom Neft, as well as major mining companies: Uralkali, Pavlik Gold Ore Company, Albynskyi Mine, etc. This is indicative of a high degree of confidence on the part of subsoil user companies from both oil and gas, and mining sectors, in the ETS GKZ mechanisms.

Thus, in the current Russian system of state expert appraisal of mineral resources and detailed development plans approval, a recognized centre of competence already exists that provides continuous generation of the latest data on reserves properties of mineral deposits discovered in the Russian Federation (including shelf zone), current potential and technological problems in deposits development. The appraisal is accompanied by identification of engineering and software challenges.

Taking into account the significance of the domestic innovative technologies development for

advancement of the RF Arctic zone, it will be reasonable to supervise processes of establishing and introduction of the Park of Russian Innovations and Software by efforts of the Department of State Policy and Administration for Hydrometeorology, investigations of Arctic, Antarctic, and World Ocean of the Ministry of Natural Resources and Environment of the Russian Federation.

### **Mechanisms and elements**

At the moment, processes of creation, revealing, practical approval, and commercialization of new technologies and software products in the field of geological exploration and mineral resources development involve the separate and independent mechanisms and elements having a high potential of effectiveness, but constrained in its unlocking by the lack of balanced system interaction (**table 1**).

While software companies integrated into the major subsoil user companies are technologically equipped, they have sufficient funding for their research, and access to testing facilities, the independent software companies are usually considerably limited or completely bereft of access to such resources.

The Russian companies - subsoil users being at the same time the developers of technologies and software products, use the in-house developments only in their own technological process, without wide practical application in national exploration and production of mineral resources. A key constraint is unwillingness to share their know-how and intellectual groundworks, as companies - subsoil users believe this will reduce their competitive advantages.

Testing facilities are a substantial asset of companies - subsoil users. Access to testing facilities is essential to try out any innovative technological developments. However, companies are reluctant to make their testing facilities available to third parties because of mistrust in the operational excellence and value of such products.

Meanwhile, things are changing, and companies - subsoil users are increasingly looking for opportunities for collaboration with each other to develop new technological, hardware and digital solutions to nowadays problems of mineral resources exploration and development.

Search for new solutions and creation of innovative developments never go without highly qualified specialists. The ESUES members have unique comprehensive practical knowledge in implementation of various projects in the field of geological exploration, development, enhancement of oil recovery, etc., and in formulation of regulatory and methodological documents. In order to rise the efficiency of new software system development,

<b>Mechanism / element</b>	<b>Functionality</b>
Russian companies developing technologies and software (hereinafter – software companies) <sup>1</sup>	Development and improvement of technologies and software products in the field of subsoil geological exploration and development
Communities of experts	Bridges the highly-skilled subsoil use professionals in all the types of mineral resources and disciplines
FBU GKZ (ETS GKZ) and CKR Rosnedra	Provides continuous generation of the latest data on reserves properties of mineral deposits, current long-range objectives and technological problems in deposits investigations and development; the appraisal is accompanied by identification of engineering and software challenges.  Provides accurate and reliable assessment of quality and efficiency of the proposed technical, technological, hardware, and software systems
Companies – subsoil users	Own substantial materials and equipment, and financial resources required for implementation of software development projects, practical approval, and commercialization of new technologies and software products; and they are the main end users of innovative technologies and software products in the field of subsoil use
Investment funds	Accumulate financial resources necessary to support the stage of the practical approval of new technologies and software in the field of subsoil use within the framework of investment projects executed on a partnership basis (including a public-private partnership)
Ministry of Natural Resources and Environment of the Russian Federation and other federal executive authorities concerned (ministries and agencies)	Perform functions aimed at development of state policy and legal and regulatory framework in the field of exploration, use, management and protection of mineral resources
<sup>1</sup> Both independent and integrated into the structure of companies – subsoil users	

**Table 1.** Mechanisms and elements functioning in the processes of creation, identification, testing and industrial implementation of new technologies and software products in the field of geological exploration and development of mineral resources

testing and implementation projects, it is practical to unite the expertise (ESUES) with the advanced skills set of the Russian Alliance of Developers of Software and Information Technologies for Fuel and Energy Sector (SRPO TEK).

System of the state expert appraisal of mineral reserves and approval of detailed field development plans (FBU GKZ and CKR Rosnedra) with the participation of the Russian (and CIS countries) expert community is of paramount importance in the processes of generation of new knowledge about mineral reserves in the country, high-priority and prospective technological problems in deposits investigations and development, as well as identifying problems, trends and industry-specific technological and software requests.

In order to create, carry out pilot testing, and widely introduce new technologies and software,

investments are indispensable. Efficiency of investment funds performance in the field of innovative technologies and software necessary to involve all types of mineral resources into development and to raise its efficiency is largely complicated because of lacking the criteria for evaluation of efficiency of mentioned technologies and program products and, as a consequence, due to the lack of confidence in new Russian developments in the field of subsoil use in general. For instance, the Skolkovo Innovation Hub may become one of the investment drivers in implementation of pilot testing of new technologies and software in the field of subsoil use.

In cooperation with all the concerned federal executive authorities, the Ministry of Natural Resources and Environment of the Russian Federation is capable to provide legal, regulatory and method-

ological assistance to the processes of introduction into the wide practice of subsoil use of Russian innovative technologies and software products having proven efficiency.

### **Key objectives**

Key objectives of the Park of Russian Innovations and Software in Geological Exploration and Mining are as follows:

1. Determination of science and technology challenges and Fuel and Energy Sector demands in the field of geological exploration and development of mineral reserves, and promising areas of pilot works, including the following:

- Analysis of present-day challenges in the field of mineral deposits exploration and exploitation;
- Identification of marginal reserves and potential for mineral resource base development;
- Analysis of the market of mining industry need in technologies;
- Substantiation of objectives and trends relevance of the domestic technological and software development.

To achieve this objective, the following societies are already established: the Centre of competence that provides continuous generation of the latest data on reserves properties of mineral deposits, current long-range objectives and technological problems of fields development, and identification of engineering and software challenges during the course of state expert reviewing (FBU GKZ together with ETS GKZ mechanism, and CKR Rosnedra); and the united expert community in different fields of knowledge (ESUES).

2. Initiation of development and/or identification of new technologies and software being developed, improvement of already developed technological and software products, facilitating access of domestic software companies to the facilities for pilot testing of their technologies and software products, including:

- Coordination of research and development areas, monitoring of innovative technologies and software development conducted by different software companies involved in development of technologies and/or subsoil users and/or research and design institutes;
- Research and development and engineering works;
- Execution of pilot projects, testing, and final adjustment of technological and software products;
- Supporting Russian software companies in preparing materials and paperwork accompanying innovative developments submission for ETS GKZ consideration.

The following institutions play main roles here: Communities of experts (ESUES); software and de-

sign companies; companies - subsoil users providing access to testing facilities, logistic and financial support in cooperation with investment funds.

3. Evaluation of new technologies and software products effectiveness, including independent expert reviewing and preparing recommendations as follows:

- Prospects for the efficient implementation of Experimental Program in developing new technologies, software and hardware;
- Analysis of the results of new technologies and software products practical approval;
- Determination of industrial application range for new technologies and software;
- Revealing the scientific novelty of new technologies under development;
- Reworking of technologies, software and hardware (if necessary).

ETS GKZ plays a key role in solving this problem. It should be appropriate to involve the concerned investment funds in supervision of the results of new technologies and software evaluation test (with the purpose to enhance confidence of investment centres in domestic technologies and software).

4. Opening and keeping updated a public Unified register of Russian innovative technologies and software in the field of subsoil use, including:

- Creation and keeping updated a Unified register of the approved Russian innovative technologies and software in the field of subsoil use that contains certificates of each technology and software;
- Wide and prompt informing of subsoil users, investors, state bodies and institutions about created innovative technologies and software with proven efficiency.

This problem is being solved by expert communities (ESUES).

5. Introduction of new technologies and software products into a wide practice of subsoil use and import substitution; promotion of Russian innovative technological and software products on the market, including:

- Pilot implementation of projects approved by expert evaluation of new technologies and software products efficiency; improvement of these projects up to the quality of commercial products;
- Regulatory and methodological support of introduction of new technologies and software products with proven efficiency into a wide practice of subsoil use.

To solve this task, it is necessary to harmonize cooperation between the expert communities (ESUES), companies - subsoil users, investment funds in terms of providing full or partial funding of pilot works on testing of promising or innovative technologies and software, and the Ministry of Natural Resources and Environment of the Russian Fed-

eration (with participation of the concerned federal executive authorities).

### **The expected effect**

As a result of implementation of conception of the Park of Russian Innovations and Software in Geological Exploration and Mining, the considerable risks will be mitigated and the following outcomes will be in hand:

- **For the state:**

- Improvement of data reliability on reserves and mineral resources production forecast through identification of new development technologies, modelling techniques, and software in the field of mineral reserves exploration, assessment and exploitation;

- Involvement of additional mineral reserves into commercial development; improvement of mineral reserves recovery efficiency and average grade of commercial components in processed ore (including mineral reserves of the RF Arctic zone);

- Reliable assessment of technological development of Fuel and Energy Sector on the basis of up-to-date information on commercial availability/unavailability of domestic technologies and software products;

- Opportunity to intentionally motivate manufacturers in the strategically significant areas and prioritizing the certain domestic technologies and software in promotion on the market;

- Growth of import independence from western technological and software products;

- Increasing competitiveness of the Russian Fuel and Energy Sector and domestic technological and digital lines of business among the foreign competitors;

- Enhancement of energy, technological, and social security of the country;

- **For companies developing software and technologies:**

- Revealing technological and software problems and tasks in the Fuel and Energy Sector, focus on key current technological and software needs and industry challenges;

- Independent assessment of efficiency of new technologies and software products being developed;

- Logistical support of pilot works and access to resources (testing facilities, laboratories, hardware, etc.) and finances necessary for the development and pilot testing of new products;

- Promotion of information among potential customers on the market appearance of new technologies and software that have been tested and proved to be efficient;

- Copyright protection and compliance to legal regime of domestic technologies and software priority on the market;

- Competitive growth as against western analogues;

- **For subsoil users:**

- Availability of up-to-date substantial public information on the market appearance of new, proven, efficient Russian technologies and software;

- Fast access to the leading-edge technologies and software proven efficient in subsoil use, which are aimed at attaining relevant objectives in geological exploration and development of mineral reserves;

- Cutting inefficient costs, improvement of operations performance.

### **Conclusions**

1. Over a long period of time in the absence of new, available, and proven innovative technologies in processes of development of mineral reserves, two negative trends have developed in the Russian Federation, they are:

- No increase in efficiency of HC reserves recovery and decrease in average grade of commercial components in processed ore of the conventional mineral deposits;

- Slowing down or stagnation of involvement into development of certain difficult-to-recover reserves.

2. Meanwhile, the necessary technologies and software are being developed in Russia, and they cover the wide spectrum of branches in the field of mineral reserves investigation and development.

3. A number of obstacles impede the development and large-scale implementation of home technologies and software, they are:

- Lacking system of communication between software companies and subsoil users on new technologies and software products being developed, evaluated, tested, and introduced;

- Lacking systematic promotion of new technologies and software, and bringing them to commercial product level;

- Lacking of measures of efficiency and system for independent expert reviewing of new technologies and software;

- Addiction of Russian subsoil users to western technologies;

- Subsoil user companies are not confident in domestic technologies and software;

- Software companies do not have the necessary financial and technological resources to prepare, test and introduce commercial prototypes.

4. Problems of identification, expert reviewing, evaluation testing and introduction of the domestic Innovations and Software in Geological Exploration and Mining, as well as growth of import independence of the Russian Federation in the field of technologies and software in the Fuel and Energy Sector

can be efficiently solved through building a platform of the Park of advanced technologies and software in the field of geological exploration, assessment, and development of mineral resources.

5. Strategic targets of the Park of Russian Innovations and Software in Geological Exploration and Mining are as follows:

- Revealing of topical and promising trends of mineral resources development, technological and digital problems and challenges of the Fuel and Energy Sector, as well as specific requests from subsoil users for new technological and software solutions.

- Independent expert assessment of efficiency of technologies and software products being developed, and the results of their pilot testing;

- Providing conditions for pilot testing of Russian technologies and software systems through the synergy of scientific and technological capabilities of Russian developers of technologies and software products, material and technical resources of subsoil users, and financial resources of investment foundations;

- Fast access for subsoil users to the best domestic technologies and software systems for efficient solving both short-term and long-term problems of mineral resources involvement into commercial development;

- Laying a foundation for regulatory and methodological support of growth of the Russian Federation import independence.

6. Key objectives of the Park of Russian Innovations and Software in Geological Exploration and Mining are as follows:

- Determination of science and technology challenges and demands of geological exploration and development of mineral reserves sector, and promising areas of pilot works;

- Origination of development and/or identification of new technologies and software being developed, improvement of already developed technological and software products, facilitating access of domestic software companies to the facilities for pilot testing of their technologies and software products;

- Evaluation of new technologies and software products effectiveness, practical approval of software, independent expert consideration of the results of testing both new technologies and programs;

- Opening and keeping updated a public Unified register of Russian innovative technologies and software in the field of subsoil use;

- Introduction of new technologies and software products into a wide practice of subsoil use and import substitution.

7. The key role in the system of the Park of Russian Innovations and Software should be assigned

to the ETS GKZ, expert communities (ESUES), investment funds, and the Ministry of Natural Resources and Environment of the Russian Federation.

Taking into account the significance of the domestic innovative technologies development for advancement of the RF Arctic zone, it is reasonable to supervise processes of establishing and introduction of the Park of Russian Innovations and Software by efforts of the Department of State Policy and Administration for Hydrometeorology, investigations of Arctic, Antarctic, and World Ocean of the Ministry of Natural Resources and Environment of the Russian Federation.

8. The expected effect of implementation of the conception of the Russian Innovations and Software Park is as follows:

- Enhancement of energy, technological, and social security of the country, owing also to growth of import independence from western technological and software products;

- Improvement of data reliability on reserves and mineral resources production forecast in the country through identification of new development technologies and software systems in the field of mineral reserves development and assessment;

- Reliable assessment of technological development of Fuel and Energy Sector on the basis of independent expert assessment of efficiency and up-to-date information on commercial availability/unavailability of domestic technologies and software products;

- Opportunity to intentionally motivate manufacturers in the strategically significant areas and prioritizing the certain domestic technologies and software in promotion on the market;

- Increasing competitiveness of the Russian Fuel and Energy Sector and domestic technological and digital lines of business among the foreign competitors;

- Providing assistance to companies developing software and technologies in pilot works and access to resources (testing facilities, laboratories, hardware, etc.) and finances necessary for the development and pilot testing of new products, the effectiveness of which is confirmed by independent expert evaluation;

- Fast access of companies - subsoil users to the leading-edge technologies and software proven efficient in subsoil use, which are aimed at attaining relevant objectives in geological exploration and development of mineral reserves.

**Logical diagram of relationships between elements and mechanisms of the Park of Russian Innovations and Software**

- Technical-Expert Board under the Federal State-Funded Institution State Commission on





**Fig. 1.**  
**Logical diagram of relationships between PRITiPO elements and mechanisms**

Mineral Resources (ETS GKZ) in cooperation with Communities of experts reveals technological and computer-based (digital) prospects for the development of geological exploration and exploitation of mineral reserves, short- and long-term objectives and topical problems of involvement additional reserves into development, increasing the recovery indicators, as well as the needs of subsoil users in efficient technological solutions.

- With the support of Communities of experts and Russian Alliance of Developers of Software and Information Technologies for Fuel and Energy Sector (SRPO TEK), companies developing software and technologies submit the documents and materials on technological and software developments in the field of geological exploration and development of mineral reserves for consideration by ETS GKZ.

- With involvement of independent experts, ETS GKZ evaluates the efficiency of presented technologies and software and provides recommendations on practicability of testing and practical approval stage or returns to companies developing software and technologies for reworking.

- Basing on civil mechanisms, Communities of experts organizes interaction of developers, subsoil users and investment funds to test and pilot new technologies and software recommended by ETS GKZ.

- Subsoil users make available their testing facilities and material and technical resources and,

in cooperation with investment funds, financing for pilot testing and practical approval of new technologies and software products. The stage of practical approval and evaluation testing of new technologies and software products is implemented.

- Documents and materials prepared by the companies developing software and technologies on the results of pilot testing and practical approval with the support of Communities of experts and SRPO TEK, are considered by ETS GKZ that confirms or not the efficiency or prospectivity of new technologies and software products. Proven technologies and software are included into the public Unified Register of Advanced Technologies and Software in the field of geological exploration and development of mineral reserves; they are accompanied by passports.

- The subsoil users in their business process change over to use the new Russian technologies and software products with the efficiency approved within the framework of the Park of Russian Innovations and Software.

- The Ministry of Natural Resources and Environment of the Russian Federation in cooperation with the concerned federal executive authorities (if necessary) makes amendments and additions to the regulatory and methodological documents to establish priority and provide for practical application of Russian technologies and software products with proved efficiency in subsoil use. <sup>(10)</sup>



# 25 СУРГУТ. НЕФТЬ И ГАЗ

MEMBER OF THE REGULAR LINEA OF INTERNATIONAL AND FAIRS

ЧЛЕН ПЕРМАНЕНТНОГО СОЮЗА ВЫСТАВОК И ФАЙРОВ

— XXV СПЕЦИАЛИЗИРОВАННАЯ ТЕХНОЛОГИЧЕСКАЯ ВЫСТАВКА —

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ОПРАВИТЕЛЬ:



ИНФОРМАЦИОННЫЙ ПАРТНЕР:



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