

# Annual Report 2011

## Responsible Science Management



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# Annual Report 2011

## Responsible Science Management



## STATEMENT of the Governing Board Chairman



Over the past seventeen years, the International Science and Technology Center (ISTC) has funded projects on a multilateral basis to contribute to the solution of problems of global interest. It continues such projects today. The Center has brought together world-renowned experts to collaborate on issues of common interest, using the extensive network the ISTC has built up carefully over time. The ISTC has contributed to nonproliferation, public health, nuclear safety, biological threat reduction, a cleaner environment, and the development of new technologies for both science and industry. Global security has been enhanced by making research institutes safer and new security equipment and accounting systems for sensitive materials have been developed. Research infrastructures in various countries have been modernized, including the sustainment, enhancement, and mobilization of scientific and technological talent and other human resources.

The theme of this year's annual report—"Responsible Science Management"—is rightly chosen. The ISTC is one of the leading organizations that address the "human dimension" as an integral part of international nonproliferation policies. The value of the Center is that it brings scientific and technological solutions to fast-moving challenges of global concern. At the same time, as an intensely hands on, intergovernmental organization, the ISTC ensures that sensitive knowledge is used for its intended purposes. The ISTC is thus a very special tool for enhancing global security and well capable of working with others.

In the two decades since the founding of the ISTC, the landscape, internationally and in the countries where the Center has been active, has undergone profound changes. The ISTC has evolved to fit this changing environment and has refocused activities between and among scientists in the current member countries. Decisions to establish programs to promote Responsible Science Management and Outreach are clear examples of this step-by-step

approach to transformation and reorientation. New initiatives like these have given younger scientists working in sensitive areas a more prominent place in the work of the ISTC.

A new initiative entitled "Technologies Outreach" was launched with a view to accelerated realization of commercial benefits of ISTC-funded projects. The aim is to contribute to the policies of innovation in the countries concerned. Knowledge and ideas are being converted into products and services for economic and social benefit.

The work carried out in Russia and in the other countries supported by the Center has proven to be of tremendous value in raising awareness of challenges to global security in the widest sense. Scientists from countries beyond the ISTC's circle of members have had the opportunity to participate in ISTC-organized conferences and seminars, dealing with issues related to today's societal challenges.

The ISTC gave another excellent demonstration of its multifaceted utility in its rapid response to the tragedy that took place at the Fukushima Nuclear Power Plant in Japan. A global technology leader, Japan is one of the four founding parties of the Center. The ISTC mobilized its store of relevant experience and know-how and began a process to identify technologies for land decontamination and clean-up that will help bring solutions to the problems that have arisen in the parts of the country affected.

During the past year, the parties continued an exchange of views on their plans for the future of the organization against the background of the announcement by the Russian Federation that it will withdraw from the ISTC in 2015. National budgets are increasingly squeezed, demands on funds are more diverse, and new proliferation challenges have emerged in other parts of the world. In their discussions, the value of the Center's multilateral science and technology engagement is recognized as a flexible, available tool for cooperation on matters of great mutual interest.

Today's challenges are both global and complex. They can best be addressed by pooling together the best available know-how. The contributions of the non-Russian ISTC member countries of the former Soviet Union have proven to be of great importance in this discussion. The desire is strong among these countries for a continuation of the activities of the ISTC on their territories in the coming years. Their disappointment at the current low funding levels for research projects and other activities is understandable. In search of greater agility and efficiency, the ISTC has begun to establish a main office in Kazakhstan, and is exploring further ways of bringing more synergies into the work of the ISTC and its sister organization, the Science and Technology Center in Ukraine (STCU).

Independent and high-value peer reviews are indispensable to ensure ongoing high quality in the work of the ISTC. I would like to express the Board's gratitude for the valuable work of the Scientific Advisory Committee during all the years of the Center's advancement of science cooperation on behalf of international security and well-being. The fiftieth meeting of the Committee was celebrated in 2011.

On behalf of the Governing Board, I would like to thank all those who make the success of the ISTC possible. In particular, I would like to thank the staff working at the ISTC Secretariat and in the Branch Offices for their professionalism in the fulfillment of their tasks during the past year. The Board is fully aware that our work is carried out under challenging and unprecedented circumstances.



*Dr. Ronald F. Lehman II*  
*Chairman of the ISTC Governing Board*



## STATEMENT of the Executive Director



In 2011, the ISTC once again proved to be an efficient tool in promoting international scientific and technological cooperation with a nonproliferation component.

Many activities were carried out covering a wide range of scientific and technological issues. At the same time, further initiatives were taken to reap the benefits of our work, i.e. by promoting the commercialization of the results of ISTC-funded projects.

Numerous projects were completed in 2011. They are listed in this Annual Report. The aim is to make valuable use of these projects by promoting further collaborative research on a partnership basis and to find the investors to take the results to the market place. The results are relevant to current societal challenges in the fields of health, energy efficiency, climate change, food security and nonproliferation. In addition, an initiative was taken to identify technologies, especially in nuclear security on the basis of ISTC-funded research that could be commercialized in future.

The report also highlights the various events that the ISTC has organized to bring together experts worldwide to discuss scientific issues of global interest. Such events are related to the issues of pediatric multidrug-resistant tuberculosis, nuclear waste management and space debris mitigation.

Training programs continued to inform scientists about intellectual property protection, business development, and export control mechanisms.

The mobility of scientists was promoted by providing them support to participate in numerous conferences, seminars and workshops. At these events, the results of ISTC-funded work were presented. Ties were forged between professionals in science and bridges were built among scientific communities in realization that the complexity of current scientific problems requires international scientific cooperation.

Our new program called Responsible Science Management came to fruition in 2011, leading to a number of new publications outlining ways to promote nonproliferation and to enhance a culture of professional responsibility in a fast-moving world with a rapid spread of and easy access to information. Good cooperation continued with the IAEA, the UNDP, the WHO and CERN.

Personally, I was pleased that the ISTC could continue to support a number of Summer Schools allowing young scientists to become aware of the latest developments in their fields of interest. There is an overall need worldwide to attract more young people into scientific activities. The Summer Schools also took initiatives to strengthen the presentation skills of the young participants concerned.

The Annual Report also lists a number of publications on the outcome of research projects, for example in the field of aeronautics and space. The ISTC participated in various events commemorating the first orbital space flight around the earth by Yuri Gagarin in 1961.

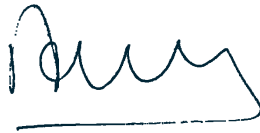
Between 1994 and 2011, the ISTC supported 2751 projects with a total value of 858.9 million USD. Most projects were funded in the areas of environment, physics and fission/fusion reactors. Over the years the EU and the US have been the main sources of funding of ISTC projects. Research institutes in the Russian Federation benefited the most from this funding. Unfortunately a declining trend in funding continued in 2011. This year 11 new projects were funded to the amount of 2.7 million USD, of which ISTC partners from public and private organizations provided 1.8 million USD for 8 projects.

The announced withdrawal of the Russian Federation from the ISTC in 2015 poses additional challenges to the work of the Secretariat. Considerable time was used to identify the matters that need to be arranged before that time, such as the timely closure of all relevant projects and the transfer of

ISTC property titles to 54,000 pieces of equipment on a tax-free basis to research institutes in the Russian Federation.

I hope you enjoy reading the 2011 Annual Report and the overview of the many activities funded by the Parties

and Partners of the ISTC. Our website is also an important source of information and I would recommend a visit to the site at [www.istc.ru](http://www.istc.ru). I trust that the recent ISTC publications will be of use to promote further international scientific and technological cooperation.



*Adriaan van der Meer*  
*ISTC Executive Director*



## OVERVIEW OF ISTC ACTIVITIES IN 2011

### ISTC – Pursuing our Objectives

The ISTC coordinates the efforts of numerous governments, international organizations, and private sector industry, providing scientists from Russia, Georgia and the CIS new opportunities in international partnership. The ISTC is central in the management of these science partnerships.

Through its legal, financial and administrative frameworks, the ISTC contributes to fundamental and applied research, innovation and commercialization by linking the demands of international markets with the scientists and engineers in Russian, Georgian and CIS institutes.

### Overview of ISTC Activities

The information provided below gives an overview of the funded projects by financing source, beneficiary country and by technology area.

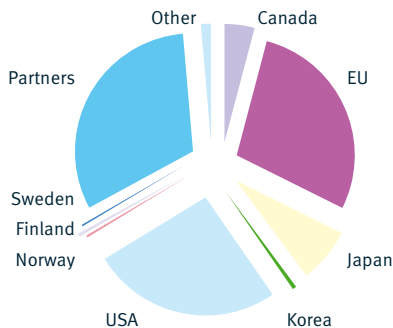
These figures show that during the period 1994-2011 ISTC supported 2751 projects with a total value of 858.9 million USD. Most projects were funded respectively in the areas of environment, physics and fission reactors/ fusion. During the years the EU and the US were the main sources of funding of ISTC projects. The research institutes in the Russian Federation benefited the most from this funding.

The decline in funding for projects continued in 2011:

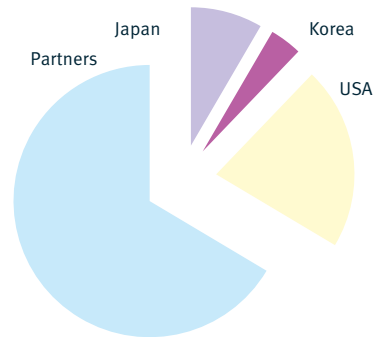
- 11 new projects were funded to the amount of 2.7 million USD of which ISTC Partners from public and private organizations provided 1.8 million USD for 8 projects;
- 2 new Partners were registered in addition to the existing 141 Partners that have provided 271 million USD in project funding since the start of the ISTC program.

### New Regular and Partner Project Funding in 2011 and Total Project Funding - by Source

Total Project Funding (\$858,964,133) by Source



New Project Funding (\$2,653,529) in 2011 by Source

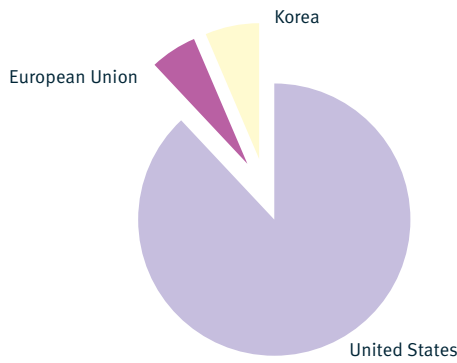


Party	Allocated Funds (\$) in 2011	Allocated Funds (\$) Total
Canada	0	35316547
EU	0	242 548 575
Japan	223 880	64 370 999
Korea	100 000	4 581 952
USA	569 809	222 510 152
Finland	0	1 185 960
Norway	0	1 881 450
Sweden	0	3 831 906
Partners	1 759 840	270 959 730
Other	0	11 776 863
<b>Total:</b>	<b>2 653 529</b>	<b>858 964 133</b>

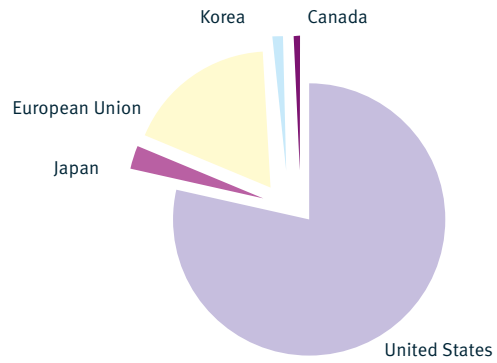


### New Partner Project Funding in 2011 and Total - by Source

ISTC Partner Projects Funding (\$1,759,840) by Party in 2011



ISTC Partner Projects Funding (\$270,959,730) by Party Total

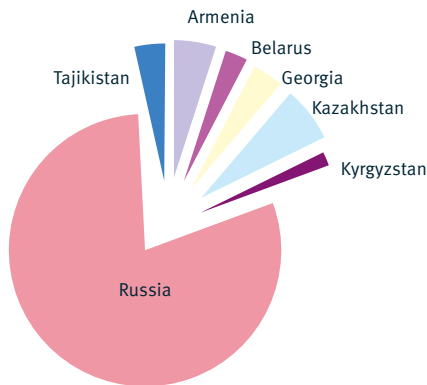


Party	Type of Partner Company	No. of projects 2011	Partner Funding (\$) 2011	No. of projects Total	Partner Funding (\$) Total	Partner Funding Total (%)
United States	Total	6	1 548 800	533	212 719 557	78,5%
	G	6	1 548 800	500	206 616 595	76,3%
	NG	0	0	33	6 102 962	2,3%
Japan	Total	0	0	64	7 501 167	2,8%
	G	0	0	16	2 154 953	0,8%
	NG	0	0	48	5 346 214	2,0%
European Union	Total	1	97 825	132	48 257 871	17,8%
	G	1	97 825	73	37 012 902	13,7%
	NG	0	0	59	11 244 969	4,2%
Korea	Total	1	113 215	10	1 904 929	0,7%
	G	0	0	6	1 580 000	0,6%
	NG	1	113 215	4	324 929	0,1%
Canada	Total	0	0	5	576 206	0,2%
	G	0	0	1	20 000	0,0%
	NG	0	0	4	556 206	0,2%
Total:	Total	8	1 759 840	741	270 959 730	100,0%
	G	7	1 646 625	596	247 384 450	91,3%
	NG	1	113 215	148	23 575 280	8,7%

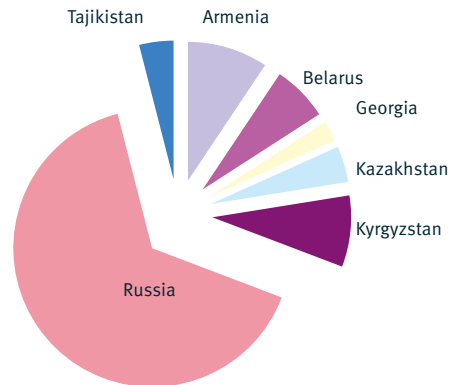
\*\* Please, note that real number of funded Partner Projects is 741 as there are 8 partner projects where 2 Partner Companies are involved, 1 partner projects where 3 Partner Companies are involved.

### Grants paid by ISTC to Beneficiary Scientists in 2011 and Total - by Country

Grants paid (\$529,442,559) Total by ISTC to CIS Beneficiary Scientists



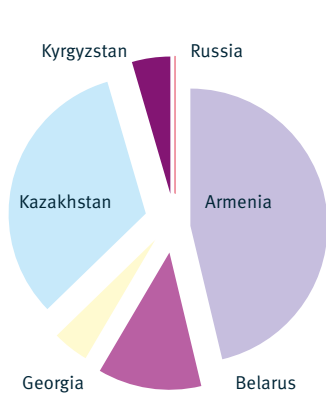
Grants paid (\$20,166,145) in 2011 by ISTC to CIS Beneficiary Scientists



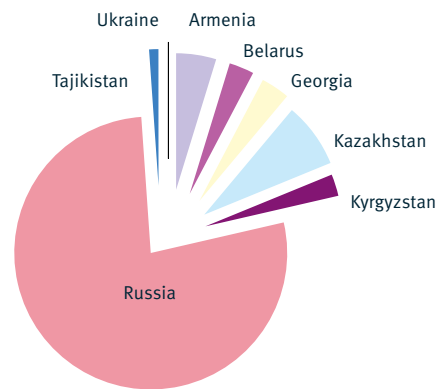
Country	Number of Scientists in 2011	Amount of Grants Payments (\$) in 2011	Number of Scientists Total	Amount of Grants Payments (\$) Total
Armenia	828	1 890 878	3 307	26 280 956
Belarus	363	1 313 002	1 816	13 990 919
Georgia	226	481 866	2 392	19 210 696
Kazakhstan	327	845 274	4 591	34 427 098
Kyrgyzstan	727	1 676 192	1 308	8 643 534
Russia	5 114	13 152 734	60 575	422 587 458
Tajikistan	274	806 199	542	4 301 898
<b>Total:</b>	<b>7 859</b>	<b>20 166 145</b>	<b>74 531</b>	<b>529 442 559</b>

## New Project Funding in 2011 and Total - per Country

2011 Project Funding (\$) by Beneficiary Country



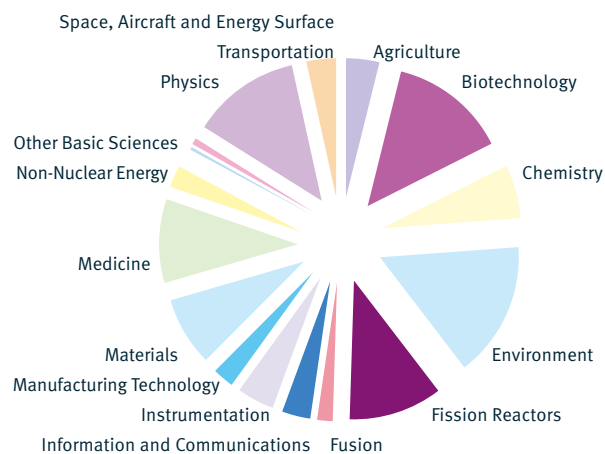
Total Project Funding (\$) by Beneficiary Country



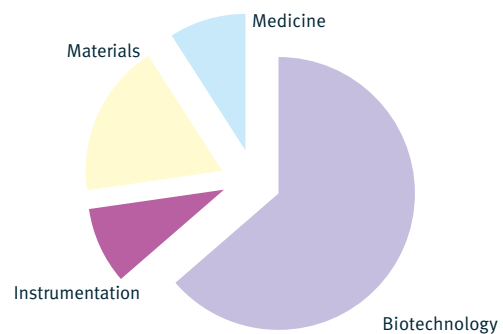
Country	No. of funded projects 2011	Allocated Funds (\$) in 2011	No. of funded projects Total	Allocated Funds (\$) Total
Armenia	4	1 227 609	168	40 759 810
Belarus	1	323 880	99	25 318 422
Georgia	1	113 215	143	29 270 473
Kazakhstan	4	868 825	184	66 244 917
Kyrgyzstan	1	120 000	86	22 215 795
Russia	0	0	2034	665 646 146
Tajikistan	0	0	36	9 444 275
Ukraine	0	0	1	64 296
<b>Total:</b>	<b>11</b>	<b>2 653 529</b>	<b>2751</b>	<b>858 964 133</b>

## New Project Funding in 2011 and Total Project Funding - by Technology Area

2011 Project Funding (\$) by Technology Area



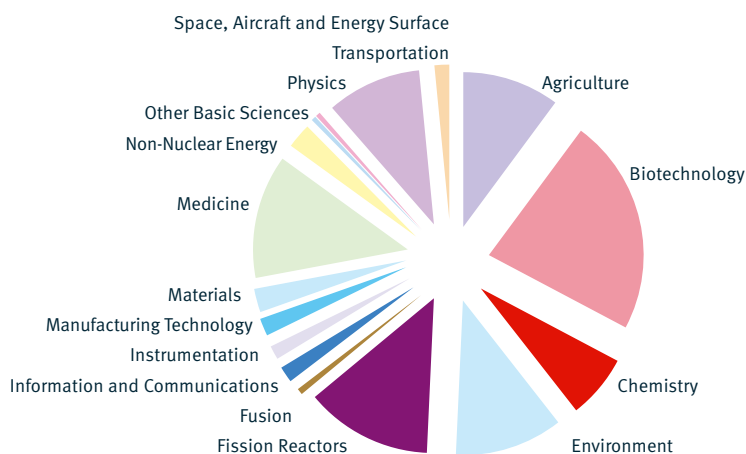
Total Project Funding (\$) by Technology Area



Tech area	No. of funded projects 2011	Allocated Funds (\$) in 2011	No. of funded projects Total	Allocated Funds (\$) Total
Agriculture	0	0	87	33 335 844
Biotechnology	7	1 032 040	309	117 610 958
Chemistry	0	0	200	53 786 313
Environment	0	0	437	135 366 567
Fission Reactors	0	0	272	93 625 903
Fusion	0	0	51	15 520 755
Information and Communications	0	0	107	28 536 916
Instrumentation	1	498 800	135	37 306 860
Manufacturing Technology	0	0	75	21 376 419
Materials	2	798 809	214	69 133 994
Medicine	1	323 880	232	83 895 569
Non-Nuclear Energy	0	0	63	21 990 981
Other	0	0	18	2 798 135
Other Basic Sciences	0	0	29	6 479 930
Physics	0	0	418	108 541 805
Space, Aircraft and Surface Transportation	0	0	104	29 657 184
<b>Total:</b>	<b>11</b>	<b>2 653 529</b>	<b>2751</b>	<b>858 964 133</b>

## Ongoing Projects in 2011 by Technology Area

### Ongoing Projects (\$) by Technology Area



Tech area	No. of projects	Allocated funds (\$)
Agriculture	30	15 080 723,00
Biotechnology	56	33 615 515,22
Chemistry	29	9 942 892,60
Environment	40	16 796 969,14
Fission Reactors	35	19 712 894,64
Fusion	3	961 364,17
Information and Communications	6	2 507 239,22
Instrumentation	7	2 135 980,93
Manufacturing Technology	5	2 729 279,02
Materials	10	3 664 644,42
Medicine	41	19 230 290,21
Non-Nuclear Energy	6	3 877 034,88
Other	3	719 533,00
Other Basic Sciences	3	732 325,65
Physics	36	14 714 542,74
Space, Aircraft and Surface Transportation	7	2 286 929,59
<b>Total:</b>	<b>317</b>	<b>148 708 158,43</b>



Responsible Science Management  
***PROJECT RESULTS 2011***



## PROJECT RESULTS 2011

In this part of the report an overview is given of the results of a number of projects that were completed in 2011. A total of 148 projects were completed during the reporting year. These are listed in an annex to this report and cover a broad range of scientific areas. All projects involved scientists with dual-use knowledge. The project results led to many presentations at international conferences and to publications in well-known international journals. It is also clear that results of many projects will lead to additional scientific work or have a potential commercial value.

In general, over the seventeen years of operations, the ISTC has supported more than 2747 civilian-oriented projects, which have involved more than 90,000 scientists, engineers, and other technical personnel. The multilateral character of the ISTC has been an essential element in its ability to generate international funding for projects and to stimulate international participation among scientists and engineers from the participating states.

The funding parties have contributed USD 858 million in support of this effort, and the institutions that have received support have contributed substantial in-kind resources during the implementation of the projects. Thousands of collaborators from countries around the globe have played a role in ISTC projects and participated in ISTC conferences and workshops. In addition, a total of USD 150 million was allocated to support programs (training, IPR, patent support, travel workshops, conferences and database development).

The ISTC has become one of the world's leading organizations to address the "human dimension" of preventing proliferation of sensitive knowledge and thus enhancing global security. The ISTC has provided new careers for scientists and engineers, created civilian-oriented research communities and developed new networks of national and international contacts. It has contributed to the economic modernization programs of various countries.

The Scientific Advisory Committee (SAC) should be complimented for its role in scrupulously assessing each individual project proposal, both on its scientific and nonproliferation merits. At the end of 2011 a new program was launched to identify the results of ISTC-funded projects in a selected number of areas: nuclear safeguards, nuclear sensor technologies and oil and gas. The aim is to single out technologies with a potential commercial value which will, in future, be presented to investors.

The project examples presented below are grouped by scientific area. They range from work in the environmental and health area to scientific and technological support in the fight against international terrorism. Excellent science lies at the heart of every project and the ISTC covers activities from "idea to marketplace." This chapter starts with illustrating newly developed techniques via ISTC funding.

## TO THE MARKETPLACE

### ISTC Project: 3177 Neutralization of B.anthraxis Spores in Soil

<b>Full Title</b>	Development of the Laboratory-Experimental Technology of Neutralization of B.anthraxis Spores in Soil with Spore Germination Activators and Bacterial Phages
<b>Leading Institute</b>	Institute of Immunological Engineering, Lyubuchany, Moscow Region, Russia
<b>Collaborators</b>	Immune Network Ltd., Vancouver, BC, Canada (A. Bain) MDM Group, Inc., Santa Clara, CA, USA (E.L. Stephen) Universitat Hohenheim / Institut fuer Umwelt- und Tierhygiene, Stuttgart, Germany (W. Beyer)
<b>Total funds allocated:</b>	USD 471,208 + EUR 100,000 (EU: EUR 100,000, CA: USD 471,208)
<b>Total grants:</b>	USD 314,408



A project was completed on the cleanup of burial sites for anthrax-infected cattle. The technique is based on bacteriophages (a virus infecting a bacteria) and spore germinants that disinfect objects and soil contaminated by spores and vegetative cells of *B. anthracis*. This new method can assist in the cleanup of many thousands of anthrax burial sites throughout the former Soviet Union and could also be used in the event of bioterrorist attacks.

A business plan was completed for further development, production and release of the disinfectant *Desanthrax* and negotiations with potential investors are underway. Two patent applications were submitted to Russian authorities. The toxicity of *Desanthrax* was tested during rigorous experiments on laboratory animals and its safety was proven.

**ISTC Project: 3282****Quality System in the SRC VB Vector**

<b>Full Title:</b>	The Development of a Strategy for Improving the Quality System in the FSUE SRC VB Vector
<b>Leading Institute</b>	State Research Centre of Virology and Biotechnology VECTOR, Koltsovo, Novosibirsk Region, Russia
<b>Collaborators</b>	HELM Global Group Limited, Cork, Ireland (Daly G)
<b>Total funds allocated:</b>	USD 147,090 (Partner)
<b>Total grants:</b>	USD 105,010



The Institute of Medical Biotechnology, an affiliated structure of the State Research Centre of Virology and Biotechnology VECTOR (Russia), was recently certified for its Quality Management Systems (QMS) in compliance with ISO 9001 standards in the biological research and preclinical trials of drugs for human and veterinary medicine, cosmetics, food and feed additives, pesticides, industrial chemicals and other consumer goods. These improvements will allow the institute to reach new levels of business development and self-sustainability.

Implementation of Quality Management Systems (QMS) began in 2006-2010 as part of an ISTC project and was completed independently by VECTOR in early 2011. A number of tasks were carried out in order to reach the project's objectives, including the training of twenty-three staff members in ISO standards, internal audits in nine departments, and the organization of eighteen workshops. Additionally, a quality assurance department was created.

**ISTC Project: 3283****Centre for New Drugs Development**

<b>Full Title:</b>	Identification, Addition and Realization of the Nascent Value of Novel Compounds as Drug Candidates Through Preclinical Safety and Efficacy Testing and technology Transfer
<b>Leading Institute</b>	Non-profit Partnership Centre for development of new potential Medicines ORCHEMED, Moscow, Russia (BJN) Institute of Physiologically Active Substances, Chernogolovka, Moscow reg., Russia
<b>Collaborators</b>	Medivation, San Francisco, CA, USA (D. Hung) Tufts-New England Medical Centre / Department of Psychiatry, Boston, MA, USA (G.F. Oxenkrug) University of California / Department of Chemistry and Biochemistry, Santa Cruz, CA, USA (J. Konopelski)
<b>Total funds allocated:</b>	USD 2,243,000 (Partner)
<b>Total grants:</b>	USD 585,245

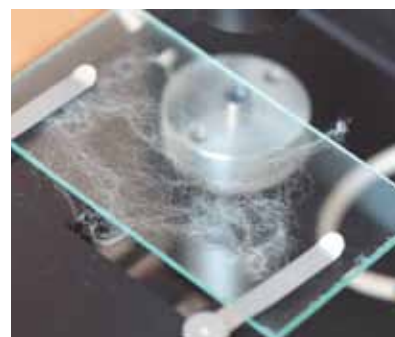


The Orchemed project facilitated the creation of one of the few preclinical testing facilities in the Russian Federation and, as a result, trials for international pharmaceutical companies can now be carried out in compliance with international standards. The project results were obtained through close collaboration between Russian and other scientists over a five-year period.

This project has substantially upgraded the research infrastructure in Russia, allowing future Russian pharmaceutical products to enter international markets. It is an important step forward for the various Russian members of the Orchemed partnership. Russia now has better tools to take compounds from its laboratories to the marketplace.

**ISTC Project: 3576****Device for Measurement of Wool Parameters**

<b>Full Title:</b>	Development of the Device for Measurement of the Grade of a Wool
<b>Leading Institute</b>	Joint-Stock Company Sarov Laboratories, Sarov, Nizhny Novgorod Region, Russia
<b>Collaborators</b>	Washington Savannah River Company, Aiken, SC, USA (D. Zigelman)
<b>Total funds allocated:</b>	USD 195,000 (Partner)
<b>Total grants:</b>	USD 136,670



Wool fibre diameter is one of the key parameters that determines wool quality, with the price of wool depending on the dispersion of fibre diameter. This information is necessary both for the consumer and the producer of wool. These

parameters are normally measured with a microscope. There are automatic devices, Ofda and LaserScan, which are produced in Australia. Their high price (~ USD 70k) prevents their wide use.

The project objective was to create a device for automating the wool certification process. At present, wool grade parameters are most often measured in laboratories of the enterprises dealing with wool preprocessing. This project developed a device for determining the average diameter and dispersion of wool fibres, based on computer processing of wool fibre images. The device consists of an illumination device based on a light-emitting diode, an optical

system, radiation detection, a unit for sample movement and a computer interface unit. The device comes as a peripheral facility to a personal computer. Special software was developed to control the device. There are prospects for the commercialization of this device due to its lower cost (~ USD 15k) and its measurement accuracy of 1 mm. The device can be used in laboratories and/or farms.

## BIOTECHNOLOGY, PUBLIC HEALTH AND AGRICULTURE

### ISTC Project: 2526

#### Build-up of Organically Bound Tritium in Crops

<b>Full Title:</b>	Studying the Build-up of Organically Bound Tritium in Agricultural Crops
<b>Leading Institute</b>	VNIIEF, Sarov, Nizhny Novgorod Region, Russia
<b>Collaborators</b>	CEA / DAM, Paris, France (F. Pointurier) CEA, Paris, France (Yv. Belot) Lawrence Livermore National Laboratory / Operations and Regulatory Affairs Division / Environmental Protection Department, Livermore, CA, USA (S.R. Peterson)
<b>Total funds allocated:</b>	USD 239,000 (US)
<b>Total grants:</b>	USD 155,450



The impact of air pollutants on agricultural crops was studied. The project objective was to determine the transfer rate of tritium oxide (HTO) from air to plants and the subsequent build-up of *organically bound tritium* (OBT) in plants. The work was accomplished by exposing edible plants to high concentrations of HTO for short periods of time followed by extensive sampling and analysis of activities of HTO and OBT in the plants.

During the first year of the project, literature was reviewed on available experimental data and models related to the build-up of organically bound tritium (OBT) in plants.

During the course of the project three field tests were carried out using:

1) *Yablonka Rossii* tomatoes;

- 2) *Moskovskaya-35* spring wheat;
- 3) *Skazka* potatoes;
- 4) *Dubachek* lettuce.

For each type of plants seven experimental plots were established: two for day-time experiments, two for night-time experiments, one for growth dynamics and background, and two kept in reserve.

The project focused on the experimental investigation of the process of OBT accumulation and loss in agricultural crops and the development of a mathematical model to describe this process.

The data obtained will be used to predict the consequences of environmental tritium emission from the air to plants.

### ISTC Project: 3135

#### Molecular Diagnostics of Mixed Tick-Borne Infections

<b>Full Title:</b>	Phosphorescence Multianalyte Microanalysis of Dried Blood Spots as a Basis of Seroepidemiological Monitoring of Zoonotic Infections Transmitted by Ixodid Ticks
<b>Leading Institute</b>	State Research Institute of Biological Instrument-Making, Moscow, Russia
<b>Collaborators</b>	Centre for Disease Control and Prevention (CDC)/Special Pathogens Branch, Division of Viral and Rickettsial Diseases, Atlanta, GA, USA (Levin M) Centres for Disease Control and Prevention (CDC) / National Centre for Infectious Diseases/ Division of Vector-Born Infectious Diseases, Fort Collins, CO, USA (B.J. Johnson, J. Priesman, M. Schriefer)
<b>Total funds allocated:</b>	USD 665,550 (Partner)
<b>Total grants:</b>	USD 359,554

Tick-borne diseases remain an important public health concern. The objective of the completed project was to develop and validate a new diagnostic technology on the basis of Phosphorescence Analysis (abbreviated PHOSPHAN) for simultaneous detection of specific anti-

bodies to agents of several tick-borne infections in blood spots, dried on filter paper.

The objective was also to detect antigens of the above-mentioned agents both in the blood of patients and in



biomaterial from ixodid ticks including their main hosts. This approach enabled the performance of screening, seroepidemic and diagnostic investigations. Tests were carried out on persons with a high risk of tick-borne infections.

Work was done to adapt the PHOSPHAN diagnostic technology to allow tick-borne infection monitoring. With this in mind, technical and engineering work was performed to develop equipment, enabling the detection of specific antibodies, antigens or genetic material in blood samples.

The project also included fundamental investigations to evaluate the possibility of early pre-clinical prognosis of tick-borne infection with patients bitten by ticks and to determine the biocenotic and etiologic structure of natural foci during field studies.

The project also involved:

- 1) applied investigations and development of modern biological microanalysis technology for programs of automated ecological and epidemiological monitoring;
- 2) sanitary and epidemic control of zoonotic infections including the timely laboratory diagnosis of the relevant diseases.

### ISTC Projects: K-1817, K-1906, T-1818, T-1819, T-1852 Biosafety Assignment Training for Tajikistan and Kazakhstan

<b>Full Title:</b>	Bio-safety Assignment Training for Tajikistan and Kazakhstan
<b>Leading Institute</b>	Kazakh Scientific Centre for Quarantine and Zoonotic Diseases, Almaty, Kazakhstan (AXT) National Centre for Monitoring, Referencing, Laboratory Diagnostics and Methodology in Veterinary Medicine, Astana, Kazakhstan (BSB) Tajik Research Institute of Preventive Medicine, Dushanbe, Tajikistan (BIU) Republican Centre for Quarantine Infection Prevention of the Ministry of Health of the Republic of Tajikistan, Dushanbe, Tajikistan (BIS) Tajik Research Institute of Preventive Medicine, Dushanbe, Tajikistan (BIU)
<b>Collaborators</b>	Foreign Affairs Canada / Global Partnership Program, Ottawa, ON, Canada (Z. Chougaiopova) Ludwig-Maximilians-Universitat / Max von Pettenkofer-Institut fur Hygiene und Medizinische Mikrobiologie, Munich, Germany (A. Rakin) Robert-Koch-Institute, Berlin, Germany (R. Grunow)
<b>Total funds allocated:</b>	USD 3,037,808 (Partner)
<b>Total grants:</b>	USD 467,300



For a number of years the ISTC has been active in Central Asia to promote biosafety and biosecurity. Various biosafety associations were created, training courses conducted and biosafety was improved at individual research institutes.

The projects provide training for scientists from Central Asia in the EU to become acquainted with modern diagnostic methods for investigating dangerous diseases and pathogens. These projects are part of a larger USD 10 million Central Asia initiative of the European Union and the ISTC to mitigate the impact of diseases and pathogens.

The overall objective of the projects is to improve biosafety and biosecurity in the Central Asian region by raising the scientific and practical skills of personnel working at the relevant laboratories in the region.

In 2011 a workshop was held in Almaty aimed at sharing experience among specialists in Kazakhstan and from abroad (Germany, France, Russia and Ukraine). Questions such as the development of training activities, the introduction of international standards and the possibilities of intensifying international collaboration and networking were discussed.

### ISTC Project: 3440 Phytophthora Infestans on Potato

<b>Full Title:</b>	Study of Possible Reason for Changes in Genotypic Structure of Phytophthora infestans on Potatoes in Russia
<b>Leading Institute</b>	Phytopathology Research Institute, Bolshie Vyazemy, Moscow Region, Russia
<b>Collaborators</b>	Agriculture and Agri-Food Canada / Crops and Livestock Research Centre, Charlottetown, PE, Canada (H.W. Platt)
<b>Total funds allocated:</b>	USD 300,000 (CA)
<b>Total grants:</b>	USD 180,000



Late blight (LB) of potatoes is currently the main problem for the majority of potato producers in Russia. Losses of potato harvest caused by late blight total 4 million tons per year. Now it has been proved that complex aggressive races of the pathogen prevail everywhere and this new population of the LB agent has replaced all populations in all regions of

the Russian Federation. This project involved studies on new pathogen population and biology aspects of disease development and the role of tomato, resistant cultivars and fungicides.

The goals of the project were to:

- Identify possible reasons for changes in the genotypic

structure of the potato pathogen *Phytophthora infestans* in Russia;

- Reveal the primary infection sources in potato fields, particularly to determine any role for tomato seeds;
- Study the influence of the cultivation of potato varieties with nonspecific resistance, and the wide-scale use of fungicides, on the properties of *P. infestans* populations.

The obtained data provided information for the development of improved disease management systems that more effectively integrate host resistance and reduce dependency on fungicides.

### ISTC Project: 3445

#### Bacteriocin Field Trials in Broilers

<b>Full Title:</b>	Bacteriocin Production and Field Trials for Treating <i>Campylobacter jejuni</i> and <i>Salmonella</i> spp. in Broilers
<b>Leading Institute</b>	State Research Centre for Applied Microbiology and Biotechnology, Obolensk, Moscow Region, Russia
<b>Collaborators</b>	Cargill, Inc., Minneapolis, MN, USA (Shebuski J) Richard B. Russel Research Centre, Athens, GA, USA (N.J. Stern, J.E. Line)
<b>Total funds allocated:</b>	USD 998,909 (Partner)
<b>Total grants:</b>	USD 499,060



Food-borne diseases are common and present a serious problem worldwide. The World Health Organization (WHO) estimates that three million people die each year because of food-borne disease. Among all food-borne diseases *Campylobacter jejuni* and *Salmonella enteritidis*-associated infections are prevalent. A natural reservoir of these pathogens is commercial broiler chickens.

A number of different methods are used to reduce levels of *Campylobacter spp.* and *Salmonella spp.* prior to slaughter of birds. They include vaccination, treatment of birds with antagonists, bacterial phages, antibiotics or chemicals. The use of vaccines and lytic phages against *C. jejuni* still requires considerable development. The application of antibiotics or drugs to control *Campylobacter spp.* in birds is undesirable. There is a negative consequence of antibiotic resistance as a result of their prolonged use in medicine, veterinary medicine and the cattle-breeding industry. Over the past 30 years, researchers had expected to apply mi-

crobial antagonists as an alternative means to antibiotics and drugs. However, such strategy has not controlled colonization of *Campylobacter* in birds but it has had limited success in controlling *Salmonella*.

Under this project a number of cooperative studies were completed to identify microbial antagonists for *C. jejuni* (Project # 1720p, 2000-2005). The work showed that providing bacteriocin from strain *Paenibacillus polymyxa* NRRL-B-30509 in emended feed or water either eliminated *C. jejuni* or *Salmonella spp.* from the intestines of experimental broilers or dramatically reduced levels of colonization. The scientists found that they could reduce the level of colonization of the pathogen in ceca by at least one million-fold by providing bacteriocin from NRRL-B-30509 in emended feed (125 mg/kg) for three days. The bacteriocins appeared to be effective in treating naturally infected birds at 35-42 days of age.

### ISTC Project: 3826

#### Genetic Polymorphism of HIV-1

<b>Full Title:</b>	Genetic Polymorphism of HIV-1 in the Former USSR Republics
<b>Leading Institute</b>	Ivanovsky Institute of Virology, Moscow, Russia
<b>Collaborators</b>	University of Amsterdam / Academic Medical Centre, Amsterdam, The Netherlands (V.V. Lukashov)
<b>Total funds allocated:</b>	EUR 238,574 (EU)
<b>Total grants:</b>	USD 179,380



The purpose of the completed project was to monitor and compare, for the first time, the molecular-epidemiological diversity of type 1 HIV in Russia, Armenia, Kazakhstan and Kyrgyzstan. In addition the prevalence of mutant drug resistant strains was analyzed. The results of this project will be used by governments to choose the most appropriate drugs to purchase on the bases of national health programs. The project is essential in order to obtain better response to treatments.

The epidemiological map drawn through this project shows a broad predominance of HIV-1 subtype A in all CIS countries studied. The current level of drug resistance and mutations were found to be very low. The results obtained during the project will form the basis of a new study on phylogenetics of HIV-infection epidemics in Eastern Europe and Central Asia. The samples were analyzed using the latest molecular epidemiological technologies.

**ISTC Project: B-1489****Diagnostics of Tumours in Children**

<b>Full Title:</b>	Automation of Diagnostics and Prognosis of Mediastinal and Retroperitoneal Tumours in Children Based on Analysis of Radiological Images
<b>Leading Institute</b>	National Academy of Sciences of the Republic of Belarus / Institute of Informatics Problems, Minsk, Belarus
<b>Collaborators</b>	Technical University of Aachen / Institute of Medical Informatics and Biometry, Aachen, Germany (T.M. Deserno, nee Lehmann) University Hospital of Lille / Department of Nuclear Medicine and Functional Imaging, Lille, France (X. Marchandise)
<b>Total funds allocated:</b>	EUR 283,447 (EU)
<b>Total grants:</b>	USD 263,770



The early diagnostics and treatment of cancer among children remains a high priority. The aim of the project was to develop a methodological support and computer system for automation of diagnostics and prognosis of mediastinal and retroperitoneal tumours in children based on analysis of radiological images.

Under this project a basic software package was developed for automation of the tumour-detection process. At the same time, an electronic atlas of typical reference cases of images of the organs of mediastinum and the retroperitoneal spaces obtained with the help of radiological methods was created. The atlas is used both as a tool to assist in

computerized diagnosis of mediastinum and the retroperitoneal space organs and an extensive collection of illustrative materials.

Hence, the project resulted in developing software for the analysis of results for radiological investigations and creating a database with the description of the cases of mediastinal and retroperitoneal tumours in children. The developed software can monitor tumour evolution and can be included in the clinical "Visualized Childhood Cancer Register."

The results of the project are of commercial value.

**ENVIRONMENT****ISTC Project: 2905****Purification of Liquid Radioactive Waste by Ultrafiltration**

<b>Full Title:</b>	Development of a Method of Liquid Radioactive Waste Treatment with the Use of Micellary Enhanced Ultrafiltration
<b>Leading Institute</b>	Institute of Highly Pure Biopreparations, St Petersburg, Russia
<b>Collaborators</b>	Emergency Science and Technology Division Environment Canada, Ottawa, ON, Canada (K. Volchek)
<b>Total funds allocated:</b>	USD 276,601 (CA)
<b>Total grants:</b>	USD 195,000



The storage of liquid radioactive waste remains a matter of concern. This project was aimed at the development of an effective method for recovery of low-level liquid radioactive waste (LRW) with the use of micellary-enhanced ultrafiltration (MEUF).

LRW is usually a mixture of several types of contaminants with different chemical origin, inter alia coarse-dispersed, or low- and high-molecular water soluble compounds. As a rule radionuclides are present in all these components, which is why any technology for recovering LRW should facilitate the isolation of each of the contaminants from water.

Present techniques for the reduction of liquid radioactive waste have several disadvantages such as high energy consumption, high cost for storage of the radioactive waste and/or the use of large equipment.

Under this project the use of micellary-enhanced ultrafiltration with Trumem membranes was developed including a new type of semi-permeable metal-ceramic membranes.

In addition the properties of semi-permeable membranes under the influence of aggressive media were studied as a means to develop new technologies for liquid radioactive waste treatment.

**ISTC Project: 3491****Electrodes for Batteries and Supercapacitors**

<b>Full Title:</b>	The Development of a Production Technique of High-Performance Cheap Thin Film Electrodes Based on Nanostructured Tin Oxides for Lithium Ion Batteries and Supercapacitors and the Manufacturing of Pilot Samples of Energy Storage Devices.
<b>Leading Institute</b>	VNIEF, Sarov, Nizhny Novgorod Region, Russia
<b>Collaborators</b>	Colorado State University, Fort Collins, CO, USA (P.K. Dorhout) Korea Institute of Energy Research (KIER), Yusong-gu, Korea (J. Kim)
<b>Total funds allocated:</b>	USD 295,000 (US: USD 225,000, RK: USD 70,000)
<b>Total grants:</b>	USD 175,750

The aim of the project was to contribute to the reduction of environmentally harmful emissions from vehicles and electronics. The project developed technology for a high energy density, cheap electrode material containing nanostructured tin oxides and the manufacturing of laboratory samples of electrochemical energy storage devices (lithium-ion batteries and supercapacitors with high technical and economical performance) on the basis of this electrode material.

Currently Li-ion batteries (LIB) outperform all other traditional systems (lead-acid, Ni-Cd, Ni-MeH batteries) due to their high energy density (up to 200 W h kg<sup>-1</sup>) and design flexibility, and they comprise more than 60% of worldwide sales of portable batteries.

Amorphous tin composite oxides (ATCO) devised by the Fuji Celltech company showed two-fold higher capacity in LIB as compared with carbon anodes (600 mA•h/kg and

less than 370 mA•h/kg, respectively). Since the publication by Fuji, various materials based on SnO<sub>2</sub> have been considered as promising solutions for negative electrodes of lithium-ion batteries.

The technology of new thin films consisting of nanostructured Sn and Ti oxides was developed under this project for electrochemical capacitors and anodes of Li-ion batteries.

The project resulted in fundamental studies of the material synthesis and better comprehension of the relationship between composition, structure and electrochemical properties of electrode materials of this type i.e. the interconnection between microstructure and macroproperties.

Commercialization of the project results was promoted through the development of prototypes of energy storage devices that demonstrated promising results compared to other similar devices worldwide.

**ISTC Project: 3547****Radionuclide Transport in the Irtysh-Ob' Basin**

<b>Full Title:</b>	Analysis of Radionuclide Transport and Assessment of Radiation Risk for the Population and Environment in the Basin of the Irtysh-Ob' River System
<b>Leading Institute</b>	Russian Academy of Sciences / Severtsov Institute of Ecology and Evolution, Moscow, Russia
<b>Collaborators</b>	ENEA, Rome, Italy (Monte L) SENES Oak Ridge Inc. / Centre for Risk Analysis, Oak Ridge, TN, USA (O. Hoffman) University of Georgia / Savannah River Ecology Laboratory, Aiken, SC, USA (T.G. Hinton)
<b>Total funds allocated:</b>	EUR 222,802 (EU)
<b>Total grants:</b>	USD 225,079

The transport of radionuclides in river basins remains an important area of environmental research. The objectives of the project were analysis of radionuclide transport and the estimation of radiation risk in the basin of the Irtysh-Ob' river system in the vicinity of the Siberian Chemical Combine (SCC).

This project builds on the results of previous ISTC projects related to the transport of radionuclides via the Tobol-Irtysh-Ob' river system.

This project developed scientific and methodological principles for continuous radioecological monitoring of the river system including an emergency response system based on analysis and prediction of radiation risk for the public and living organisms.

This project was essential for gaining better fundamental knowledge of mechanisms of biogenic migration of radionuclides, implementing specific goals towards developing regional radioecological monitoring and estimating radiation risk in the basin of the Irtysh-Ob' and for predicting the behaviour of radioactive pollutants in the environment.

An important feature of the project was using a risk analysis methodology, both for estimating potential radiological consequences for the population and radiation exposure of plant species, and for further development of this methodology and its application to non-radiation risk sources (chemical pollutants and biological risk from parasitic diseases of living organisms, for example).



The project results can be used for the upgrading the regional radioecological monitoring of rivers and emergency response system, modeling of the consequences of pos-

sible technology-related and natural disasters for nuclear facilities, as well as for estimating radiation risk to human beings and the environment.

### ISTC Project: 3816 Earthquake Early Warning

<b>Full Title:</b>	Development of Methods and Algorithms for Automatic Real-Time Identification of Waveform Introduction from Local Earthquakes in Increased Level of Man-induced Noises for the Purposes of Ultra-short-term Warning of an Earthquake.
<b>Leading Institute</b>	International Institute of Earthquake Prediction Theory and Mathematical Geophysics, Moscow, Russia
<b>Collaborators</b>	National Institute for Earth Science and Disaster Prevention, Ibaraki, Japan (S. Horiuchi) Royal Observatory of Belgium, Brussels, Belgium (Camelbeek T)
<b>Total funds allocated:</b>	EUR 223,911 (EU)
<b>Total grants:</b>	USD 223,335

The implementation of this project led to both scientific and commercial results. Scientifically, the most important result was the development of techniques and algorithms for automatic computation of earthquake parameters in real time based on observations of a few sensors under high seismic noise.

Commercially, the project resulted in the manufacture and sale of an instrument giving an ultra-immediate warning about local earthquakes.

The project envisaged the development of technological, technical and software tools, the creation of several mo-

dels of the different specialized seismic sensors and an experimental mechanical installation to simulate ground motion (based on digital signals of near earthquakes previously recorded at seismic stations) for experimental testing and debugging of the algorithms for identification of the advent of first earthquake waves.

The scientific results of this project were presented at international symposia and published in leading geophysical journals.

### ISTC Project: 3925 Paleomicrobiology of Permafrost

<b>Full Title:</b>	Revival of Non-Culturable Microorganisms from Siberian Permafrost Soil
<b>Leading Institute</b>	Institute of Biochemistry and Physiology of Microorganisms, Puschino, Moscow Region, Russia
<b>Collaborators</b>	Universitet Innsbruck / Institut für Mikrobiologie, Innsbruck, Austria (R. Margesin)
<b>Total funds allocated:</b>	EUR 329,213 (EU)
<b>Total grants:</b>	USD 254,525

The aim of the project on the revival of non-culturable microorganisms from Siberian permafrost soil was to analyze the microbial community in Russian permafrost samples. In total thirty-four soil samples were collected from the northeastern Arctic tundra in Russia, which is characterized by continuous permafrost. Subsequently these samples were investigated.

The research involved optimization of a number of techniques such as the treatment of permafrost samples and the visualization of microorganisms by high resolution in situ electron microscopy and fluorescence microscopy. Samples contained a large amount (up to 80%) of cells with an undamaged structure.

The development of novel reactivation-based microbiological techniques allowed the isolation of 280 pure bacterial strains, 109 of which were subject to molecular analysis in

order to determine the taxonomic position of these strains. Seventeen strains were described as representatives of novel species or genera.

Another task was related to the detection of nanocells (ultramicrobacteria), which are very small (250-300 nm) and difficult to work with. Surprisingly, the microbial community in some permafrost samples contained more than 60% of such nanocells. The construction of a bacterial clone library showed the presence of thirteen phylotypes, most of them belonging to the phyla Actinobacteria and Proteobacteria.

The results of this study will have a major impact on international research on permafrost.



**ISTC Project: A-1418****Natural Hazards in the Southern Caucasus and Central Asia**

Full Title:	Open network of Scientific Centers for Mitigation Risk of Natural Hazards in the Southern Caucasus and Central Asia
Leading Institute	Scientific Foundation "International Center Garni", Yerevan, Armenia (BLY)
Collaborators	Ecole et Observatoire des Sciences de la Terre, Strasbourg, France (Dorbath I) Lawrence Livermore National Laboratory / Center for Global Security Research, Livermore, CA, USA (Vergino E S) Massachusetts Institute of Technology (MIT) / Earth Resources Laboratory, Cambridge, MA, USA (Reilinger R) National Observatory of Athens / Institute of Geodynamics, Athens, Greece (Kalogeras I) New England Research, Inc., White River Junction, VT, USA (Martin III R J) Universita Degli Studi di Bari, Bari, Italy (Biagi P F) Universite Montpellier II / Laboratoire Dynamique de la Lithosphere, Montpellier, France (Philip H)
Total funds allocated:	USD 300,000 +EUR 233,663 (EU, US)
Total grants:	\$325720



The main objective of the project was the establishment of four centers in Armenia, Georgia, Kyrgyzstan and Tajikistan on seismic movements. During the period 2007-2011 tests were carried out in the Javakhq highland in the Caucasus and in the Alay basin in Central Asia. At the same time young scientists were trained in the studying of seismic processes and the assessment of their potential impact.

More in detail project results were:

- identification and study of earlier unknown fault lines over a long distance and cutting through the border of Georgia and Armenia;

- development of a geodynamic model for the Javakhq highland;
- development of a working model of current deformations between the Tien Shan and Pamir mountainous regions.

The obtained data together with the produced digital GIS maps of natural hazard zoning as well as developed specific software have a potential commercial value for example for property owners, construction and real-estate companies.

**GLOBAL SECURITY****ISTC Project: 3106****Prevention of mail terrorism**

Full Title:	Development of Multi-Purpose Technology for Detection of Toxic, Explosive and Radioactive Chemical Compounds and Inactivation of Organisms
Leading Institute	Khlopin Radium Institute, St Petersburg, Russia
Collaborators	SEPAREX Supercritical Fluid Technology, Champigneulle, France (M. Perrut) Universite Louis Pasteur / Faculte de Chimie, Strasbourg, France (A. Varnek) Westinghouse Electric Company UK, Preston, UK (N. Shulyak)
Total funds allocated:	EUR 146,690 (EU)
Total grants:	USD 141,118



The aim of the project was to contribute to combating the threat of international terrorism, i.e. by developing new multipurpose technology for detecting compounds of different origin and deactivating organisms. The developed technology can be used to detect terrorist acts in particular via mail correspondence.

A technology was developed and equipment was designed in particular to detect and deactivate toxic, explosive and radioactive chemical compounds and microorganisms.

In the course of project implementation both standard methods of physicochemical analysis ( $\alpha$ - and

$\gamma$ -spectrometry, AAS, X-ray fluorescent analysis) and methods of extraction into liquid and supercritical carbon dioxide, developed under earlier ISTC projects (1160 and 2055) were used.

Extraction by supercritical and liquid CO<sub>2</sub> is a rapidly developing area of science. The method has proved its efficiency as applied to separation of toxic compounds (for example polychloroaromatic hydrocarbons) from solid matrices, disinfection of paper and disposable medical equipment. The advantages of this method are the high treatment rate, minimal secondary waste and high penetrability of carbon dioxide.

**ISTC Project: 3173****Hand-held express drug detector**

<b>Full Title:</b>	Hand-Held Express Detector of Drug Traces Based on a Method of Ion Mobility Increment Spectrometry
<b>Leading Institute</b>	Siberian Branch of RAS / Design & Technological Institute of Instrument Engineering for Geophysics and Ecology, Novosibirsk, Russia
<b>Collaborators</b>	US Department of Energy, Washington, DC, USA (T. Wilson)
<b>Total funds allocated:</b>	USD 78,499 (US: USD 30,000, Other Funding Sources: USD 48,499)
<b>Total grants:</b>	USD 38,960



The aim of the project was to contribute to scientific and technological support in the fight against international terrorism. The project concentrated on the development of equipment in order to detect the illegal trafficking and smuggling of explosives and drugs. The detection method focused respectively on explosives and drug-related vapours.

The project paid special attention to develop an experimental computer-aided unit and to conduct experimental studies on detecting vapours of the main drugs. The operation of the Ion Mobility Increment Spectrometry (IMIS) is based on detected compound ionization, separation of produced ions by ion mobility increment, which depends on compensation of electric field strength and separated ions detection in purified air.

A laboratory spectrometer prototype was developed. The device uses purified air as a carrier gas and has shown

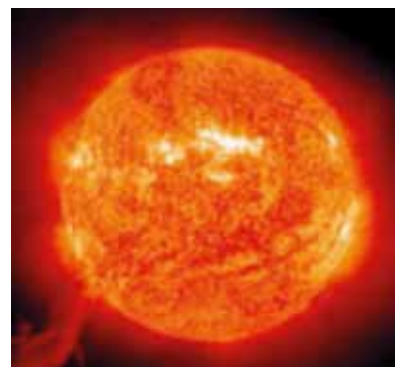
high sensitivity and selectivity for the vapours of TNT, DNT and nitroglycerin and can, in principle, be used to detect vapours of RDX and PETN. Cocaine and heroin vapours were also detected. These results provide good conditions for this method to facilitate the successful detection of drug vapours.

Detection limits at a level of Cocaine HCl  $3 \cdot 10^{-3}$  MDA  $6 \cdot 10^{-3}$  were determined on an experimental basis. The analytical circuit of a detector was developed and engineering work took place for the development of a pilot detector prototype.

Experiments showed that IMIS provides good opportunities for the detection of vapours and microparticles of the drugs heroin, cocaine, amphetamine and MDA. The IMIS technology can be used to develop drug detectors.

**NUCLEAR SCIENCE AND PHYSICS****ISTC Project: 3755****Non-Ideal Plasma of the Sun**

<b>Full Title:</b>	Physical and Chemical Evolution of Nonideal Plasma of the Sun Inferred from Modern Helioseismic Data
<b>Leading Institute</b>	VNIITF, Snezhinsk, Chelyabinsk Region, Russia (AAB)
<b>Collaborators</b>	Politecnico di Torino, Torino, Italy (P. Quarati) Universität Rostock / Institut für Physik, Rostock, Germany (R. Redmer) University of Aarhus / Department of Physics and Astronomy, Aarhus, Denmark (Christensen-Dalsgaard J) University of Southern California / College of Letters, Arts and Sciences, Los Angeles, CA, USA (D ppen W)
<b>Total funds allocated:</b>	241,915 EUR (EU)
<b>Total grants:</b>	USD 231,195



In modern astrophysics the model of the sun is understood as a simulation of how the distribution of solar plasma chemical composition evolves in time, starting from the initial homogeneous stage until the modern state of the sun. A detailed description of the evolution of the sun is necessary for realistic forecasting of processes on the earth and in the solar system.

The standard model of solar composition was formed by the mid 20th century and was widely recognized up until the late 1980s. It was based on various substantially simplified assumptions. For example, it was assumed sufficient to consider evolution of only the basic com-

ponents such as hydrogen and helium. These elements could be converted by means of the thermonuclear reactions localized in the solar core. At the same time it was assumed that all intermediate components of the transformation chain are in equilibrium, i.e. all reactions were considered as single stage ones. Extensive observational data on the eigenfrequencies of solar vibrations obtained recently provide substantial information about the solar environment. These data are quite accurate and allow us to obtain the radial profiles of acoustic speed and solar density. The project mainly improved the evolutionary model of solar structure using the latest experimental data in helioseismology.

Construction of such a model included the creation of computational-theoretical techniques to describe physical parameters of weakly non-ideal plasmas with a multi-parameter chemical composition. These techniques can be used not only in astrophysics, but also in other applied and basic research areas, in engineering of plasma chemical and power installations and in university educational programs.

These techniques and helioseismological observations were crucial in obtaining high-precision data on solar plasma EOS, optical opacity coefficients and fusion reaction rates along the radius of the sun at various stages of its chemical evolution.

Further details on the project are available at <http://sun.snz.ru>.

## SPACE

### ISTC Project: A-1229

#### Testing Materials for Application in Space

<b>Full Title:</b>	Simulating Space Conditions and Their Effect on Materials and Devices Intended for Application in Space
<b>Leading Institute</b>	A.I. Alikhanyan National Science Laboratory, Yerevan, Armenia
<b>Collaborators</b>	A.U.G. Signals LTD, Toronto, ON, Canada (G. Lampropoulos) National Technical University of Athens / Laboratory of Microwave and Fibre Optics, Athens, Greece (N. Uzunoglu) Pacific Northwest National Laboratory, Richland, WA, USA (B.R. Johnson) School of Pharmacy and Chemistry, Liverpool John Moors University, Liverpool, UK (C. Rhodes) Spacecraft Engineering, Space Technologies Branch, Canadian Space Agency, Longueuil, QC, Canada (D. Nikanpour) University of California, Irvine, CA, USA (P. Collins)
<b>Total funds allocated:</b>	USD 299,200 (US: USD 149,600, CA: USD 149,600)
<b>Total grants:</b>	USD 157,496



Materials in space are constantly under the influence of radiation, ultra-violet irradiation, variable temperatures and other extreme physical conditions. Development of new space technologies and reliable operation of space vehicles demand a study of their impact on the characteristics of materials and their structures used in space.

Modelling of the conditions in space on earth means we can study the impact on materials and designs; it also provides a unique opportunity to use special space conditions for the creation of new materials, such as nano-materials.

Under this project two vacuum chambers were constructed to investigate the impact of space radiation on semi-

conductor properties including the properties of high-temperature superconductors.

The first results of the investigations have shown that the physical behaviour of materials depends on irradiation type, intensity and dose, as well as on environmental conditions (temperature, vacuum).

A model of a mini-greenhouse was developed for cultivation of certain crops in a space ship using zeponics with pre-treated Armenian natural zeolites as a substrate.



Responsible Science Management  
**TECHNOLOGY DEVELOPMENT**



## TECHNOLOGY DEVELOPMENT

Technology development and the promotion of innovation feature among the main objectives of the work of the ISTC. The aim of the activities is to convert knowledge and ideas into products and services for economic and social benefit, in the energy and health sectors, for example.

The ISTC promotes commercialization of funded research projects in various ways, as described below.

A technology “pull” program exists to match business partners with ISTC beneficiary institutes in the CIS and Georgia. The aim is to draw value from ISTC scientific projects and research works in order to modernize existing production processes or to build completely new ones. It presents a means of attracting direct foreign investment into countries of the CIS and Georgia.

The ISTC implements a skills enhancement program at its resource centres in CIS countries. Numerous training programs are conducted for scientists and engineers in subjects such as business management and entrepreneurship. ISTC courses also deal with training on IPR issues. There was considerable interest in 2011 in participating in these training programs.

A series of two Sustainability Planning Workshops were held in Yerevan on 11-12, May 2011 and in Tbilisi on November 7-10, 2011. More than ten directors and deputies from Armenian and Georgian research institutes participated in the events. During the workshops, lectures and master classes on patent investigation were given by experts from Armenia, Georgia and Russia. Key components of the Sustainability Planning process were discussed.

The ISTC funds commercialization or so-called innovation initiatives so far have created 750 new job places. This pro-

gram directly contributes to governmental policies of economic diversification in the countries concerned, through the creation of new commercial products in areas such as biotechnology, medicine, manufacturing technology and environment.

A Technology Outreach program is in place since 2010. The aim of this program is to accelerate the realization of the commercial benefits of ISTC-funded projects.

The ISTC Technology Outreach efforts consist of:

- Identifying potentially commercial innovations;
- Performing technical and market analyses;
- Preparation of opportunity briefs;
- Training of developers;
- Organization of matchmaking events;
- Support for new business ventures;
- Presentation of technologies/innovations to investors/partners;
- Early-stage support for newly created joint ventures.

In 2011 the Technology Transfer activities began with matchmaking events in Riga and Tomsk, out of which came a first wave of 24 technology matches. This group of technologies is at the stage of acquiring investment in production capacities. Other events took place in Yekaterinburg and efforts were expanded with a first matchmaking event held in Kazakhstan in September 2011.

During the year two new joint ventures were created by developers and international investors. Also, investment funds of over 500,000 USD were committed by Banks and others to support pre-seed development of a group of emerging technologies funded by the ISTC.

## THE FOLLOWING IS AN OVERVIEW OF SUPPORTED EVENTS:

### 14th Seminar of the ISTC Scientific Advisory Committee in Kazakhstan



The seminar focused on issues related to innovative development and technology transfer in a global security environment. It was organized by the ISTC in cooperation with the Institute of Nuclear Physics of the National

Nuclear Centre of Kazakhstan (INP NNC RK). The event was attended by more than 120 scientists and experts worldwide.

Special focus was given to an exchange of practical experience in innovation and technology development, i.e. to review achieved results, to discuss practical solutions and to share lessons learnt for the establishment of commercial

partnerships. The role and involvement of governmental organizations to promote innovation was discussed. The presentations given have been made widely available and can be downloaded from the ISTC website.

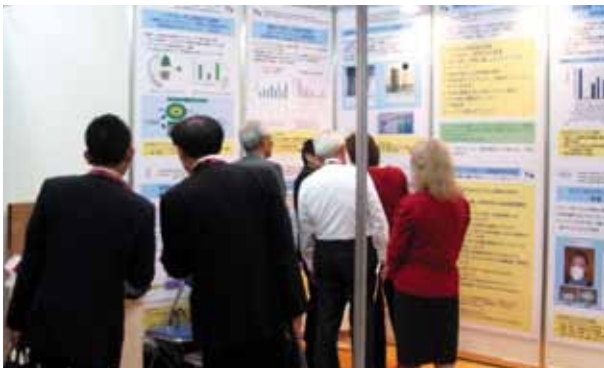
### **Innovation Investment Forum In Kazakhstan**



Together with the State Centre for Scientific and Technical Information of Kazakhstan and a private investment company, the ISTC organized an event to promote technology development in the CIS. During the forum, Armenia, Georgia and Kazakhstan presented marketable technologies and products to private investors and state companies to promote innovation. The commercial value of the various technologies was recognized and various follow-up activities were planned.

At the end of the year a Memorandum of Cooperation was signed between the ISTC and the Kazakh National Investment fund to strengthen mutual cooperation.

### **BioJapan 2011 In Japan**



The ISTC presented six technologies developed in Russia and other CIS countries at “BioJapan 2011”. These new technologies relate to the health sector. The ISTC booth at the exhibition attracted the attention of numerous visitors interested in these new technologies and arrangements were made for future cooperation between Japanese and CIS partners.

### **London Business Forum In UK**

The ISTC, together with the Baltic International Bank, held a Business Forum in London. Participants reviewed investment opportunities in CIS countries. During the fo-

rum several technologies developed with ISTC funds were presented to the investment panel. Potential investors for the development of these technologies were identified.

### **Aerospace Industry Exhibition Tokyo 2011 (ASET 2011) In Japan**

The ISTC introduced eight technologies at the Aerospace Industry Exhibition Tokyo 2011 in Tokyo. There was interest from various investors in the commercialization of some of the presented technologies. The ISTC booth at-

tracted the attention of parties interested in new technologies developed in CIS.



Responsible Science Management  
***YOUNG SCIENTISTS***



## RESPONSIBLE SCIENCE MANAGEMENT: YOUNG SCIENTISTS

The overriding aim worldwide is to attract young persons to scientific and engineering work. The ISTC took a number of initiatives to encourage young people to seek a future professional career in science and technology development. In 2011 the Centre offered opportunities to young scientists to obtain the very latest knowledge in scientific areas of their interest. During the discussions attention was paid to the potential dual use of research findings. Lectures were given on ways to maintain and develop a culture of professional responsibility in scientific and technological work, especially when dealing with dual use technologies.

A number of summer schools and master classes were organized together with other international organizations and research institutes worldwide. These activities built on the success of similar initiatives done in previous years. For example, young and promising scientists were informed again about the latest scientific progress in nuclear physics. Participants came from a number of different coun-

tries. Through these initiatives scientific networks were built to develop collaborative research projects further.

In 2011, during a summer school held in Darmstadt (Germany), an award competition was held among young scientists to train presentation skills. Young scientists gave a presentation of their research work in ultra-high intensity light science and applications.

A young scientists award competition was also organized during the Second ISTC Targeted Initiative "Probiotics and Health" Workshop, as part of the International Symposium on Gnotobiology on 20-23 November 2011 in Yokohama, Japan.

The ISTC interviewed the winners of these competitions Dr. Sergey Rykovanov and Dr. Andrey Shkoporov. These interviews bear witness to the key interest of young people in our events.

### INTERVIEW WITH DR. S. RYKOVANOV winner of the competition, ISTC-GSI Young Scientists School 2011, Darmstadt, Germany

***From what institute did you graduate?***

I graduated from the Lomonosov Moscow State University, Physics Department, Chair of General Physics and Wave Processes.

***Where do you work currently?***

I work at the Arnold Sommerfeld Centre for Theoretical Physics, Ludwig-Maximilians University, Munich, Germany.

***On what topic are you currently working?***

My main research topic is theoretical studies of methods for generation of coherent attosecond ( $1 \text{ attosecond} = 10^{-18} \text{ s}$ ) x-ray pulses. Having sharp localization in both space and time they provide unique tools for studying the ultrafast electron motion in condensed matter.

***What did participation in the Young Scientists School and the prize mean to you?***

The main reason for my participation in the School was the list of lectures offered. I learned many new topics and met and interchanged ideas with many new people. I hope the contacts I made with other young scientists will remain strong in the future.

Getting the prize for my presentation on the generation of circularly polarized x-ray pulses is a great honour for me. I am very indebted to all the experts that voted in favour of my talk.

***Why did you decide to become a scientist?***

Coming from a scientific family, the only question I had after graduating from high school was whether to enter a

Computer Science or a Physics faculty at a University. I chose Physics, but ended up doing a lot of computer simulations. Science is huge; one can always find something interesting to study and work on.

***What are your career plans? Which goals did you set for yourself?***

I want to keep working in physics, extending my knowledge and contributing to society. In the future, I would like to have my own small research group. My goal is to become an expert in what I am doing.

***What does international scientific cooperation mean to you?***

It means a lot. In our time it becomes more and more difficult to be a universal scientist on the level of, for example, L.D. Landau. Moreover, there are many new inventions and discoveries in inter-disciplinary areas of science. It is much easier and beneficial to find an expert, who can do the job better and faster, than going into the details and methods of some particular and often very narrow area of science. It doesn't mean though, that one should become an expert in a very narrow subject. Keeping your eyes and brain open for something new is very important for a scientist.

***What qualities should the modern scientist possess?***

At the moment we see tremendous growth in the number of publications. I wish modern, especially young scientists, including myself, to be more thorough and think deeper and read more books instead of often re-inventing the bicycle.

## INTERVIEW WITH DR. A. SHKOPOROV

winner of the young scientists award competition,  
 “Probiotics and Health” Workshop, International Symposium on Gnotobiology (SOMED)  
 Yokohama, Japan



**From what institute did you graduate?**

I graduated from the Russian State Medical University.

**Where do you work currently?**

I work at the N.I. Pirogov Russian National Research Medical University, Department of Microbiology and Virology.

**On what topic are you currently working?**

I work on genetics and genomics of Bifidobacteria.

**What did participation in the Young Scientists School and the prize mean to you?**

Participation in the 34th SOMED conference and ISTC workshop was very important to me. This meeting provided me an excellent opportunity to present my recent research results and share ideas and opinions with a wide range of scientists from around the world. I am looking forward to starting some research collaboration with these people. Also, it was a great honour and pleasure for me to receive the Young Scientist award for my poster presentation. This decision of the organizing committee was really unexpected since there were

a good many young scientists with very interesting oral and poster presentations.

**Why did you decide to become a scientist?**

I guess I made this decision when I was an undergraduate student, possibly during my second or third year. Before that moment I was thinking of a medical career and I was very determined to become a medical doctor. However, after completing my first years at university, learning some basic sciences like immunology, biochemistry and genetics, I was so impressed by the beauty and elegance of various biological processes that I decided to devote myself to research instead of medical practice.

**What are your career plans? Which goals did you set for yourself?**

I can't say that I have a particular "career plan". I'm happy with what I have now; I'm happy to have a job that I really love. I guess my current goal is to complete several projects on which I am currently working, to obtain some interesting results and to publish a couple of decent papers in high-ranking journals.

**What does international scientific cooperation mean to you?**

I guess that international cooperation is the driving force of modern science. Nowadays science is becoming more and more specialized – a particular scientist working in his/her narrow field may have only a few colleagues with similar narrow research interests who reside in different parts of the world, separated by thousands of miles. As for my lab, we work in close contact with our colleagues from the US, Ireland and China.

**What qualities should the modern scientist have?**

I believe that a modern scientist, in addition to his strong scientific background, should have good management skills.

## ISTC-CERN-JINR Summer School on High Energy Physics and Accelerator Physics, CERN, Geneva, Switzerland

The second ISTC-CERN-JINR Summer School on High Energy Physics and Accelerator Physics was targeted at postgraduate and PhD students from CIS countries and Georgia.

The course included five days of lectures, training activities and visits to CERN's experimental facilities. Lectures were given by scientists from CERN, JINR, a Kazakh and other scientific centers. In total 30 young scientists from the CIS countries and Georgia participated in the school, discussing the latest developments in High Energy Physics and Accelerator Physics. A declaration was adopted, calling for the

organization of a Third Summer School, to be held in 2012 at JINR-Dubna, Russia.

**Article by Dr Nodir Buriev, a young scientist from the International Centre of Nuclear Physics Research of the S.U. Umarov Physical-Technical Institute, Academy of Sciences of the Republic of Tajikistan - “The Dream That Came True”**

“When I was a schoolboy, I heard from my father about the European Organization for Nuclear Research (CERN), about the world's largest accelerator - the Large Hadron Collider (LHC) that had been built in Geneva, Switzerland. At that time I could not imagine what it was. However, deep in-



side me there emerged a dream - to see it; to see the Large Hadron Collider.

After graduation from the university I applied for a job at the International Center of Nuclear Physics Research at

the S.U. Umarov Physical-Technical Institute, Academy of Sciences of the Republic of Tajikistan as junior scientist, where I performed research in radiation ecology.

The year 2011 was to be a year of good fortune for me, when I received an invitation to participate in the Summer School held at CERN. The dream of my life came true. I saw the LHC – the most advanced scientific ideas and concepts realized in this truly “grand” project. I am very glad to be one of the first representatives of Tajikistan visiting the Large Hadron Collider in CERN.

Tajik research of high-energy physics and cosmic rays is currently being renewed within the framework of the international research project “Pamir-Chacaltaya”. Attendance at such summer schools is very informative and useful, especially for young scientists joining the difficult but very interesting pathway of science.”



*Dr. Nodir Buriev, Visiting LINAC2 facility, CERN, Geneva, Switzerland*



*Dr. Mick Storr, CERN (left) Nodir Buriev and Nikolai Zimine, JINR (right) At the CERN campus, Geneva, Switzerland*

## Summer School



The Joint Institute for Nuclear Research, (JINR) (Dubna, Russia), the European Organization for Nuclear Research (CERN) (Geneva, Switzerland) and the Institute for Nuclear Research and Nuclear Energy of the Bulgarian Academy of Sciences (INRNE) (Sofia, Bulgaria) organized the XXIII International Symposium on Nuclear Electronics and Computing (NEC'2011). The Symposium was held in Varna, Bulgaria, on 12-19 September 2011.

Young scientists from Russia, Kazakhstan, Ukraine, Bulgaria, Macedonia and Georgia participated in the school.



## ISTC-GSI Young Scientists School 2011 in Darmstadt

The First ISTC-GSI Young Scientists School 2011 “Ultra-High Intensity Light Science and Applications” was held at GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany, 10-15 October 2011. The school organizers were the ISTC and GSI with the support of FAIR and EMMI.

A broad review was given of the scientific activities in the field of high-power laser interaction with matter.

The school brought together 39 participants from Russia, Germany and France. Well-known scientists from Europe, Japan and Russia delivered lectures and presentations

related to laser technology, laser-plasma interactions, industrial applications and applications in medical diagnostics and hadron therapy.

The first school of young scientists, focusing on ultra-high intensity light science and applications at GSI, facilitated contacts between the young scientists to establish collaboration in this area.

The event was organized in the framework of the ISTC targeted Initiative “Ultra-High Intensity Light Science and Technologies”.

## The ISTC Workshop “Probiotics and Health” and the Congress of Society for Microbial Ecology and Disease



Russian, Ukrainian, Kazakh, Armenian and Georgian probiotic scientists participated in the Second ISTC Targeted Initiative (TI) “Probiotics and Health” Workshop

that took place as part of the Congress of the Society for Microbial Ecology and Disease on 20-23 November 2011 in Yokohama, Japan.

The ISTC Workshop was aimed at further development of priority topics/areas for the TI PROBIO. The event involved intensive and fruitful discussions of proposals and newly funded ISTC-STSU projects.

The Congress and ISTC Workshop appeared to be very successful meetings that enriched all the participants with new scientific ideas and promoted further the international science cooperation on microbial ecology and probiotics for human health.



Responsible Science Management  
**EDUCATION AND AWARENESS RAISING**



## EDUCATION AND AWARENESS RAISING

More and more attention is now being paid on an international level to the need to promote responsible science management, i.e. to increase awareness and responsibility among scientists in order to ensure that knowledge continues to be used for its intended purposes. Within that context the ISTC took an initiative and in 2010 launched a program called Responsible Science Management. The aim of this program is for students and scientists to become aware of the potential dual-use of their work and to develop a culture of responsibility and safety.

The program has a four pillar approach:

- Education and training. These activities include support for new courses at universities, publishing textbooks and training;
- Science and technology. Special support is given to the development of research reviews, monographs, training modules and tutorials;
- Instrumentation development. Support is provided for the development of instrumentation to ensure safety of activities;

## EVENTS

The plans and results of the ISTC Responsible Science Management Program were presented at various occasions in 2011. For example, information was provided during the NRNU/ MEPhI International Conference of the European Nuclear Society on Nuclear Education and Training, held in Prague in May 2011.

Two round table meetings on the culture of nuclear non proliferation and safety were held with the support of the ISTC at the University of Obninsk.

### Second IAEA-INSEN Working group meeting and IAEA-INPRO Steering Committee Meeting

The ISTC is part of the IAEA International Nuclear Education Network (INSEN). This network aims to exchange best practices and experience and develop joint education materials for students and experts. At these meetings the ISTC gave

- International collaboration. Funds are allocated to promote an exchange of information at international level, the development of websites, the organisation of lectures, an exchange of lessons learnt and to inform parties on best practices with respect to education and training programs in this specific area.

In 2011, under the Responsible Management Program, the ISTC supported various initiatives, aimed at promoting a culture of nuclear nonproliferation among students and nuclear scientists. Support was given for the publication of textbooks, manuals and other written material for students and experts in two languages (English and Russian). Support was given to promote lectures and discussions among students on a nuclear safety culture at the National Research Nuclear University (NRNU) MEPhI in Moscow, the Technical University of Tomsk, the NRC Kurchatov Institute and the Nonproliferation Center in Obninsk.



an overview of the results achieved under the Responsible Science Management program, in particular on a pilot project Culture of Security and Nonproliferation. In total 60 participants from different countries from 20 educational institutions and other interested persons took part in the Second Annual INSEN meeting.

## EDUCATION



The ISTC was invited to participate in a number of events commemorating the 50th anniversary of Yuri Gagarin's first orbital space flight around the earth. The results of ISTC-funded projects in space research were presented at a high level conference in London. The ISTC has funded projects totaling over USD 100 million in aeronautics and space.

A special event was sponsored by the ISTC at a school in Moscow to explain the achievements of Yuri Gagarin to pupils. During this event excerpts from a new film, First Orbit were shown. A lecture was given by the film's director Dr. Christopher Riley. Subsequently an award ceremony took place for the best works of art dedicated to space by the pupils from the school.

Responsible Science Management  
***OUTREACH***

## OUTREACH

Outreach activities of the ISTC are based on one of the three main objectives of the Center, namely to promote the further integration of the scientists of the states of the CIS and Georgia into the international scientific community. The aim of the various outreach initiatives is to bring scientists together worldwide to discuss the latest scientific findings in specific areas of research and in particular to discuss and disseminate the results from ISTC funded programs and projects. An overview is given below of the number of events organized during recent years, including the number of participants.

### Scientific Support Execution (2007-2011)

Years	Allocated funds	Number of events	Number of participants	CIS participants	Foreign Participants
2007	680,000	30	4300	3225	1075
2008	344,000	21	3760	2600	1100
2009	270,000	25	5500	3500	2000
2010	330,000	19	5000	3500	1500
2011	310,000	17	2600	1600	1000

The participation of individual scientists in international conferences is a key and successful element of this work of the ISTC. At specific seminars and workshops the best possible expertise is brought together to promote an informative discussion on current developments in ISTC-funded research areas such as global health, nuclear safety and security, environment, agriculture, space and new materials.

### Conferences, Seminars and Workshops

Numerous conferences, seminars and workshops were held in 2011 at which representatives of the ISTC or representatives of institutes receiving ISTC funding presented the findings of their work.

The following are some examples of supported events during the reporting year:

### Russia-UK Collaboration in Space Research



The ISTC facilitated contacts between UK and Russian scientists to develop the so-called Twin Sat project. The main aim

of this project is to diagnose natural and man-made VHF electromagnetic signals to detect earthquake precursors.

A tripartite Memorandum of Understanding was signed between UCL Mullard Space Science Laboratory, the Institute of Physics of the Earth and the ISTC on future collaboration in the TwinSat Project that combines Russian and UK technologies to build new-generation Earth observation satellites to monitor seismic activity such as earthquakes and volcanoes.

A Science Cafe on international cooperation in space research was held in Moscow to attract the attention of journalists to the work of leading scientists supported by the ISTC on satellite technologies, human psychology in space, and more broadly on the advantages of international collaboration in space research.

### Issyk-Kul WS - Radio Ecology and Waste Management

The ISTC sponsored and participated in the workshop 'Problems of radio ecology and waste management of uranium manufacture in Central Asia', held in the Kyrgyz Republic. Over 50 experts from the European Union, Kazakhstan, the Kyrgyz Republic, Russia, Tajikistan, Ukraine and Uzbekistan took part in the workshop.

The Workshop discussed:

- Radio ecology and radio biogeochemistry of uranium and its derivatives in the environment;
- Nuclear-physical, geochemical and geo-morphological processes in areas of uranium heritages and estimation of their impact on the environment;



- Modern methods of rehabilitation of wastes from former uranium manufacturing facilities in mountain conditions;
- Medical, biological, social, economic, and legal aspects in public health services and management of radioactive waste.

The issue of uranium tailings and toxic industrial waste in countries of the CIS remains extremely serious and the consequences of this problem will impact a considerable amount of people if not dealt with in an effective and timely way. ISTC funded 19 projects related to this problem amounting to \$4 million.

### Paediatric Multidrug Resistant Tuberculosis (TB) Conference: Emerging Global Challenge

The theme of this conference was suggested by the Smolensk State Medical Academy in view of the challenges they face with respect to paediatric tuberculosis in the region. This subject of the event was supported by the World Health Organization (WHO), the Institute of Allergy and Infectious Diseases (DHHS), the Petersburg Dialogue and the Institute of Medicine, Department of Healthcare of the Smolensk Region.

During the meetings problems were discussed relating to multidrug-resistant Tuberculosis in Russia and worldwide with the participation of experts from the EU, India, South Africa, the USA, Russia, other CIS countries and Georgia.



### ISTC-STCU International Environmental Forensics Workshop



The Workshop on Environmental Forensics was organized by the ISTC together with the STCU. The objective was to

bring together scholars, regulators and other persons working in environmental forensics and to discuss research results.

The meeting focused on information sharing on scientific techniques available to identify contaminating agents, including means of their dissemination.

More than 80 scientists, engineers, managers, project directors, and other persons from twelve countries (Azerbaijan, Belarus, Canada, France, Georgia, Kazakhstan, Moldova, Russia, Tajikistan, Ukraine, the UK and the USA) attended the workshop. In total 40 presentations and 20 posters sessions were held during six thematic sessions.

### Second Joint NIAID-ISTC Workshop on Bioinformatics Tools and Innovation through Collaboration

The purpose of the workshop was to expand on the previously established relationship between NIAID and research institutions from CIS countries to identify and discuss collaboration initiatives in bioinformatics, computational biology, medical and clinical informatics as related to allergy and infectious diseases.

The workshop included invited presentations and a plenary session. Common areas of interest and collaboration were identified. New research projects are now under development as a follow up.



## ISTC-Korea Workshop on Nuclear Science



The ISTC, in collaboration with the Korean Ministry of Education, Science & Technology, hosted the 26th

International Workshop on Advanced Nuclear Materials and Radiation Biology at the Korea Atomic Energy Research Institute (KAERI) in Daejeon, Korea.

The topics of the workshop – nuclear materials and radiation biology – are critical to both efficiency and safety of nuclear power plants. The ISTC invited prominent scientists in the two areas from Russia and Belarus to the workshop, in which around 100 attendees from Korean research institutions and industry participated. The focus of discussion between ISTC scientists and KAERI experts was, inter alia, on nuclear structural materials, coating technologies and new manufacturing processes.

Participants shared their experience, discussed possible joint R&D and agreed to commence preliminary studies from sample testing.

## Working Meeting on Space Debris Mitigation and Removal

An international working meeting on long and man-made space debris mitigation and removal was held at the ISTC. The meeting followed the ISTC Thematic Workshop on Space Debris Mitigation held on 10 April 2010 and an Expert Group meeting held on 6 July 2011 in Saint Petersburg.

An exchange of views on the latest development with respect to space debris mitigation and removal took place. The meeting focused on scientific and technical support regarding possible techniques of debris removal.

Presentations on possible removal techniques were given by experts from the European Union, Japan and Russia.

The meeting participants underlined that international cooperation and partnership is essential for the solution of



the space debris problem. They also stressed the importance of the continuation of research in space debris removal in the lower earth orbit, taking into account various elements such as the risk of collision and self-decaying of the various objects.

## PUBLICATIONS

The ISTC has released a series of publications disseminating the findings of funded projects. These publications make the results of the Center's work known to a wider audience. The aim is to generate follow-up collaborative

research or to attract investments into commercialization of the results of ISTC-funded projects.

The publications in 2011 cover wide-ranging areas.

### Space and Aeronautics

The ISTC has funded projects in space and aeronautics. The relevant findings were published in 2011.





## Nuclear Science

The ISTC has funded numerous science and technology projects related to nuclear science, the development of innovative concepts and technologies and the improvement of nuclear safety.

The funded research areas include:

- nuclear safety, efficiency of operating nuclear power plants and plant life management;
- nuclear power plant decommissioning and waste treatment;
- novel reactor concepts and nuclear fuel cycle options;
- nuclear materials accounting and control and physical security of nuclear materials;
- knowledge preservation in nuclear science;
- nuclear technologies for the development of medicine;
- fusion.

The results of this work are available through various publications such as:



## Innovation

The ISTC has published a manual on how to conduct innovations at corporate level. This publication is available free of charge from the ISTC.



## Ultra-High Intensity Light Science and Applications Targeted Initiative

A comprehensive review related to assessment of prospects of international cooperation in Ultra-High Intensity Lasers for civil applications was also published within the framework of ISTC activities. The study provides information related to the science and technology potential of leading Russian institutes and ways in which they could be involved in international projects such as ELI and HiPER.



## SPECIFIC OUTREACH PROGRAM

In 2010 a special ISTC program began releasing information on a more structural basis on the functioning and work modalities of the ISTC, including an explanation of its results and impact. The lessons learnt during more than 17 years of the ISTC's experience are explained in particular presentations to interested persons of non-ISTC member countries.

Within that framework a number of events were supported by the ISTC in 2011 that promoted discussion on the en-

agement of scientists, especially with respect to the role of science centres within that concept.

The following are examples of activities supported by the ISTC:

## International Seminar - Nuclear Energy and the Development of Nonproliferation Culture: Covering New Regions, ISTC-PIR Centre

The International Seminar, Nuclear Energy and the Development of Nonproliferation Culture: Covering New Regions, discussed various topics such as:

- the development of a nonproliferation culture;
- regional issues of nonproliferation culture development and education in nonproliferation culture.

There was also an exchange of views on the events and the lessons learnt at the Fukushima Daiichi NPP.

The seminar was attended by representatives from over 20 countries including high-ranking diplomats and senior officials of national atomic companies and scientific institutes.

The ISTC supported the International Summer School on Global Security of July 2011 in Moscow that aims to broaden understanding and knowledge on current trends in nonproliferation and nuclear security.

The school was attended by young diplomats, officials and scholars from CIS countries.

A special session was organized on the subject of the scientists' engagement. In that framework, the experience and results of the ISTC were explained.



# *RESPONSIBLE SCIENCE MANAGEMENT*



# ISTC PROJECT MAP



- ISTC PROJECT LOCATION
- CIS CAPITALS WITH ISTC PROJECTS

ISTC PROJECTS LOCATED IN MOSCOW REGION

Bolshie Vyazemy	Lyubertsy	Ramenskoye
Chernogolovka	Lytkarino	Serpukhov
Dubna	Lyubuchany	Shatura
Dolgoprudny	Nemchinovka-1	Shcherbinka
Elektrostal	Obolensk	Troitsk
Fryazino	Podolsk	Zelenograd
Khimki	Protvino	Zhukovsky
Korolev	Puschino	



## List of Projects Completed in 2011 (research, innovation, other)

No	Short title	Leading Institute	Collaborators
<b>Agriculture</b>			
#3440	Phytophthora Infestans on Potato	Phytopathology Research Institute, Bolshie Vyazemy, Moscow Region, Russia	Canada
#3445	Bacteriocin Field Trials in Broilers	State Research Centre for Applied Microbiology and Biotechnology, Obolensk, Moscow Region, Russia	USA
#3571	Antimicrobials against Staphylococcus	State Research Centre for Applied Microbiology and Biotechnology, Obolensk, Moscow Region, Russia	USA
#K-788.2	Atlas of Zoonosis Infections in Kazakhstan	Kazakh Scientific Centre for Quarantine and Zoonotic Diseases, Almaty, Kazakhstan	USA, Canada
<b>Biotechnology and Health</b>			
#1987	Variola Virus Genome	State Research Centre of Virology and Biotechnology VECTOR, Koltsovo, Novosibirsk Region, Russia	USA
#2754.2	Bacterial and Cell Culture Collection	State Research Centre for Applied Microbiology and Biotechnology, Obolensk, Moscow Region, Russia	Canada, USA
#3154	Technology of Manufacturing Enzyme Preparations	Open Stock Company Vostok, Kirov, Kirov Region, Russia	USA
#3177	Neutralization of B.anthraxis Spores in Soil	Institute of Immunological Engineering, Lyubuchany, Moscow Region, Russia	Canada, USA, Germany
#3255	Hepatitis C Virus Proteins Analysis	State Research Centre of Virology and Biotechnology VECTOR, Koltsovo, Novosibirsk Region, Russia	USA
#3303	Function of Heat Shock genes in Human Ageing	Institute of Gerontology, Moscow, Russia	Finland
#3479	Production of Recombinant Antibodies	Institute of Bioorganic Chemistry, Moscow, Russia	France
#3566	Nanostructured DNA Vaccines	Institute of Immunological Engineering, Lyubuchany, Moscow Region, Russia	Finland
#3624	Nickel Bioleaching	Institute of Biochemistry and Physiology of Microorganisms, Puschino, Moscow Region, Russia	Canada
#3731	Anti-Allergic Properties of Lactic Acid Bacteria	Moscow State University / Department of Biology, Moscow, Russia	
#3807	Comparative Genomics of Bacteria	Institute of Strategic Stability, Moscow, Russia	Germany, France
#3909	Stomach Cancer Early Diagnosis	Cancer Research Institute, Siberian Branch, Russian Academy of Medical Sciences, Tomsk, Tomsk Region, Russia	Sweden
#3925	Paleomicrobiology of Permafrost	Institute of Biochemistry and Physiology of Microorganisms, Puschino, Moscow Region, Russia	Austria
#A-1227	Crohn's Disease	International Armenian Centre of Ethnopathology, Yerevan, Armenia	Slovakia, France, Japan, Italy
#A-1701	Proline-Rich Polypeptides and Hematopoiesis Regulation	Institute of Biochemistry, Yerevan, Armenia	USA
#G-1318	Epilepsy Treatment	Tbilisi State University, Tbilisi, Georgia	Germany
#G-1687	Combination of Bacteriophages and Probiotics against Diarrhea	Union Biochimpharm, Tbilisi, Georgia	Spain
#G-416.3	Anti-Anthrax Immunoglobulin	Georgian Academy of Sciences / Institute of Bacteriophage, Microbiology and Virology, Tbilisi, Georgia	USA, UK
#K-1251	Preparation for Fermental Fractionation of Cellulose	National Centre of Biotechnology, Stepnogorsk, Kazakhstan	USA
#T-1171	Plague Infections in Tajikistan	Republican Centre for Quarantine Infection Prevention of the Ministry of Health of the Republic of Tajikistan, Dushanbe, Tajikistan	USA
#T-1373	Chronic Viral Hepatitis in the Republic of Tajikistan	Institute of Gastroenterology, Academy of Sciences, Republic of Tajikistan, Dushanbe, Tajikistan	Germany
<b>Chemistry</b>			
#2526	Build-up of Organically-Bound Tritium in Crops	VNIIEF, Sarov, N. Novgorod Region, Russia	France, USA
#2883	Dioxide Plutonium Storage	A. Bochvar All-Russian Scientific Research Institute of Non-Organic Materials, Moscow, Russia	UK, France, USA
#3234	Membranes for Pure Syn-Gas Generators	VNIIEF, Sarov, N. Novgorod Region, Russia	France, UK, USA
#3235	Recovery of Polymer Waste by Shear Strains	VNIIEF, Sarov, N. Novgorod Region, Russia	Canada
#3364	"Electronic tongue" for detection of metals	Khlopin Radium Institute, St Petersburg, Russia	Denmark, USA, UK
#3655	Metal Hydride Tank for Vehicle	VNIIEF, Sarov, N. Novgorod Region, Russia	USA
#3736	High-Purity Highly Enriched Silicon	Russian Academy of Sciences / Institute of Applied Physics, N. Novgorod, N. Novgorod Region, Russia	Belgium, Germany, Japan, Canada, Korea
#CI-009	NF <sub>3</sub> and WF <sub>6</sub> Pilot Manufacture	Siberian Chemical Combine, Seversk, Tomsk Region, Russia	
#A-1563	Antitumoural Nanocomposites	State Engineering University of Armenia, Yerevan, Armenia	UK
#G-1361	Hetero-multimetallic Catalysts	Tbilisi State University, Tbilisi, Georgia	Switzerland, Germany, France, UK

#II-103	Production of radiation-modified polymer samples	Ural factory of polymer technologies MAYAK, Ltd., Oziorsk, Chelyabinsk Region, Russia	
#K-1342	Semiconductors for Converters of Solar Energy	Institute of Organic Catalysis and Electrochemistry, Almaty, Kazakhstan	USA, UK
#K-1574	High Purity Tantalum Metal Production	Joint Stock Company Ulba Metallurgical Plant, Ust Kamenogorsk, Kazakhstan	USA
#K-1700	Carbon Based Composite Materials	Kazakh National University / Centre of Physical and Chemical Methods of Analysis, Almaty, Kazakhstan	USA, Italy
<b>Environment</b>			
#1022.2	Solid Waste Safety	State Research Institute of Organic Chemistry and Technology, Moscow, Russia	USA
#2683	Transportable Detonation Containment System	VNIIEF, Sarov, N. Novgorod Region, Russia	USA
#2806	Carbon Exchange in Eurasian Forests	VNIIEF, Sarov, N. Novgorod Region, Russia	USA
#2845	Simultaneous Propagation of Infrasound and Seismic Waves	NIIT (Pulse Techniques), Moscow, Russia	Germany, Austria, Netherlands, France, Norway
#2905	Purification of Liquid Radioactive Waste by Ultrafiltration	Institute of Highly Pure Biopreparations, St Petersburg, Russia	Canada
#3288	Exchange between Atmosphere and Underlying Surface	Karpov Institute of Physical Chemistry, Moscow, Russia	The Netherlands, Germany, Austria, Canada
#3305	Catalysts for Degradation of Harmful Gases	Institute of problems of chemical-energetic technologies Siberian Branch of Russian Academy of Sciences, Biysk, Altay Region, Russia	Germany, Spain, Italy
#3381	Decontamination of Beryllium Waste	VNIIEF, Sarov, N. Novgorod Region, Russia	Belgium
#3389	Synthesis Gas Production from Diesel Fuel	Boreskov Institute of Catalysis, Akademgorodok, Novosibirsk Region, Russia	
#3405	Transplutonium Elements Recovery from Wastes	Khlopin Radium Institute, St Petersburg, Russia	Canada, Czechia, Italy, France
#3428	Foamed Vermiculite	Mining and Chemical Complex, Zheleznogorsk, Krasnoyarsk Region, Russia	
#3535	Liquid Low-Level Waste Processing	Siberian Branch of RAS / Institute of Chemistry and Chemical Technology, Krasnoyarsk, Krasnoyarsk Region, Russia	USA, Canada
#3547	Radionuclides Transport in the Irtysh-Ob, Basin	Russian Academy of Sciences / Severtsov Institute of Ecology and Evolution, Moscow, Russia	USA
#3549	Land Remediation Planning	Khlopin Radium Institute, St Petersburg, Russia	USA
#3581	Sorbents to Clean Liquid Radioactive Waste	VNIIEF, Sarov, N. Novgorod Region, Russia	USA
#3583	Ultraviolet Purification of Water Supply Systems	Siberian Branch of RAS / Institute of High Current Electronics, Tomsk, Tomsk Region, Russia	USA
#3676	Highly Sensitive Gas Analyzer	VNIIEF, Sarov, N. Novgorod Region, Russia	Sweden
#3696	Radionuclide Transport to the Water Bodies	VNIIEF, Sarov, N. Novgorod Region, Russia	Spain
#3777	Models of Toxic Action of Chemicals	Institute of Physiologically Active Substances, Chernogolovka, Moscow Region, Russia	Italy, UK
#3799	Off-Gas Cleaning from Semivolatile Radionuclides	Khlopin Radium Institute, St Petersburg, Russia	USA, UK, Belgium
#3816	Earthquake Early Warning	International Institute of Earthquake Prediction Theory and Mathematical Geophysics, Moscow, Russia	Japan, Belgium
#CI-096	Production of peat-mineral oil biosorbent	Press-torf, Kirovo-Chepetsk, Kirov Region, Russia	
#G-1303	Litosphere of Caucasus	Geophysics Institute, Tbilisi, Georgia	Germany
#K-1240	Pavlodar Post-Containment Mercury Management	Almaty Institute of Energy and Communication, Almaty, Kazakhstan	UK
#K-1296	The Syrdarya River Model	National Nuclear Centre of the Republic of Kazakhstan / Institute of Nuclear Physics, Almaty, Kazakhstan	USA
#K-1345	Residual Sodium in BN-350 Loops	Nuclear Technology Safety Centre, Almaty, Kazakhstan	USA, UK
#K-1400	Extraction, Detoxication and Utilization of Arsenic	Chemical and Metallurgical Institute, Karaganda, Kazakhstan	USA
#KR-1430	Model of Toktogul Water Reservoir	Institute of Water Problem & Hydropower Engineering, Bishkek, Kyrgyzstan	Belgium, Finland, Italy
#KR-1522	Atmospheric Brown Cloud	Kyrgyz-Russian Slavonic University, Bishkek, Kyrgyzstan	Germany, France
#T-1163	Radioactive Pollution of Central Asia Rivers (Continuation)	Physical-Technical Institute, Dushanbe, Tajikistan	USA
<b>Fission Reactors</b>			
#0967	Gallium in MOX Fuel	A. Bochvar All-Russian Scientific Research Institute of Non-Organic Materials, Moscow, Russia	USA
#1316	Radiation in Nuclear Fuel Cycle	A. Bochvar All-Russian Scientific Research Institute of Non-Organic Materials, Moscow, Russia	USA
#2585	Characterization of Samples with Spontaneously Fissioning Isotopes	MIFI, Moscow, Russia	Germany, Finland, Canada
#2781	Ferritic-Martensitic Steels for Fusion Reactor	NIAR (Atomic Reactors), Dimitrovgrad, Ulianovsk Region, Russia	
#3420	VVER-1000 Reactor Pressure Vessel	Kurchatov Research Centre, Moscow, Russia	The Netherlands, Germany, Czechia, Belgium

#3514	Removing Corrosion Products from NPP's Systems	Research Institute of Technology, Sosnovy Bor, Leningrad Region, Russia	Canada
#3839	Ultra High-Purity Cesium-131 for Medical Applications	Institute of Reactor Materials, Zarechny, Sverdlovsk Region, Russia	USA
#3955	Low-Temperature Irradiation of Zirconium Alloys	NIAR (Atomic Reactors), Dimitrovgrad, Ulianovsk Region, Russia	Canada
#3958	VVER Fuel Burnup and Nuclide Composition	NIAR (Atomic Reactors), Dimitrovgrad, Ulianovsk Region, Russia	
#A-1492	Safety of Armenian NPP	Nuclear and Radiation Safety Centre of Armenian Nuclear Regulatory Authority, Yerevan, Armenia	USA, The Netherlands
#B-1604	Actinides Neutron Data for High Energy	Joint Institute of Energy and Nuclear Research - Sosny, Minsk, Sosny, Belarus	France, Belgium, Austria
<b>Fusion</b>			
#2805	Hydrogen Trapping and Release	MIFI, Moscow, Russia	Germany, Japan, USA
#3785	Fast Gamma-Ray Spectrometry	Russian Academy of Sciences / Physical Technical Institute, St Petersburg, Russia	Portugal
#3927	Cryogenic Targets Rep-Rate Producing	FIAN Lebedev, Moscow, Russia	UK
<b>Global Security</b>			
#2978	Digital Technology for Fissile Materials Detection	MIFI, Moscow, Russia	Canada, Germany, USA, Italy
#3157	Position-sensitive detector of electrons	Russian Academy of Sciences / Physical Technical Institute, St Petersburg, Russia	Canada
#3173	Hand-held express drug detector	Siberian Branch of RAS / Design & Technological Institute of Instrument Engineering for Geophysics and Ecology, Novosibirsk, Novosibirsk Region, Russia	USA
#3106	Prevention of mail terrorism	Khlopin Radium Institute, St Petersburg, Russia	France, UK
#3534	Device for Detection of Explosives	Khlopin Radium Institute, St Petersburg, Russia	Canada, Japan, Italy, USA
#3586	Fire Extinguishing with Water-Filled Capsules	VNIIEF, Sarov, N. Novgorod Region, Russia	Portugal
#3638	Explosive-Resistant Container	VNIIEF, Sarov, N. Novgorod Region, Russia	USA
#3716	Mass Spectrometry for Forensic Application	A. Bochvar All-Russian Scientific Research Institute of Non-Organic Materials, Moscow, Russia	USA
#A-1292	Converters and Detectors for X-Ray Imaging	A.I. Alikhanyan National Science Laboratory, Yerevan, Armenia	Canada
<b>Information and Communication</b>			
#3262	Polyfiber Infrared Systems	VNIIEF (Chemical Technology), Moscow, Russia	Germany, Italy, France
#3683	Photonic Crystal Fibers	VNIIEF, Sarov, N. Novgorod Region, Russia	Czechia, Austria, Italy
#3772	Cross-City Nonproliferation Network	VNIIEF, Sarov, N. Novgorod Region, Russia	USA
#CSP-049	Development of Joint Institute of Power and Nuclear Research. Sosny communication system	Joint Institute of Energy and Nuclear Research - Sosny, Minsk, Sosny, Belarus	
#CSP-054	WiMax Network Expansion	Kyrgyz-Russian Slavonic University, Bishkek, Kyrgyzstan	
<b>Instrumentation</b>			
#3576	Device for Measurement of a Wool Parameters	JS Company Sarov Laboratories, Sarov, N. Novgorod Region, Russia	USA
#3660	Deep Sea Probe	VNIIEF, Sarov, N. Novgorod Region, Russia	USA
#3709	Animal 3-D Forms	JS Company Sarov Laboratories, Sarov, N. Novgorod Region, Russia	USA
#3740	Gas-Analyser Based on Diode Lasers	A.M. Prokhorov General Physics Institute RAS, Moscow, Russia	USA
#A-1524	Moisture Remote Sensing	ECOSERV Remote Observation Centre Co. Ltd., Yerevan, Armenia	Germany
<b>Manufacturing Technology</b>			
#2984	Business Plan for Development of Water-Jet Technologies	VNIITF, Snezhinsk, Chelyabinsk Region, Russia	
#3124	X-Ray Optics	Russian Academy of Sciences / Institute of Crystallography, Moscow, Russia	Italy, France, Netherlands
#3722	Diaphragm Coupling	Experimental Designing Bureau of Machine Building (OKBM), N. Novgorod, N. Novgorod Region, Russia	
#K-1162	Pilot Plant for Silicon Production	Institute of Physics and Technology, Almaty, Kazakhstan	USA
<b>New Materials</b>			
#2854	Vanadium Superpermeability to Hydrogen Isotopes	VNIIEF, Sarov, N. Novgorod Region, Russia	France, Germany, Japan
#3414	Polymer Quasicrystal Composite Materials	MISIS (Steel and Alloys), Moscow, Russia	Germany
#3620	Diamond Polycrystals Nozzles	MISIS (Steel and Alloys), Moscow, Russia	France
#3706	Fianite in Optoelectronics	A.M. Prokhorov General Physics Institute RAS, Moscow, Russia	Germany, Norway, France
#3717	Aluminum Alloys Coloration	Mining and Chemical Complex, Zheleznogorsk, Krasnoyarsk Region, Russia	USA
#3718	Polymers in Opto- and Microelectronics	Institute of Physical Chemistry and Electrochemistry, Moscow, Russia	Sweden, Netherlands, Austria, France
#3719	Optical Nanoceramics	Tomsk Polytechnical University, Tomsk, Tomsk Region, Russia	Germany
#4024	Severe Plastic Deformation of $\beta$ Alloys	Ufa State Technical University of Aviation, Ufa, Bashkiriya, Russia	
#A-1486	Nonlinear Oriented Tape Glass-Ceramics	Institute of Electronic Materials, Yerevan, Armenia	Germany, Finland, Poland
#A-1523	Ultraviolet Glass	NPF Stone & Silicates, Yerevan, Armenia	France, Portugal, Italy, Greece, Spain
#B-1805	Ceramic Scintillator for Computed Tomography	Institute for Nuclear Problems, Minsk, Belarus	
#CI-004	BGO Crystals Pilot Production	Nikolaev Institute of Inorganic Chemistry, Siberian Branch of the Russian Academy of Sciences, Novosibirsk, Novosibirsk Region, Russia	



<b>Medicine</b>			
#2734	Cholinesterase for Prophylactics of Poisoning by Organophosphorous Inhibitors	State Research Institute of Organic Chemistry and Technology, Moscow, Russia	France
#2879	Research Center for Tuberculosis Clinical Trials	Ministry of Health / The I.M. Sechenov First Moscow State Medical University / Research Institute of Phthisiopulmonology, Moscow, Russia	USA, Switzerland
#2893	Coherent Photonics and Computer Simulation in Dentistry	MIFI, Moscow, Russia	France, Germany
#3135	Molecular Diagnostics of Mixed Tick-Borne Infections	State Research Institute of Biological Instrument-Making, Moscow, Russia	USA
#3301	Prophylaxis and Treatment of Myocardial Infarction	Institute of Theoretical and Experimental Biophysics, Puschino, Moscow Region, Russia	France, Finland
#3426	Quorum Sensing Genes of Dangerous Pathogens	State Research Centre for Applied Microbiology and Biotechnology, Obolensk, Moscow Region, Russia	France
#3436	Influenza A viruses in Novosibirsk region	State Research Centre of Virology and Biotechnology VECTOR, Koltsovo, Novosibirsk Region, Russia	USA
#3505	Limited Efficacy of Antihyperlipidemic Drugs	Gamalei Institute of Epidemiology and Microbiology, Moscow, Russia	Canada
#3563	Planning System for Proton Therapy	VNIITF, Snezhinsk, Chelyabinsk Region, Russia	USA
#3591	Cancer Therapy by Carbon Ions	ITEF (ITEP), Moscow, Russia	Germany
#3808	Cell Therapy of Ischemia	Institute of Immunological Engineering, Lyubuchany, Moscow Region, Russia	Italy, Finland
#B-1489	Diagnostics of Tumors in Children	National Academy of Sciences of the Republic of Belarus / Institute of Informatics Problems, Minsk, Belarus	Germany, France
#G-1195	H.pylori Epidemiologic Studies	National Centre for Diseases Control, Tbilisi, Georgia	USA
#II-151	Upgrade of diagnostic radiopharmaceuticals facility in compliance with GMP standards	Khlopin Radium Institute, St Petersburg, Russia	
<b>Non-Nuclear Energy</b>			
#2590	Drill String Radar (DSR)	Institute of Measuring Systems, N. Novgorod, N. Novgorod Region, Russia	USA
#3250	Explosive Compaction for Technology of Thermoelectric Materials	VNIIEF, Sarov, N. Novgorod Region, Russia	USA
#3491	Electrodes for Batteries and Supercapacitors	VNIIEF, Sarov, N. Novgorod Region, Russia	USA, Korea
#K-1342	Semiconductors for Converters of Solar Energy	Institute of Organic Catalysis and Electrochemistry, Almaty, Kazakhstan	USA, UK
<b>Physics</b>			
#2740	Unsteady Wave Processes of Model Gasdynamic Devices	TsIAM (Aviation Motors), Moscow, Russia	France
#3057	Plasma-Induced Ignition	Joint Institute for High Temperatures RAS, Moscow, Russia	
#3074.2	Neutron Diffraction Study of Nuclear Reactor Materials	Ural Branch of RAS / Institute of Metal Physics, Ekaterinburg, Sverdlovsk Region, Russia	Germany, Netherlands, Czechia
#3310	Negative Differential Resistance in Molecular & Wires	VNIIEF, Sarov, N. Novgorod Region, Russia	USA
#3390	Possibilities of Enriched Uranium Detection	VNIIEF, Sarov, N. Novgorod Region, Russia	Canada
#3454	Tubular Electron String Ion Source	Joint Institute of Nuclear Research, Dubna, Moscow Region, Russia	Canada
#3504	Updated Atomic Database	VNIITF, Snezhinsk, Chelyabinsk Region, Russia	USA, Czechia, Italy, Germany, Belgium, France
#3599	Extra Ultra Violet Source	TRINITI, Troitsk, Moscow Region, Russia	Japan
#3743	Oxide Interfaces for Quantum Devices	Russian Academy of Sciences / Institute of Radioengineering and Electronics, Moscow, Russia	Sweden, Italy, Denmark
#3794	Longitudinal Vortex Plasmoid	Joint Institute for High Temperatures RAS, Moscow, Russia	
#3881	Nuclear Fusion on Polarized Deuterium and Helium-3	Nuclear Physics Institute, Gatchina, Leningrad Region, Russia	Germany, Switzerland
#3893	Calcium Molybdate for Low Background Beta Spectrometry	ITEF (ITEP), Moscow, Russia	Korea
#A-1484	Light Valves	Yerevan State University, Yerevan, Armenia	USA
#A-1602	Smith-Purcell Free Electron Laser	A.I. Alikhanyan National Science Laboratory, Yerevan, Armenia	Germany
#A-1606	Armenian-Georgian Grid for Physics	Information and Automation Problems Institute, Yerevan, Armenia	France, Greece, Italy, Poland, Germany, UK
#G-1255	Plasma Machine for Surface Treatment	Georgian Technical University, Tbilisi, Georgia	Canada
#G-1458	Rare Processes at Experiment of Large Hadron Collider	Tbilisi State University, Tbilisi, Georgia	USA, Switzerland
<b>Space</b>			
#3550	Aerodynamics of Reentry Space Vehicles	Siberian Branch of RAS / Institute of Theoretical and Applied Mechanics (ITPMech), Novosibirsk, Novosibirsk Region, Russia	France, The Netherlands, Germany
#3684	Space Cultivation of Microorganisms	State Research Centre of Virology and Biotechnology VECTOR, Koltsovo, Novosibirsk Region, Russia	UK, Netherlands
#A-1229	Testing Materials for Application in Space	A.I. Alikhanyan National Science Laboratory, Yerevan, Armenia	UK, USA, Greece, Canada
<b>Other Basic Sciences</b>			
#G-1532	Model of the Lithosphere of the Caucasus	Geophysics Institute, Tbilisi, Georgia	Bulgaria, Germany

## PROMOTING CIS SCIENCE AND TECHNOLOGY

The ISTC assists in the integration of Russian and other CIS scientists into the international S&T community and in engendering sustainable cooperation both during the lifetime of an ISTC project and beyond. Canada, the European Union, Korea, the United States, and Japan fund these activities and, in 2011, the ISTC supported or organised over 60 events inside and outside the ISTC member states.

This work includes a number of promotional initiatives to inform the international private and public science and technology sector of the results of ISTC-funded projects and opportunities to bring these results to the marketplace. The ISTC has participated in major international trade shows, scientific and technological exhibitions and conferences and has organised or supported specific science exchange workshops and targeted company visits. An overview of activity is presented below.

### ISTC Involvement in Promotional Events and Science Workshops/Seminars in 2011

Date	Title	Place
26-27 January	NIRS-ISTC Workshop on Cytogenetic Biodosimetry	Chiba, Japan
5 February	Culture of Nuclear Non-Proliferation and Security: from nuclear legislation and international agreements to the engineering barriers	Obninsk, Russia
9-10 February	Fourth Workshop on Enhancing Capabilities of Safeguards Analytical Services (ECAS)	Vienna, Austria
16-17 February	IAEA-CEG Workshop - Study of Nuclear Submarines and Objects with Spent Nuclear Fuel and Radioactive Wastes Sunken in the Arctic Seas and Strategies	Oslo, Norway
16-18 February	NanoTech 2011	Tokyo, Japan
16-17 February	UK / Russia Space Satellite Workshop	Moscow, Russia
22 February	Launch of Russia / UK Year of Space Research	Moscow, Russia
20-26 February	9th International Ural Seminar - Radiation Damage Physics of Metals and Alloys.	Kyshtym, Chelyabinsk reg., Russia
March-July	Biorisk Management Training Course for Central Asian Specialists	Almaty, Kazakhstan
14-18 March	XIII Khariton's International Topical Scientific Readings - Extreme States of Substance. Detonation. Shock waves	Sarov, Russia
16-17 March	Yuri Gagarin's Legacy - 50 Years On - Securing the vision for the next half century	London, UK
22-23 March	Workshop - New forms of drugs for luminescence diagnostic and photodynamic therapy (PDT) of tumours	Moscow, Russia
29-31 March	International Scientific Conference	Dushanbe, Tajikistan
5-14 April	Workshop - Application of Monte Carlo methods and codes for modelling therapeutic proton beam lines and deso-field calculations in treatment planning systems	Wiener Neustadt, Austria
12-14 April	Conference - Next Generation of Nuclear Security	Vienna, Austria
17-22 April	25th ISTC-Korea WS on Characterization of Nano Materials, Nano Structures and Advances in Nano Devices	Seoul, Korea
May-October	Organization of Information Seminars for BSL3 Laboratory	Bishkek, Kyrgyzstan
1-8 May	International Symposium and School of Young Scientists - Biomaterials and Bionanomaterials: recent advances and the toxicology issue	Heraklion, Greece
30 May - 4 June	ISTC Targeted Initiative: Ultra-High Intensity Light Science and Technologies	Kyoto, Japan
June-November	First biosafety/biosecurity capacity building training: modern methods of diagnostics and laboratory management	Dushanbe, Tajikistan
5-18 June	Summer School on Practical Physics	Trieste, Italy
6-9 June	International Conference - Problems of Radioecology and Waste Management of Uranium Production in Central Asia	Issyk-Kul, Kyrgyzstan
16-18 June	Workshop - Micro- and Nano-structured Materials for Photonics	Yerevan, Armenia
20-28 June	Workshop for young scientists and experts - Renewable Energy Sources: a View to the Future	Leningrad Region, Russia
23-24 June	Scientific Seminar - Nanomaterials in the Environment: Ecological Risk Assessment	Pushchino, Russia
23 June	International Seminar (ISTC-PIR Center) - Nuclear Energy and the Development of the Nonproliferation Culture: Covering New Regions	Moscow, Russia
25-30 June	Business Conference on Innovation	Issyk Kul, Kyrgyzstan
19 June - 2 July	Annual International Summer School on Global Security 2011	Moscow Region, Russia
4-8 July	7th International Symposium on Technetium and Rhenium - Science and Utilization	Moscow, Russia

4-8 July	European Conference for Aerospace Sciences (4th EUCASS)	St Petersburg, Russia
14-15 July	Thematic Workshop - Variable Geometry Rotor	Tbilisi, Georgia
16-22 July	International Conference - Advanced Lasers in Biomedicine	St Petersburg, Russia
8-12 August	2nd IAEA-INSEN Meeting	Vienna, Austria
7-9 August	Workshop - Innovative Drug Discovery Collaboration (ISTC 3D Targeted Initiative)	Niagara Falls, Canada
22-27 August	2nd International Workshop on Practical Cytometry	Moscow, Russia
29 August-1 September	Second Joint NIAID-ISTC Workshop on Bioinformatics Tools and Innovation Through Collaboration	Moscow, Russia
5-7 September	International Conference - Innovation Project on Creation of Kazakhstani Tokamak for Materials Testing. Scientific Research and International Cooperation	Astana, Kazakhstan
6-16 September	Workshop on Infectious Diseases in Siberia/Far East Russia and Conference of Asian Lactic Acid Bacteria Association at the Unlimited World of Microbes (International Congress of Bacteriology, Mycology and Virology)	Sapporo, Japan
11-18 September	14th Workshop on Polarized Sources, Targets and Polarimetry (PST2011)	St Petersburg, Russia
12-19 September	Summer School - Nuclear Electronics and Computing	Varna, Bulgaria
12-16 September	Environmental Forensics Workshop	Tbilisi, Georgia
20-21 September	ISTC-Korea Workshop on Nuclear Science	Daejeon, Korea
25 September-01 October	14th Topical Meeting on Optics of Liquid Crystals (OLC-2011)	Yerevan, Armenia
21-23 September	International Conference - Nonlinear Optics: East-West Reunion	Suzdal, Russia
27-28 September	SAC Seminar - Developing Innovation and Technology Transfer in a Global Security Environment	Almaty, Kazakhstan
29 September	Innovation Investment Forum	Almaty, Kazakhstan
25 September - 1 October	ISTC-CERN-JINR Summer School on High-Energy Physics and Accelerator Physics (CERN).	Geneva, Switzerland
27-30 September	3rd Annual Conference of the Biosafety Association of Central Asia and the Caucasus	Tbilisi, Georgia
4-7 October	12th International Conference/Nuclear Safety and Personnel Training 2011 (NSAPT 2011)	Obninsk, Russia
5-7 October	Czech-Russian Workshop (Space 2011)	Prague, Czech Republic
5-7 October	World Business Forum - BioJapan 2011	Yokohama, Japan
10-15 October	Young Scientists School 2011 - Ultra-High Intensity Laser Physics and Applications, ISTC-GSI	Darmstadt, Germany
10-12 October	20th CEG Severe Accident Management (SAM) Meeting	Moscow, Russia
10-14 October	Interpol Training Session on Anti-Bioterrorism Efforts	Almaty, Kazakhstan
11-14 October	Workshop for researchers from Georgian institutes working in Biotechnology	Tbilisi, Georgia
14 October	London Business Forum	London, UK
26-28 October	Aerospace Industry Exhibition - Tokyo 2011	Tokyo, Japan
27-28 October	Workshop - Training of Specialists to Strengthen Biosafety and Biosecurity in Central Asia (KSCQZD)	Almaty, Kazakhstan
2-5 November	IAEA-INPRO Steering Committee Meeting	Vienna, Austria
2-7 November	27th ISTC-Korea Workshop on Advanced Sensor Materials and Applications	Daejeon, Korea
14-15 November	Pediatric Multidrug Resistant Tuberculosis (TB) Conference: Emerging Global Challenge	Moscow, Russia
20-23 November	2nd TI PROBIO Workshop and Meeting at the International Symposium on Gnotobiology and Congress of the Society for Microbial Ecology and Disease	Yokohama, Japan
27 November - 4 December	Practical Training for Russian Cardiologists at the Karlsburg Clinic	Karlsburg, Germany
1-2 December	International Meeting on Space Debris Mitigation and Removal	Moscow, Russia
5-7 December	6th Renewable Energy 2011 Exhibition	Chiba, Japan

## ISTC STRUCTURE

### Permanent Governing Board Parties



Canada



European Union



Japan



Russian Federation



United States

### Other Parties



Norway



Republic of Korea

### CIS Parties and Georgia



Armenia



Belarus



Kazakhstan  
(Board Member  
in 2011)



Kyrgyz Republic



Tajikistan



Georgia

### Members of the Governing Board:

Chair (USA)  
Canada  
European Union  
Japan  
Russian Federation  
United States of America

Ronald F. Lehman II  
Andrew Shore  
Kristian Schmidt  
Manabu Miyagawa, Masaki Sugamiya  
Lev Ryabev  
Simon Limage

### Members of the Scientific Advisory Committee:

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Canada  
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Russian Federation  
United States of America

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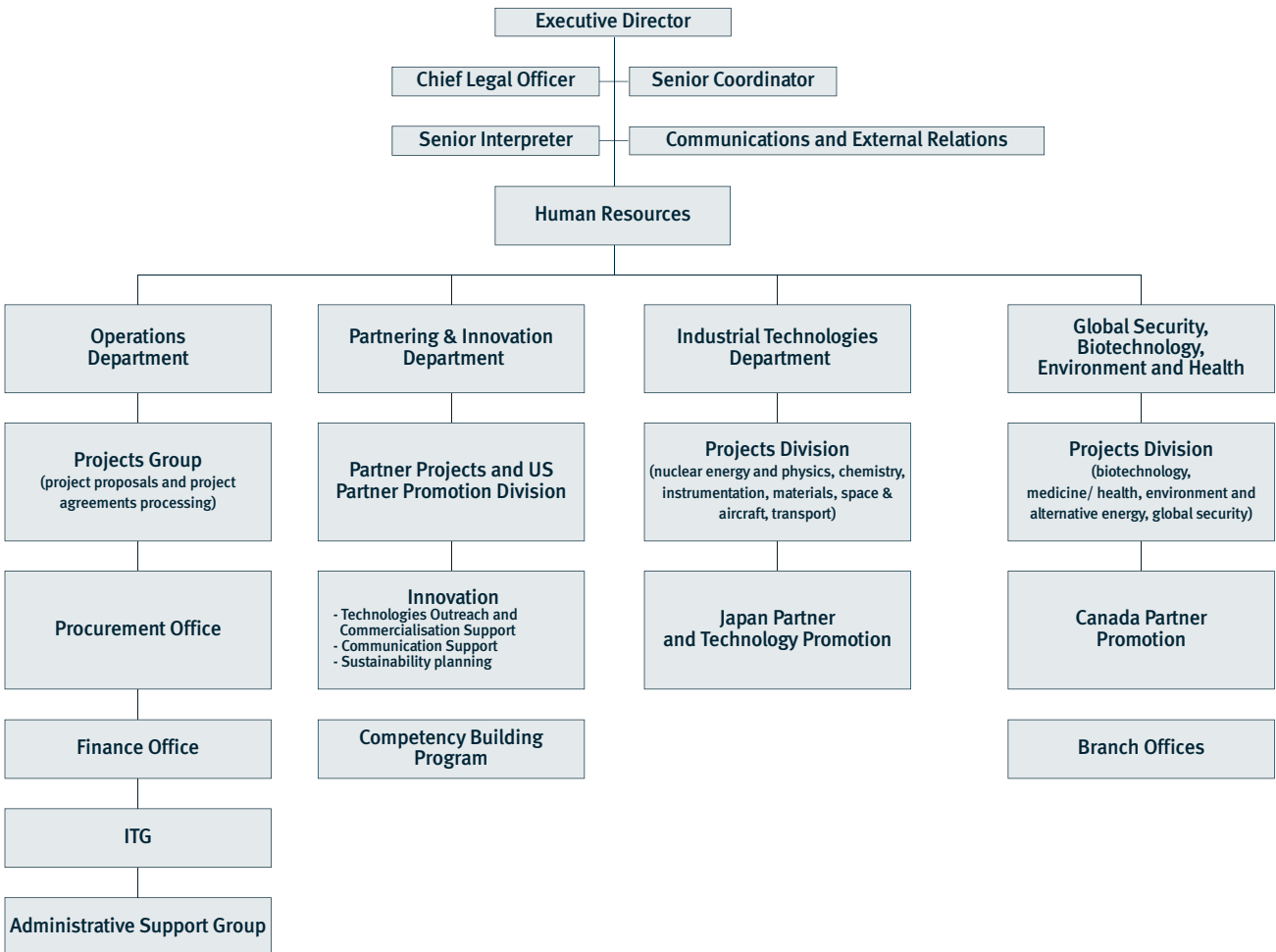
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**ISTC SECRETARIAT STRUCTURE**



## GLOSSARY OF MAIN ISTC TERMS AND PROGRAMS

The **Bio-safety/Bio-security Program** provides additional resources to support various Bio-safety and Bio-security initiatives.

The **Commercialisation Support Program** facilitates and strengthens long-term commercial self-sustainability efforts by ISTC beneficiaries through promotion of marketable products and services.

The **Communication Support Program (CSP)** supports eligible CIS institutes and organisations for building IT infrastructure where existing capabilities inhibit the accomplishment of ISTC projects and the development of commercial opportunities.

The **Competency Building Program** supports former scientists, engineers and their organisations to improve the basic skills needed to create, maintain and develop self-sustainable business and commercialisation of technologies.

The **Counter-Terrorism Program** provides scientific and technological support for counter-terrorism and law enforcement.

The **Governing Board** is the primary ISTC decision-making body, which is made up of representatives from Canada, the European Union, Japan, the Russian Federation and the United States, with one yearly rotating seat for representation of one of the other countries of the CIS member states or Georgia.

The **Mobility Program** provides additional opportunities for direct communication of the Russian and other CIS and Georgian scientists with their colleagues from abroad through financing international travel related to ISTC projects and activities.

The **Outreach Program** explains the objectives and working methodology of ISTC including the disseminating of ISTC project results.

The **Partner Promotion Program** attracts, initiates and develops projects between the private sector and institutes in Russia and other CIS member countries or Georgia.

The **Patenting Support Program** provides assistance and support for the appropriate protection of intellectual property created under ISTC regular projects for its effective exploitation.

The **Responsible Science Management program** aims to increase awareness among scientists about the potential dual-use of research including the use of sensitive materials.

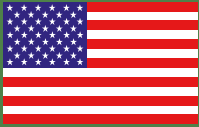
The **Science Workshop and Seminar Program** promotes the integration of ISTC beneficiary institutions and scientists and engineers into the international S&T community through supporting various science events.

## ISTC TARGETED INITIATIVES

A number of targeted initiatives were created to provide a focused approach and technical solutions to a number of topical problems of global interest.

- Drug Design and Development
- Fuel Cells
- Law Enforcement Technology
- Probiotics and Health
- Science and Technology in the Prevention of Biological Threats
- Scientific and Technical Support against the illicit trafficking of Nuclear and Radioactive Materials
- Technical Support for IAEA Advanced Safeguard and Verification Development Program
- Ultra-High Intensity Light Science





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