

# Project Report

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| <b>Abstract :</b><br>This document presents the ICT R&D priorities in Russia and ICT R&D areas recommended for cooperation with Europe. . It's an update of an older document created under ISTOK - SOYUZ project. |
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## Russia's ICT R&D Priorities

Russia has been traditionally known as the "old" scientific partner of the European Union. Many developments have taken place in recent years in Russia and its image as the "old" partner has changed. Russia has a strong R&D sector, though the scale of conducted research activities and their financial support have been considerably reduced compared to the ones observed in the Soviet Union. During the last 10 years, R&D funding in Russia has been growing permanently, facilitated by the constant GDP growth (6-7% per year) and by the increase in the R&D expenditures (1.4% of GDP by 2004).

In 2007, the share of IT sector in Russian GDP was about 1.4%, which is several times less than in EU countries, USA and Japan. However, the Russian IT sector grows by 20-30% per year and its sales volume was estimated at 25 billion Euros in 2007. The greatest growth is observed in software and hardware supply in the framework of integration projects. In the software production sector, the Russian companies progress in their narrow niches such as IT security, speech recognition, computer-aided translation, etc. without competing with big transnational corporations in operating systems, databases or ERP. Some Russian companies are already visible at the global IT outsourcing market and included in world ratings. Russian software export is estimated about 1.5 billion Euros, yielding only to India and China.

Today, the goals and objectives of the Russian State ICT-related policy are not formulated clearly enough and dissipated over several documents. These documents are dedicated directly to the general ICT development or to its specific areas (e.g. "Strategy of development of an information society in Russia", "Concept of the development of the market of information technologies in the Russian Federation") while the priority areas of ICT R&D are contained in the strategic documents defining the national R&D development policy in general (e.g. "Strategy of science and innovation development in the Russian Federation for the period till 2015", "The basics of the policy of the Russian Federation in the development of science and technology till 2010 and further on").

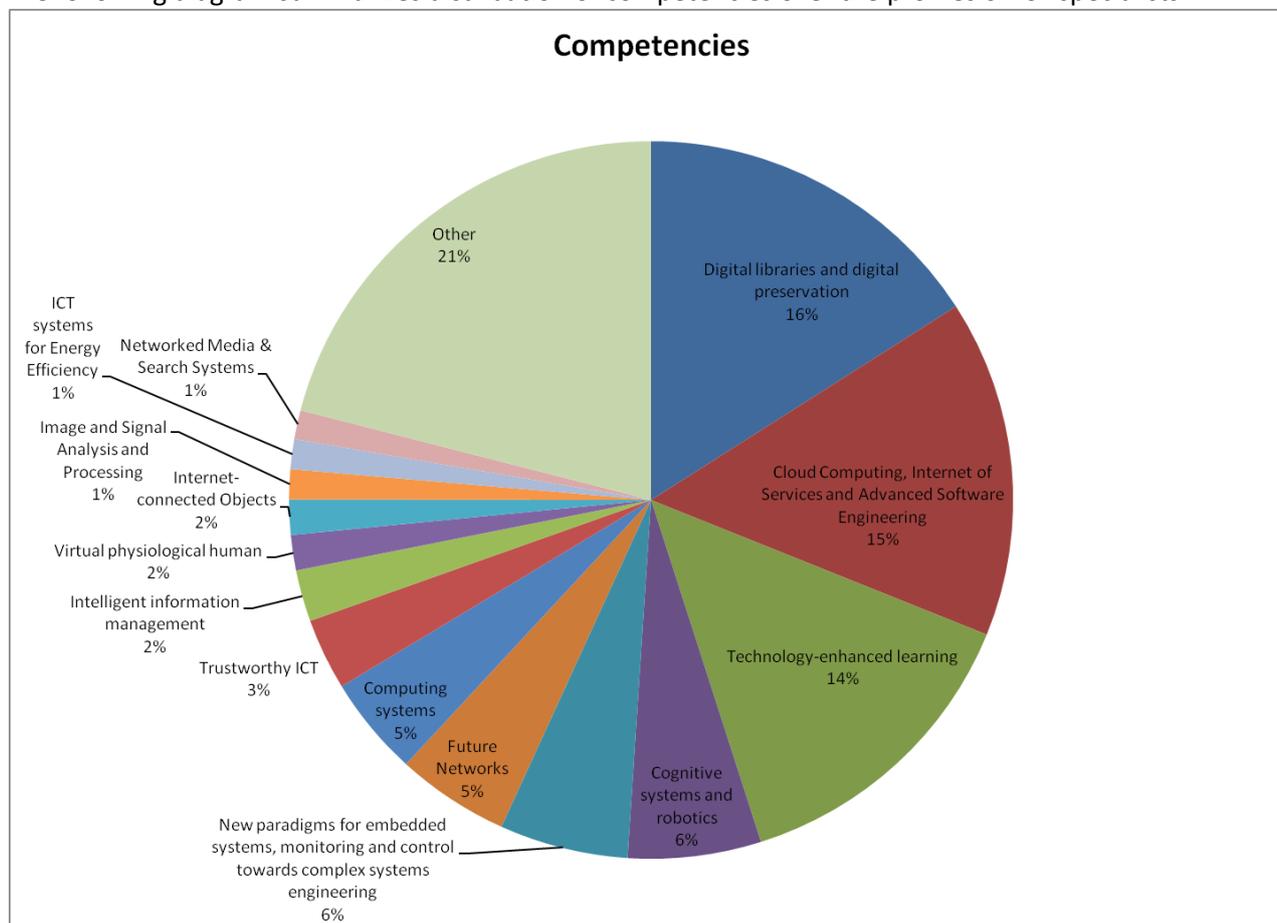
According to the study "Long-Range Technology Forecast: Russian IT Foresight" (2005-2006, by RF Ministry of Information Technologies and Communication), the expert evaluation of ICT R&D level in Russia is relatively optimistic. However, the prospect of Russia's entering the top five ICT production and export countries has a low probability. Yet thanks to a low labour productivity of Russian IT specialists, it is possible that Russia takes stronger position in a middle-term and long-term view, as compared with 2006. This can be partly explained by a low level of IT outsourcing in Russia, that is, the fact that most enterprises that are not IT specialists prefer to solve IT problems in-house.

Russia is one of the most active participants of FP6/7 among the third countries. Still, most ICT cooperation projects with Russian participation are based on personal links. It is also to be noted that in the middle and end of 90's, Russian organizations' key motivation for taking part in joint projects was an opportunity of attracting additional financial resources for R&D. But in the last years, due to growing R&D funding in Russia, the following factors became prevailing, such as new references, establishment of strategic partnerships at international markets, new opportunities for promoting their competences, technologies and products to the European market, improving one's image and reputation. This is to say that there is a high potential for EU-Russian collaboration in the ICT field.

In 2010 Russian Government initiated creation of Russian Technology Platforms following the pattern of the European Technology Platforms. In April 2011 25 Platforms were approved; 4 Platform are related to ICT (they are listed in ...). Emergence of the technology platforms create a new landscape of ICT research in Russia since it is a new tool to consolidate resources and focus efforts on key and strategic technologies and domains.

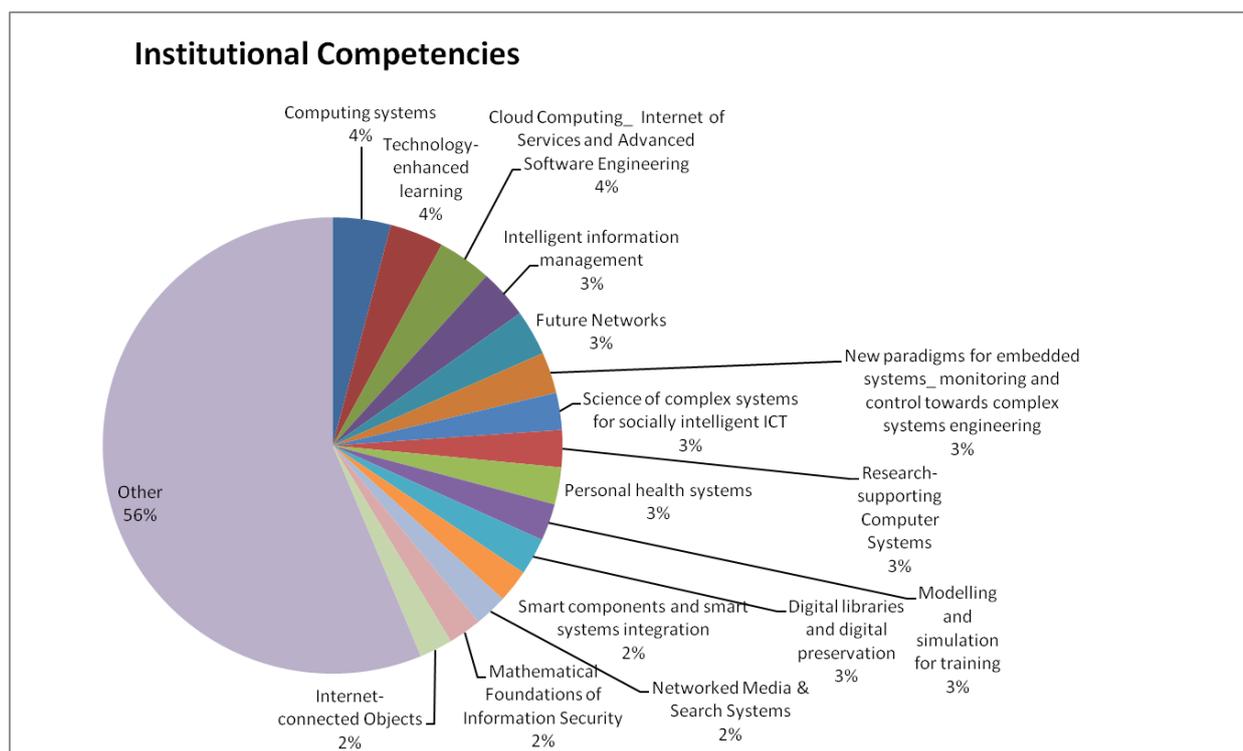
## Survey of the EECA ICT Competence Platform

The EECA ICT Competence Platform contains 1058 profiles of ICT specialist and 64 profiles of organizations. The following diagram summarizes distribution of competencies over the profiles of ICT specialists.



This diagram depicts the 15 competencies that were claimed most often by the Russian ICT specialists. The 'Other' segment of this diagram embraces more than 40 competencies which were reported by 30 researchers or less. The list of 'Other' competencies includes Mathematical Modeling in Sociology and Economics, Data-driven simulation, Research-supporting Computer Systems, Personal health systems, Future Internet Research and Experimentation (FIRE), Cooperative systems for energy efficient and sustainable mobility, etc.

The following diagram presents distribution of top 15 ICT competencies claimed by the registered ICT R&D organizations.



The big ratio of 'Other' competencies shows that ICT competencies of Russian ICT R&D organizations are uniformly distributed over a wide range of ICT domains. It makes the task of identification of ICT domains with critical mass and selection for cooperation priorities extremely difficult (see the next section).

### ***ICT R&D areas recommended for cooperation with Europe***

Identifying the critical mass of ICT research in the country and observing the ICT development policies in effect in Russia allowed the detection of R&D ICT areas, which are more propitious for EU-Russian cooperation. As the analysis presented in the previous section shows, the ICT competencies in Russia are uniformly spread over a wide range of ICT domains. There only 3 domains that could be referred to as having 'Critical Mass of competencies', all other ICT areas account comparable number of researchers and R&D organizations.

In order to identify topics best suited the international cooperation the method of analysis was updated. The following table lists the domains that:

1. Correspond to the top-rated topics in both lists of competencies: individual competencies of the registered ICT specialists and institutional competencies of the registered ICT R&D organisations.
2. References in the national policies of ICT development.
3. Undergo strong consolidation activities, such as National Technology Platforms or other All-Russia federation programmes.

The table below summarises those recommended ICT priorities.

The major update to the intermediate revision of the document is inclusion of Russian Technology Platforms, the new initiative of the national government oriented towards consolidation of R&D and funding resources in specific areas crucial for industry development and modernization.

| R&D ICT areas  | Argument   |
|--|--|
| <b>Advanced Software Engineering</b>                                     | <p>Construction of Software Engineering tools and development infrastructures is listed as a critical technology of the Russian Federation. Russia has profound background in both applied software development and systems development.</p> <p>Latest initiatives of the Russian Government on Software Engineering, including creation of the National Software Platform, manifest the intention to replace imported software in state governance and enterprises with open-source alternatives. Selection of open-source products opens the way to unique mutually beneficial cooperation between EU and Russia. Open-source software does not have borders, it easily allows for collaborative development and reuse in various scenarios.</p> <p>Establishment of the National Software Platform provides an opportunity to set up cooperation at the level of big industrial/research consortia that ETP actually are. Such cooperation might result in further clarification of Strategic Agendas and Implementation Plans.</p>   |
| <b>Embedded Systems</b><br><b>Robotics</b><br><b>Intelligent Systems</b> | <p>Embedded systems are widely used to control complex systems. Russian research bodies and private companies are active at development new hardware and software embedded systems; focus is on the real-time control systems and extreme conditions of operations.</p> <p>EU-RF R&amp;D collaboration in the field of embedded electronics components will contribute to increasing the share of the ES value in the value of the final product especially in sectors such as Industrial, Telecommunications, Consumer Electronics, Smart Homes and Health/Medical Equipment.</p> <ul style="list-style-type: none"> <li>• ES EU-RU cooperation will be particularly promising in the automotive sector (the share of embedded electronics in the car will reach 35-40% by 2015)</li> <li>• Automation in consumer goods is likely to be the strongest driver in the near future</li> <li>• Joint R&amp;D projects oriented to advanced procedures for embedded decision-making can expect a rapid return on investment from telecommunications and multimedia requiring research activity on sensors and communication, networks (conventional and wireless).</li> </ul> <p>The impact is however likely to be felt even more widely in emerging applications such as monitoring over sensor networks and control of industrial processes over wireless Networks.</p> <p>This domain is supported by the National Platform on Mechatronics, Embedded Control Systems, RFID and Robotics.</p> |

| R&D ICT areas  | Argument   |
|--|--|
| <b>GRID and Cloud Computing</b><br><b>High-performance computing</b> | <p>Russia has developed an outstanding expertise in key fundamental research domains such as micro/nanoelectronic, aerospace and other scientific domains making strong use of mathematical background. All of these require intensive modeling and computations.</p> <p>High Performance Computing (HPC), including Grid computing, cloud computing, supercomputers, is the major research tool in physics, chemistry, biology and other sciences. HPC is one of the driving forces of the modern technology; it is used in automobile, aerospace, microelectronics and other industries.</p> <p>Russia has a critical mass of competences in HPC systems design and implementation, its applications to various needs of natural sciences and national industries.</p> <p>5 Supercomputers installed in Russian Universities and research centers are listed in November 2011 TOP 500 list of the most powerful supercomputers in the world, 30 systems have peak performance above 10 TFLOPS.</p> <p>Supercomputing domain progressed in 2009-2011 rapidly: the total computing power of HPC resources doubles each year.</p> <p>The computing resources of universities and research centers are being consolidated in the "University cluster" initiative that federates the HPC resources all over Russia to build a global educational and research workbench on supercomputing.</p> <p>This domain is supported by the National Supercomputing Platform.</p> |
| <b>Network of the Future</b>   | <p>The vastness of the territory of Russia gives a unique opportunity for large scale networking infrastructures, providing access to new services and next generation services for more than 10% of the Earth's land. It calls for new communication media, new security challenges and trust infrastructures. Russian Government has already announced "Digital-TV" initiative to bring new digital service to every household in the country.</p> <p>There are some hard reasons to raise the importance of EU-RU joint projects in this field. Firstly this area has a great potential related to growing interoperability between infrastructures. Secondly, EU scientists attesting very strong theoretical background need to reinforce the "proof of the concept" level and validation of research results. Russian IT researchers possess very strong software engineering skills, which has a great impact on rapidly proving the conceptions in applied research areas. Finally, the joint next-generation IT projects can incite a huge interest of business investors requiring for quite obvious demonstrations of success and for rapidity of technology commercialization.</p> <p>This ICT domain correlates with the National Software Platform.</p>  |

| R&D ICT areas                        | Argument  |
|--------------------------------------|---|
| <b>Nanoelectornics and Photonics</b> | <p>Nanotechnologies are included into the list of the critical technologies of the Russian Federation. State corporation “RosNano” was established to fund fundamental and applied research in this area. Several leading research centers including Kurchatov Institute were oriented towards research in nanotechnologies.</p> <p>It is reasonable to launch collaborative action relevant to the entire topic of nanoelectronics. Russia has a critical scientific mass and advanced technological competences in the entire nanoelectronics area:</p> <ul style="list-style-type: none"> <li>– next generation nanoelectronics components and electronics integration;</li> <li>– organic and large area electronics;</li> <li>– computing systems;</li> <li>– photonic component and subsystems</li> <li>– micro- and nano-systems</li> <li>– nanodevices, nanomaterials</li> </ul> <p>These domains are supported by the National Platform “Innovative Laser, Optical and Optoelectrical Technologies – Photonics” and RUSNANO State Corporation.</p> |
| <b>Digital Libraries</b>             | <p>The research EU-RF project will boost the development of new digital library centers (academic library, law library, medical library, etc.).</p> <p>R&amp;D joint projects will contribute to achieving excellence for digitization and preservation processes. They will integrate knowledge access for technology-based and traditional companies increasing their competitiveness.</p> <p>A particular challenge that joint EURU projects should address is the need to develop stronger and more varied forms of privacy protection. A new integration initiative “Scientific Heritage of Russia” was initiated in 2010 that embraces libraries of the Russian Academy of Sciences, universities and research centers and sets an ambitious goal of providing united access to the whole body of scientific texts in the Russian language.</p>   |

| R&D ICT areas                      | Argument   |
|------------------------------------|--|
| <b>ICT for Health</b>              | <p>The 'National Health Programme' initiated by ex-president Putin provides US\$1.7 billion to build 15 specialized health centers. The program acknowledges the importance of information and communication technologies in meeting specific challenges of the healthcare sector. Health research is positioned as one of three strategic areas for cooperation with the European Union.</p> <p>This ICT domain intersects with the focus area of "Medicine of the Future" Technology Platform. The list of areas most profitable for cooperation includes Advanced patient-specific computer modeling and simulation and the Security of patient-specific data that contribute to reducing global market fragmentation and lack of interoperability through standardization and certification.</p> <p>The health market in Russia offers huge potential and is set to grow at an unprecedented rate. The Russian market for medical technology is worth US\$2 billion a year and is growing by about 15% per annum. European IT providers can strengthen their presence in Russia's healthcare market.</p> <p>In 2011 the government approved creation of "Medicine of the Future" Technology platform as well two RTPs on biology and related sciences. We can expect rapid advance in the area of ICT for Health thanks to new level of cooperation and integration in Russia that RTP should provide.</p> |
| <b>Security<br/>Trustworthy IT</b> | <p>Security is a specific topic in Russian ICT since its primary customers are law enforcement and defense agencies. As a result it is notably closed for cooperation.</p> <p>Still in 2011 the initiative of the National Software Platform proclaimed security as one of the key objectives of the platform, with stress on open-source and redistributable hardware and software systems. This gives a perspective of opening R&amp;D in security for international cooperation.</p> <p>This ICT domain is covered by National Software Platform.</p>   |

Besides the areas mentioned in the previous table some ICT-related domains are listed in «List of critical technologies of the Russian Federation», approved by the RF President in 2006:

- Bio-information technologies, in 2011 the Government approved creation of the National Platform on Bioenergetics.
- Robotics and micro-system technologies, these domains are inclined with embedded control systems in the current RTP distributions.
- Information processing, storage, transmission and protection technologies; it is closely related to both Software Engineering and supercomputing. These topics are more-or-less presented in the National Software Platform and in the National Supercomputing Platform
- Software development technologies,
- Distributed computing and system technologies,
- Technologies for development of intelligent navigation and control systems,
- Technologies for development of electronics components.

## ***Russian Technology Platforms in ICT***

In 2010 Russian government undertook new course towards intensification of R&D in various so called “Critical Technology Areas”, including ICT. The new course is devoted towards intensification research, development and deployment of new technologies, leading Russia towards the economy of knowledge. Russian Technology Platforms (RTP) was proclaimed to be one of the primary tools of the new course. The way how RTPs are implemented, is closely related to the European Technology Platforms.

The first step towards RTP was performed by the Government Committee for High Technologies and Innovations in 2010. The first draft of RTP Programme was presented by Deputy Minister of Economic Development of the Russian Federation A. Klepach in his speech<sup>1</sup> at the session of the Government Commission for High Technologies and Innovations on August 2, 2010.

The primary goal of RTP Programme is to solve a number of critical problems to transform the economy into innovative and knowledge-based:

- Increase the innovation activity of industry by means of research coordination facilities introduced by RTP, shared access to research institutions and laboratory facilities, establishing permanent partnerships with leading research and educational centers.
- Focus state funding on research and development in business-critical domains, maximizing the effect of corresponding state programmes on the competitiveness of the economy and the amount of private investments into hi-tech projects.

The list of R&D domains for Technology Platforms is determined by the priorities of Technology Development of The Russian Federation by 2020. The programme defines two-stage process of RTP formation:

1. Specification of the list of RTPs according to procedures provided by the Ministry of Education and Science of the Russian Federation.  
By April 2011 this list included 27 RTPs.
2. Development of the supporting procedures for establishing the Technology Platforms within the Federal Programme being implemented by Ministries of the Russian Federation and governmental Agencies.

The Programme must consider the funding priorities of the emerging Technology Platforms within the funding initiatives for basic and applied research, projects on innovation infrastructure development and technology valorization of the Russian Academy of Sciences, Russian Foundation for Basic Research, other academies and state foundations.

The Ministry for Economy Development, together with the Ministry for Science and Education and the Ministry for Industry and Trade, are responsible for informational and consulting support at the stage of RTP foundation, coordination of Federal Research Programmes with the strategic research agendas developed by the RTPs, intensification of international scientific cooperation and attraction of direct investments from abroad.

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<sup>1</sup> In Russian, [http://www.economy.gov.ru/minec/about/structure/depStrategy/doc20100802\\_016](http://www.economy.gov.ru/minec/about/structure/depStrategy/doc20100802_016)

## ***National Platforms in ICT Domain***

By April 2011 the Russian Government approved creation of 25 Technology Platforms, with 4 acting in ICT domain. The platforms are in early stages of development.

| <b>Platform Title</b>   | <b>Coordinator</b>   |
|---|--|
| <b>National Software Platform</b>   | JSC "Sirius"<br>E-mail: <a href="mailto:info@con-sirius.ru">info@con-sirius.ru</a><br>Web: <a href="http://con-sirius.ru/">http://con-sirius.ru/</a>   |
| <b>National Supercomputing Platform</b>   | Program Systems Institute of RAS<br>E-mail: <a href="mailto:hq@hpc-platform.ru">hq@hpc-platform.ru</a><br>Web: <a href="http://www.psi-ras.ru/">http://www.psi-ras.ru/</a><br>Moscow State University<br>E-mail: <a href="mailto:voevodin@parallel.ru">voevodin@parallel.ru</a><br>Web: <a href="http://www.msu.ru/">http://www.msu.ru/</a>  |
| <b>National Platform on Mechatronics, Embedded Control Systems, RFID and Robotics</b>             | Moscow Institute for Physics and Technology<br>E-mail: <a href="mailto:kpz@rt.mipt.ru">kpz@rt.mipt.ru</a><br>Web: <a href="http://www.mipt.ru/">http://www.mipt.ru/</a><br>Russian Nanotechnology Corporation<br>E-mail: <a href="mailto:Georgy.Kolpachev@rusnano.com">Georgy.Kolpachev@rusnano.com</a><br>Web: <a href="http://www.rusnano.com/">http://www.rusnano.com/</a><br>Central Research Institute for Robotics and Cybernetics<br>E-mail: <a href="mailto:voevodin@parallel.ru">voevodin@parallel.ru</a><br>Web: <a href="http://www.msu.ru/">http://www.msu.ru/</a> |
| <b>National Platform on Innovative Laser, Optical and Optoelectrical Technologies – Photonics</b> | Laser Association<br>E-mail: <a href="mailto:las@tsr.ru">las@tsr.ru</a><br>Web: <a href="http://www.cislaser.com">www.cislaser.com</a>   |