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Presidium of Russian Academy of Sciences

Science management: Challenges of the 21st Century[*]

Abstract

A number of global issues like energy supply, climate changes, biotechnology and food, health, information and communications, terrorism etc., which are in the face of the humankind cannot be solved by the efforts of individual even highly developed industrial countries. The only way to solve these issues is to combine the intellectual, material and technical resources of all the countries. Therefore, one of the challenges of the XXI century, globalization of Science, requires the development of new tools of Science management. European Union and the Framework Programs in particularly are among the most important areas for the development of science management serving to arrange the cooperation not only of the countries of the European Union, but also of the so-called „third countries". Among the third countries, the Russian Federation, the United States, China, and India are particularly successful in cooperation under the European Framework Programs. Apparently, the traditional tool of international cooperation is the bilateral and multilateral projects which are mutually supported on an equal footing. Moreover, new tools of international cooperation were developed and tested over the recent decade. They include the joint international laboratories and networks under co-direction of principal partners with a shared budget. These new tools give new opportunities to share the expensive equipment, advanced technologies, the unique materials, and an access to the informatics base data. Furthermore, special huge technical centers, so-called „platforms" are created to achieve the same technical objectives. The use of different tools of international cooperation, joint projects, laboratories, networks, platforms, implies the spe-

[*] The paper is a Power point presentation delivered at the Conference.

cial training mostly of young researchers under co-supervision. Indeed, PhD students are widely trained in the frame of bilateral agreements between different European countries. Noteworthy, the first European program of this kind was created by the Russian Academy of Sciences and the French Ministry of Education and Science in the early 90-ties. It occurred to be very efficient, first for development of bilateral long-term cooperation and then for protection from the brain-drain of the Russian researchers during the political and economical crisis in Russia in the 90-ties. For the successful development of science and new technologies, the authorities should: (a) support this key area in a value nor less than 2.5% GDP, (b) create lows facilitating the scientists migration as well as the transportation the equipment and scientific specimens from one country to another, (c) provide good accommodation for invited researchers; (d) exempt from taxes when purchased scientific equipment and materials, etc.

Thus, a number of global issues, which are in the face of the humankind, can be solved by joining of efforts, the intellectual, material and technical resources, of all the countries.

International Conference
VALUES AND 21st CENTURY
19-21 November 2009, Podgorica

Challenges for world society and science in the 21st century :
Climate, energy, food, pure water, human health, space flights, terrorism

Internationalization and globalization of science :
Cooperation instead of competition – pooling of international facilities

International megaprojects :
- ✓ *Human genome project;*
- ✓ *Large hardon collider;*
- ✓ *International space station, etc.*

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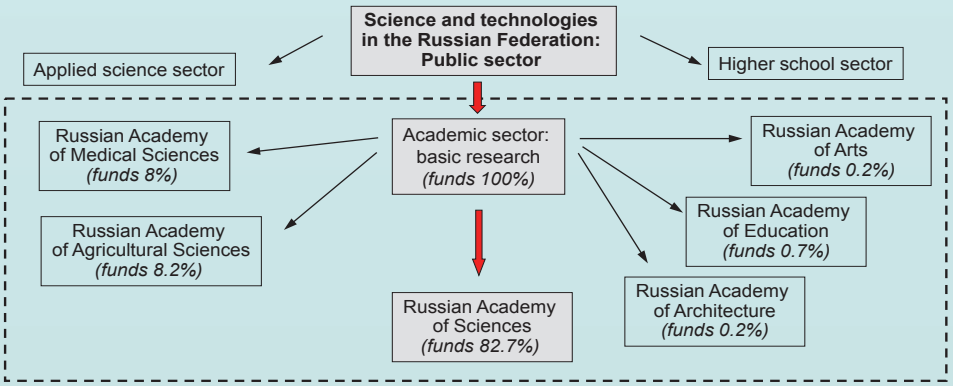
Advanced tools of science management :

- ✓ Bilateral and multilateral international projects (programs);
- ✓ Joint laboratories;
- ✓ Scientific international networks;
- ✓ Technical centers – “platforms”;
- ✓ Access to any kind of information;
- ✓ Mobility of scientists – “brain circulation”

Russian Academy of Sciences
Mechanisms of integration to European science :
Progress and problems

RUSSIAN ACADEMY OF SCIENCES AS A PRINCIPAL PARTNER FOR INTERNATIONAL COOPERATION IN BASIC SCIENCES AND TECHNOLOGIES



What is the Russian Academy of Sciences (RAS) ?

RAS is a state self-governed non-commercial organization with the following objectives:

- Obtaining of new knowledge in Basic and Social Sciences
- Coordination and expertise of the investigations in Basic and Social Sciences in Russia

Primary

- Development of new technologies and their transferring to industry
- Training of highly qualified researchers
- Development of the international cooperation in Basic and Social Sciences

Secondary

What are the indicators of efficiency in Basic Sciences

?

Paper published in a peer-reviewed international journal is the principal **product** in Basic Sciences as a source of new knowledge

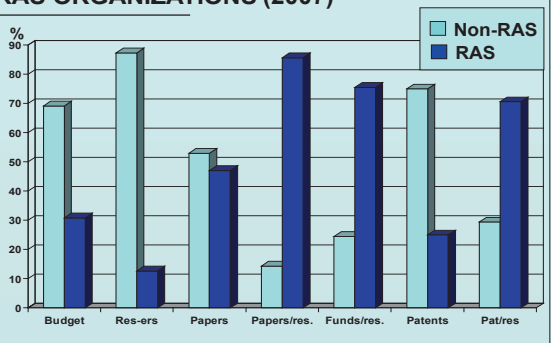
- Number of papers is a quantitative indicator of scientific efficiency;
- Impact factor of a journal is an indicator of quality of the paper;
- Citation index of a paper is an indicator of its demand in the open market

Patent is a manifestation of the development of new technologies under new knowledge being a **co-product** in Basic Sciences

EFFICIENCY OF BASIC RESEARCH IN RUSSIA: RAS AND NON–RAS ORGANIZATIONS (2007)

Comparative competitiveness of RAS and non-RAS organizations

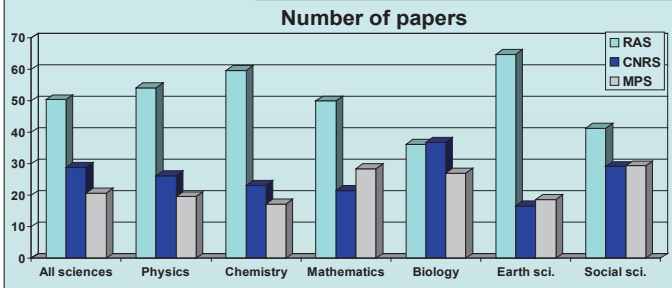
Organization / Characteristic	Non-RAS	RAS	% RAS
Number of institutes	3 525	432	10.9%
Number of researchers	342 873	49 683	12.7%
Number of papers	12 554	16 641	57.0%
Number of papers per researcher	0.04	0.3	88%
Number of patents	1726	572	25.0%
Number of patents per researcher	0.005	0.012	70.6%

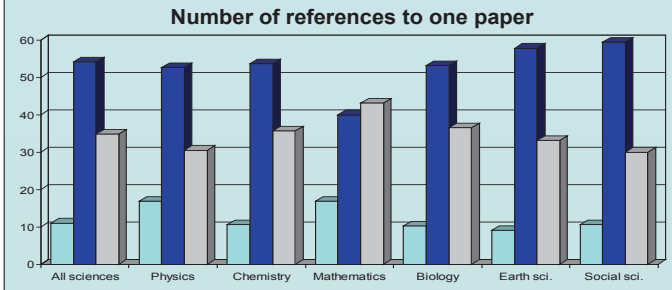


Conclusions

- The efficiency of RAS is as high as that of non-RAS organizations in a whole despite significantly lower human and financial recourses that is partly explained by:
  - ✓ Long-term traditions in basic sciences ("scientific schools");
  - ✓ Well-developed management infrastructure, material and technical basis;
  - ✓ Long-term and wide international cooperation
- The efficiency of individual researchers in RAS greatly exceeds that in non-RAS organizations

EFFICIENCY OF BASIC RESEARCH IN RAS, CNRS, AND MPS (papers 1996-2007, ESI)*





*Papers in peer-reviewed Russian and international journals (Web Science)

Conclusions

- The number of papers in RAS significantly exceeds that in CNRS and MPS when evaluating papers published in selected peer-reviewed international and Russian journals
- Citation index of one paper is significantly smaller in RAS than in CNRS and MPS; It might probably be higher if excluding Russian journals from evaluation

RUSSIAN ACADEMY OF SCIENCES : INTERNATIONAL COOPERATION

6 Intergovernmental agreements with the RAS participation

9 Intergovernmental scientific programs with the RAS participation

108 Agreements with the Academies of Sciences in **60** countries

46 International non-governmental scientific organizations with the RAS membership

415 Contracts with national scientific agencies and individual organizations in **75** countries

40 International joint laboratories and networks with the RAS participation

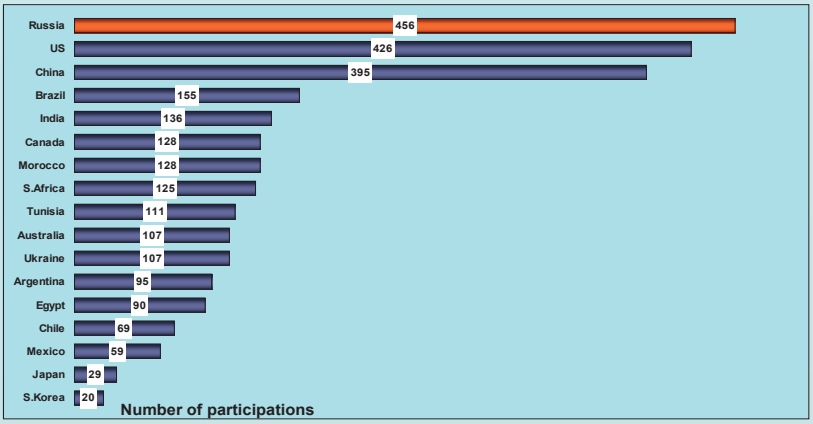
1782 Travel grants provided by the RAS and foreign partners in 2007 for visiting researchers

COOPERATION OF THE RAS WITH THE EUROPEAN COUNTRIES IN BASIC RESEARCH : PRINCIPAL PARTNERS

Country	Agreements
France	Centre National de la Recherche Scientifique; Institut National de la Recherche Agronomique; French Academy of Sciences; L'École des hautes études en sciences sociales; Maison des science de l'homme; Universities Bordeaux I and Paris 6
Germany	Max Planck Society, Deutsche Forschung Gemeinschaft, Berlin-Brandenburg Academy of Sciences; Helmholtz Society, German Academic Exchange Service
Italy	National Research Council, Accademia Nazionale dei Lincei, "Alessandro Volta" Centre for Scientific Culture, National Institute of Nuclear Physics, Consiglio Nazionale delle Ricerche.
UK	The Royal Society
Czech Republic	The Academy of Sciences of the Czech Republic
Hungary	The Academy of Sciences
Norway	University of Oslo, Bergen University
Spain	Spanish High Council for Scientific Research, Madrid Polytechnic University
Sweden	Royal Academy of Sciences, Royal Swedish Academy of Letters, History and Antiquities
Switzerland	World Agency for Planetary Monitoring and Earthquake Risk Reduction

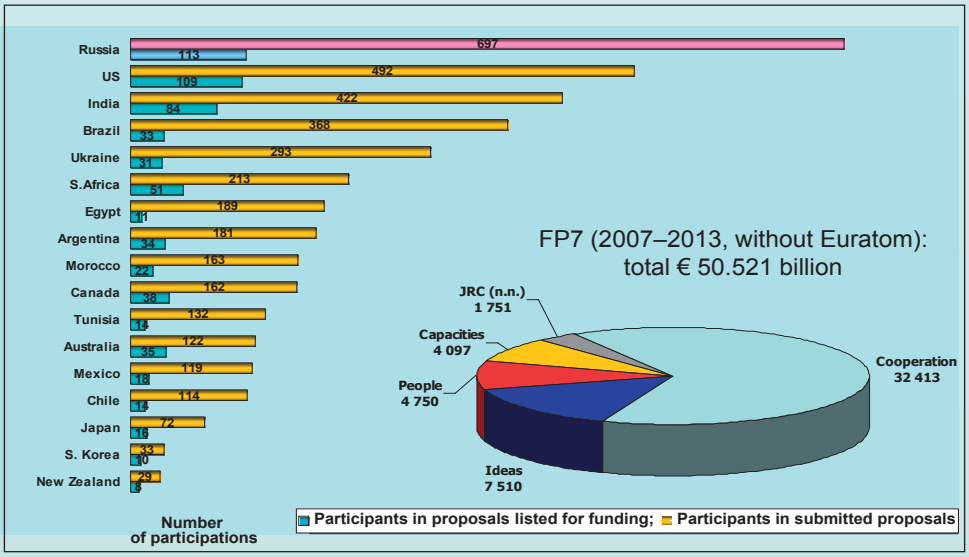
10 Joint French-Russian Laboratories (CNRS-RAS)
20 European networks with the Russian participation

PARTICIPATION IN FP6 OF MOST SUCCESSFUL THIRD* COUNTRIES (2002-2006)



*Non-members of the EU

FP7: BUDGET, PARTICIPATION OF "THIRD COUNTRIES"*
Cooperation and Capacities Programs, first call



*Non-members of the EU

OVERALL RESULTS OF PARTICIPATION OF RUSSIA IN FP6

455 Number of Russian organizations supported by FP6

268 Number of projects in FP6 with the Russian partnership with a total budget **€2.8 billion**

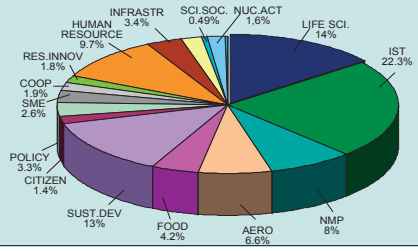
50 M€ Total funding of Russian participants in FP6

1.8% Average funding of Russian participants per project

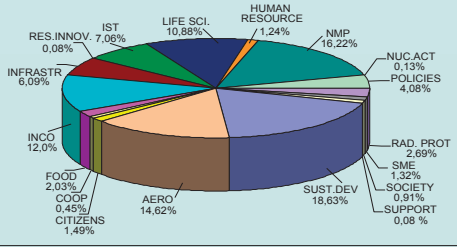
1 : 0.8 ÷ 4 Contribution of non-RAS and RAS organizations to FP6 estimated by:

- ✓ The number of projects;
- ✓ The number of Institutes;
- ✓ Funding

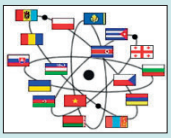
Distribution of FP6 budget (17 883 M€)



Funding of Russian participants of FP6



INTERNATIONAL TECHNICAL CENTERS "PLATFORMS"

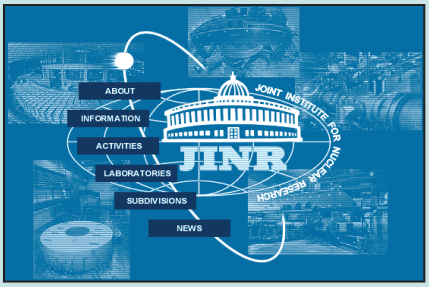


Operations:

- ✓ Execution of joint international projects;
- ✓ Training of invited researchers;
- ✓ Organization of international scientific meetings

International laboratory of Strong Magnetic Fields and Low Temperatures, Wroclaw, Poland (1968)

Joint Institute for Nuclear Research Dubna, Russia (1956)



European Research Council erc

The objective of the specific program 'IDEAS' and RAS is to reinforce excellence, dynamism and creativity in European fundamental studies and improve the attractiveness of Europe for the best researchers

RAS

How to escape ***brain drain*** and promote ***brain gain*** ?

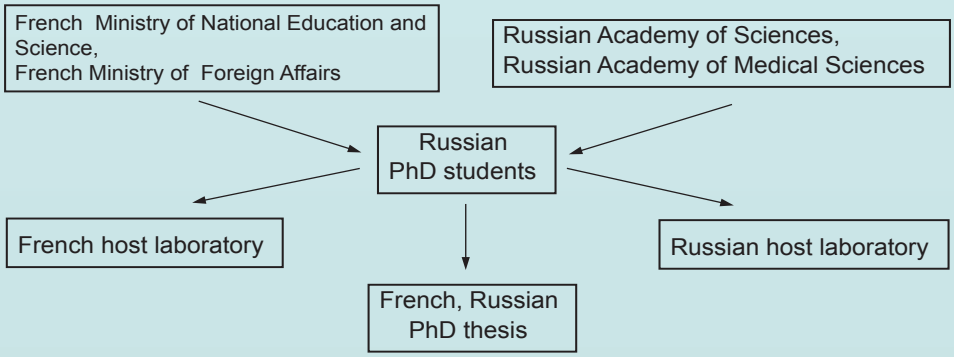
? Brain drain ≡ Brain circulation

Russian Academy of Sciences
(St. Petersburg's department) :
National Contact Point on "IDEAS"

Goal:
Encouragement of the participation of Russian researchers in competition in the frame of "IDEAS"

FRENCH-RUSSIAN PROGRAM

"Postgraduate training of Russian young scientists"
(1994-2009)



Agreement: Over three years, Russian young scientists stay annually for six months in a French laboratory and for six months in a Russian laboratory contributing to the joint project.

What is the prospect for Russia to be an associate member of FP7

?

Major points for discussion:

- Annual registration fee
- Rights of the potential Russian members in the executive committees of FP7
- Relations with ERC and the program IDEAS

What might be done to increase the efficiency of the RAS in international cooperation ?

It would be reasonable:

- To re-establish a network of the RAS representatives in the Russian agencies and international and national scientific organizations in the European countries
- To create the RAS foundation or the targeted programs for supporting international projects under competition;
- To promote a creation of international laboratories and networks on a priority basis serving to increase the efficiency of basic research and to develop new technologies;
- To prohibit brain-drain and to promote brain-gain by using the opportunities of different Russian and international foundations and programs including RFBR, Mobility (FP7), etc.;
- To extend the program for training of Russian and foreign PhD students under co-supervision in the frame of the joint international projects;
- To construct “guest-houses” in the principal centers of RAS for accommodation of PhD students and visiting researchers;
- To strengthen cooperation with FP7 by entering as an associate member.

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Thank you for your attention

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