International Science and Technology Center

Annual Report 2012

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I S T C
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Annual Report 2012

18 Years Supporting International Scientific Cooperation

Statement

of the Chairman of the ISTC Governing Board

Innovation, cooperation, and adaptability have been the three pillars of success for the International Science and Technology Center (ISTC). Today, the ISTC is widely acclaimed for creating beneficial technologies, encouraging commercialization, generating economic growth, promoting greater public health, improving our environment, and advancing both basic and applied science. All the while, the ISTC has stayed true to its core objective, advancing international security in the interests of all of its members.

As the ISTC prepares to move to a new headquarters in Almaty, Kazakhstan, emphasis is on sustaining cooperation and building deeper partnerships. Drawing upon lessons learned along the way, the Center continues to transform itself into a more modern, agile, efficient, and effective intergovernmental science organization, looking to enhance international security and prosperity.

The world now is very different from the world twenty-one years ago when the foreign ministers of Russia, Germany, and the United States jointly issued a call for the creation of the ISTC. The ISTC is different also. The founders of this bold initiative were focused on quickly addressing dangers arising from the legacies of the past. Today, the members of the ISTC are teamed to address new challenges facing humanity's future. The founders may not have envisioned that more than 40 countries would eventually become engaged. They could not have anticipated that contributions thus far would total $1 billion, of which more than $868 million has supported more than 2,700 projects with grants to over 75,000 scientists. Nor could they have anticipated that two science centers (ISTC and STCU) would evolve so significantly, increasingly linking themselves synergistically with partners around the globe and with each other.

All the parties have contributed and benefited – Armenia, Belarus, Canada, the European Union and its member countries, Georgia, Japan, Kazakhstan, the Kyrgyz Republic, Norway, the Republic of Korea, the Russian Federation, Tajikistan, and the United States. Sweden and Finland were individual members until they joined the European Union and continued to engage through that membership. Some non-members, such as Switzerland, participated in projects.

In terms of total funding, the Russian Federation has been the greatest beneficiary. Not surprisingly, the Russian Federation has become self-supporting. In terms of sustaining scientific excellence, however, many smaller countries saw at least equal benefit, even if some are not yet able to fund the full richness of their talent.

The evolution of the ISTC continues. Support from member governments has been essential. These Parties provide the leadership necessary for the ISTC to be of continuing value. At the same time, the development of the Partner's program, through which both government and private entities can fund cooperative science, has more than matched regular government funding for projects and has created greater opportunities for mutual benefit.

From the beginning, the ISTC has adapted to changing circumstances and the evolving needs of the parties. Important experiments, modifications, and reforms over the years included the introduction of international accounting practices and standards and programs for promoting commercialization of suitable technologies to deal with public needs such as health, safety, environment, remediation and restoration. Important training was added to develop best practices in business skills including the protection of intellectual property. New fields of science and new generations of scientists joined the effort. Increasingly, projects were targeted toward the priorities of the members rather than just the interests of the researchers. Many projects became intensely multilateral in both participation and funding.

Seven years ago, the ISTC made a decision to transform itself further to serve the Parties better as they seek to meet contemporary and emerging needs. Building upon changes already made and experiments already undertaken, the transformation underway encourages a spirit of true partnership, promotes more balanced co-funding of projects, reduces overhead and administrative costs, and increases efficiency and agility.

To measure the value of the ISTC, the Center is often asked to report on inputs to the Center such as funding, facilities, and equipment. The best measures however, involve outputs such as knowledge enhanced, health improved, partnerships created, and societies

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advanced. Above all, we must recognize that the many contributions of the ISTC are really the product of the scientists, engineers, physicians, and technicians from many different countries and cultures who work together every day through the ISTC for the benefit of all.

Working across many time zones, in numerous countries, under different circumstances, and to meet specific needs is a tremendous challenge. In overseeing this effort, the Governing Board has benefited from the wisdom of its members, lead by the dean of the Board, Minister Lev Ryabev of the Russian Federation. The Board has also benefited from strong support from the Parties and during this period of transition must acknowledge the special leadership undertaken by the Government of Kazakhstan.

To lead and implement the Center's transition, the ISTC relies heavily on its Executive Directors and the staff of the ISTC headquarters in Moscow and in the Branch Offices. In recent years, the Governing Board has benefited greatly by the service as Executive Director of Ambassador Adriaan van der Meer. Adriaan, who most ably initiated the transformation of the ISTC, has returned to Brussels to take on new duties with the European Commission. The Governing Board of the ISTC joins me in expressing our deepest appreciation to him and to his successors, Sergey Vorobiev of the Russian Federation, who has now joined ROSATOM, and our current Executive Director, Leo Owsiacki of Canada. The demands placed on all our staff and its leadership are particularly challenging during this time of transition and downsizing. As we look to the future beyond 2015, close coordination among all the Parties and among the staff will be essential.

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

Statement

OF THE EXECUTIVE DIRECTOR

2012 represented a difficult year for the organization, as downsizing, which was started several years ago, was continued, funding in support of research projects from the Parties continued to decline, and the Executive Director for the past four years unexpectedly departed at the end of August. However, despite these challenging developments, staff continued to respond in a positive way and the operations were maintained at a high level of professionalism and client service throughout the year.

Partner funding became more and more important and rose to the highest percentage level (85%) since the program was initiated in the late 1990s, both in terms of project support and supplementary budget activities. These activities include such things as supporting scientist travel to meet with colleagues internationally and to attend important training sessions and workshops, funding patents, and supporting maintenance contracts related to security upgrades at key facilities and institutes. During the year, new projects funded by both Parties and Partners focused on Central Asia, the Caucasus and Belarus. The EU has recently become very active through DEVCO as a Partner to the ISTC and is supporting more than EUR 6.8 million in new project activities, with a focus on biosafety and biosecurity in Central Asia.

Most importantly, supplementary activities continued to be developed and implemented and comprised a more significant percentage of the Center's activities during the year. For example, new Targeted Initiatives (TIs) continued to be expanded, with project developmental workshops being held in various countries, such as the Science and Technology for the Prevention of Biological Threats: Progress & Future Plans Workshop (Center on Export Controls) held in Bishkek, Kyrgyzstan; the Probiotics TI international conference Bacteriophages and Probiotics – Alternatives to Antibiotics held at the Eliava Institute of Bacteriophage, Microbiology, and Virology in Tbilisi, Georgia; and the Efforts Against Illicit Trafficking of Nuclear and Radiation Materials in Central Asia – Regional Priorities and Experience under the TI on Scientific and Technical Support against the Illicit Trafficking of Nuclear and Radioactive Materials held in Almaty, Kazakhstan.

Other important developments included the re-engagement of the Norwegian Party in supporting a major joint expedition to the Kara Sea, involving both Norwegian and Russian scientists working together to monitor possible radiation effects of previously sunken nuclear waste materials and a previously scuttled nuclear submarine. Follow-up workshops to present data and results are now planned in 2013 through the ISTC.

Additionally, the catastrophe at the Fukushima Daichi nuclear plant in Japan stimulated the ISTC and its Parties to reach out to try and assist in some way. The immediate engagement and funding support provided by the US Department of Energy GIPP resulted in funding and support for many meetings between Russian nuclear scientists, who had previously worked on resolving similar technical problems related to the Chernobyl disaster, and Japanese experts, both in Japan and Russia. A follow-up Call-for-Proposals was subsequently carried out jointly with the sister center STCU in Ukraine and resulted in identification and funding support for at least 6 new projects which will focus on rehabilitation and monitoring aspects connected to the Fukushima area.

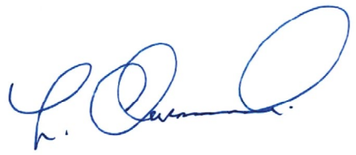
As the new Executive Director, I have been tasked to continue the winding down of operations in Moscow and the Russian Federation in 2013, while maintaining a high level of support for the other member countries of the organization; to continue to manage the over 180 projects still underway in seven countries; and to continue to engage with the dozens of Partner companies and government agencies and the network of scientific collaborators across the globe supporting this work. At the same time, the government of the Republic of Kazakhstan has invited the ISTC to relocate its headquarters to that country. As a direct result, a new multilateral agreement to continue the ISTC and a bilateral agreement between Kazakhstan and the ISTC to host the headquarters are under development. A new Facility Agreement to provide office space for an expanded office and staff in Almaty as a precursor to establishing a main office is also being negotiated at this time.

These developments serve to demonstrate clearly the continuing interest of most of the countries which belong to and support the ISTC in continuing to use science and technology as a means of ensuring security, both locally and globally. Providing the support necessary to a part of the world still requiring partnership and engagement of its scientific community remains critically important. However, an additional new focus of future efforts on a wider geographic area and on subjects which will continue to address such themes as disease surveillance, illicit trafficking of CBRN materials, detectors for these materials, and other targeted initiatives aimed at supporting global security and non-proliferation can only strengthen this dimension of the ISTC.

The currently increasing importance of Partners to the operations in fact reflects a previous strategic direction and will be part of the foundation of the "new and improved" ISTC being established in Kazakhstan. Private-sector engagement to support innovative new work in areas responding to security challenges will be promoted as will non-government and other government-agency partnerships devoted to global non-proliferation and to addressing security issues of regional and global concern.

It is my honor and privilege to be selected to play a pivotal role in the transition of the organization to a new and dynamic level, which will reflect the changing times as well as the equal partnerships planned between all member countries that will form the foundation for future engagement.

The staff which comprises the Secretariat - those remaining and those who were vital members in the past - can be proud of the fact that they have played a significant part in helping to make the world a safer place over the past eighteen years.



Leo Owsiacki
ISTC Executive Director

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Overview of ISTC Activities in 2012

ISTC – Pursuing our Objectives

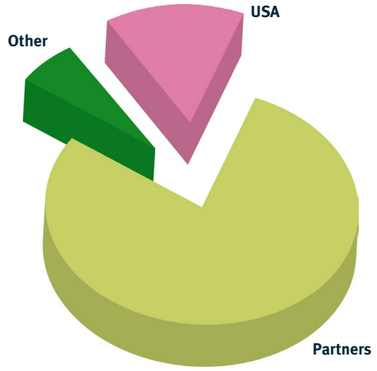
The ISTC coordinates the efforts of numerous governments, international organizations, and private sector industry, providing scientists from Russia, Georgia and the CIS new opportunities for international partnership. The ISTC plays a central role in the management of these science partnerships. Through 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 scientists and engineers in Russian, Georgian and other CIS institutes.

Overview of ISTC Activities

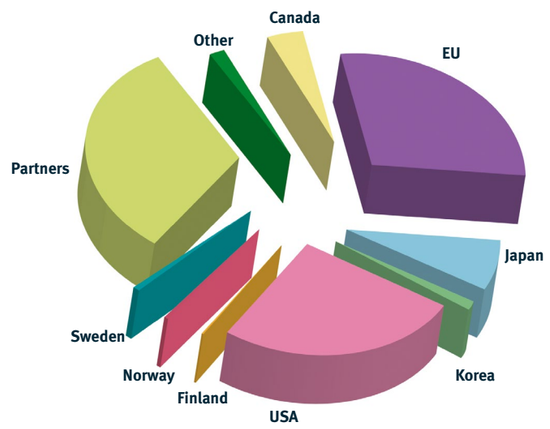
- The information provided below gives an overview of funded projects by financing source, beneficiary country and technology area.
- These figures show that between 1994 and 2012 the ISTC supported 2,764 projects with a total value of USD $868,047,033. Most projects were funded in the areas of environment, biotechnology, physics and fission reactors. Over the years the EU and the USA have been the main sources of funding for ISTC projects and to date research institutes in the Russian Federation have benefited most from this funding.
- However, this year, the ISTC's Partners provided 85% of the funding, which illustrates that the Center is now moving in a new direction. Additionally, this funding is directed more and more to the ISTC's countries in Central Asia and the Caucasus.

2012 Project Funding and Total Project Funding (1994-2012) - by Source

2012 Project Funding ($ 5,460,663) by Source



1994-2012 Total Project Funding ($ 868,047,033) by Source



Party	Allocated Funds 2012 (USD)	Allocated Funds-Total (USD)
Canada	0	35,376,624
EU	0	242,568,010
Japan	0	64,370,999
Korea	0	4,581,952
USA	802,170	225,115,151
Finland	0	1,185,960
Norway	0	1,881,450
Sweden	0	3,831,906
Partners	4,311,343	277,189,668
Other	347,150	11,945,313
Total:	**5,460,663**	**868,047,033**

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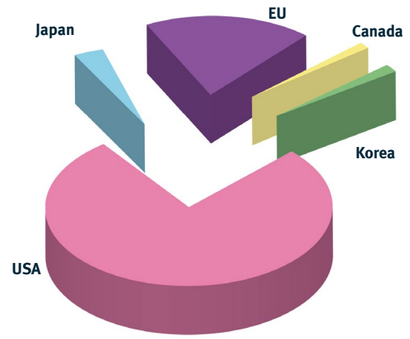
2012 Partner Project Funding and Total Partner Project Funding (1994-2012) - by Party

2012 Partner Project Funding ($ 4,311,343) by Party

1994-2012 Total Partner Project Funding ($ 277,189,668) by Party

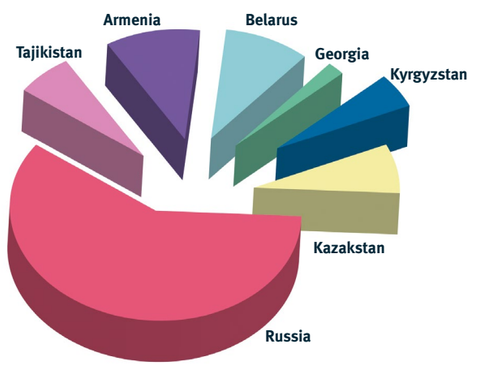


Party	Type of Partner Company	No. of projects 2012	Partner Funding (USD) 2012	No. of projects Total	Partner Funding ($) Total USD
United States	**Total**	**4**	**808,000**	**537**	**214,670,765**
	G	4	808,000	504	208,282,793
	NG	0	0	33	6,387,962
Japan	**Total**	**0**	0	**64**	**7,516,167**
	G	0	0	16	2,169,953
	NG	0	0	48	5,346,214
European Union	**Total**	**4**	**3,503,343**	**137**	**52,075,360**
	G	4	3,503,343	78	40,794,348
	NG	0	0	59	11,280,972
Korea	**Total**	**0**	0	11	**2,304,929**
	G	0	0	7	1,980,000
	NG	0	0	4	324,929
Canada	**Total**	**0**	0	**5**	**622,456**
	G	0	0	1	20,000
	NG	0	0	4	602,456
****Total:**	**Total**	**8**	**4,311,343**	**754**	**277,189,668**
	G	**8**	**4,311,343**		**253,247,134**
	NG	**0**	**0**	**148**	**23,942,534**

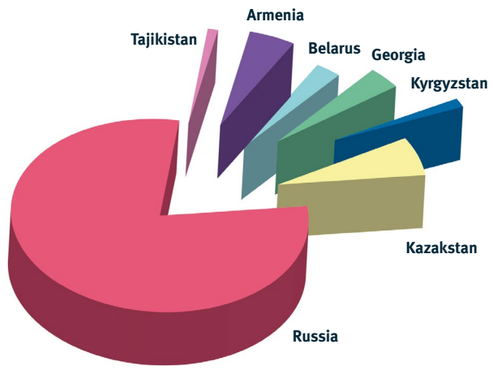
** Please note that real number of funded Partner Projects is 750 as there are several partner projects where 2 or 3 Parner Companies are involved

Grants paid by the ISTC to Beneficiary Scientists in 2012 and Total Grants paid (1994-2012) - by Country

Grants paid ($ 11,589,557) in 2012 by the ISTC to Beneficiary Scientists



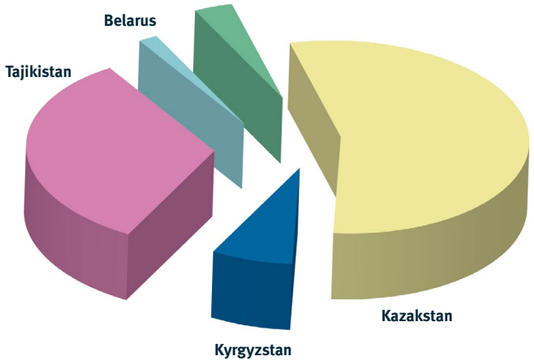
Total grants paid ($ 541,032,117) by the ISTC to Beneficiary Scientists



	Number of Scientists in 2012	Amount of Grant Payments (USD) in 2012	Number of Scientists Total	Amount of Grant Payments (USD) Total
Armenia	587	1,229,183	3,347	27,510,139
Belarus	343	1,090,122	1,858	15,081,041
Georgia	130	234,668	2,408	19,445,364
Kyrgyzstan	258	577,798	1,343	9,221,332
Kazakstan	467	856,015	4,645	35,283,112
Russia	2,896	6,878,954	60,979	429,466,412
Tajikistan	282	722.818	600	5,024,716
Total	**4,963**	**11,589,557**	**75,180**	**541,032,117**

2012 Project Funding and Total Project Funding (1994-2012) – by Beneficiary Country

2012 Project Funding ($5,460,663) by Beneficiary Country



Total Project Funding ($ 868,047,032) by Beneficiary Country (1994-2012)

Country	Number of funded projects 2012	Allocated funds 2012 (USD)	Number of funded projects Total	Allocated funds-Total (USD)
Armenia	0	0	168	40,759,810
Belarus	1	96,992	100	27,361,214
Georgia	1	180,000	144	29,500,473
Kazakstan	5	3,000,170	190	69,900,362
Kyrgyzstan	1	380,000	87	22,655,873
Russia	0	0	2,034	666,557,229
Tajikistan	4	1,803,501	40	11,247,776
Ukraine	0	0	1	64,296
Total:	**12**	**5,460,663**	**2,764**	**868,047,032**

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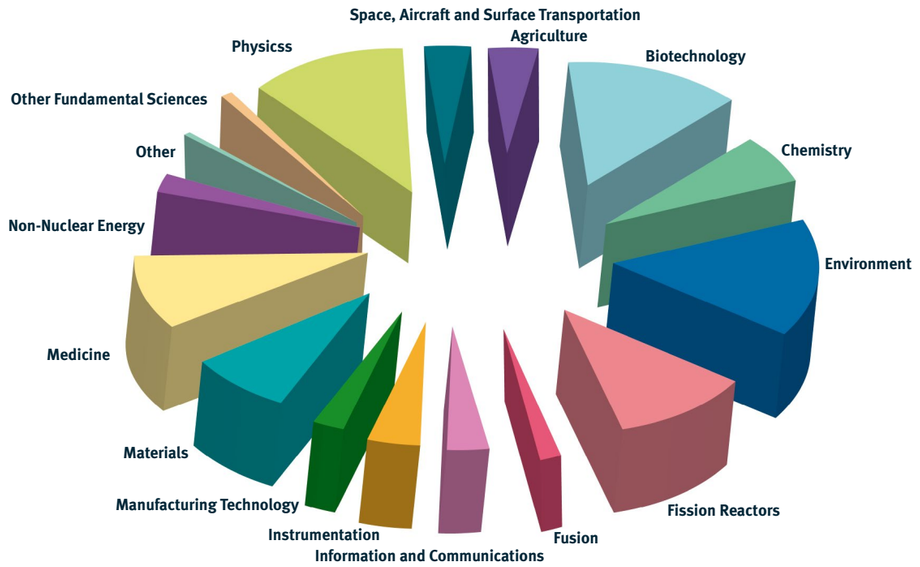
1994-2012 Total Project Funding ($ 868,047,032) by Technology Area



Tech area	Number of funded projects- Total	Allocated funds -Total (USD)
Agriculture	87	33.435,844
Biotechnology	316	121,932,734
Chemistry	203	54,525,475
Environment	437	135,337,548
Fission Reactors	272	96,305,027
Fusion	51	15,542,308
Information and Communications	107	28,536,916
Instrumentation	135	37,324,855
Manufacturing Technology	75	21,411,403
Materials	214	69,044,189
Medicine	232	84,019,969
Non-Nuclear Energy	64	22,470,981
Other	18	2.798.135
Other Fundamental Sciences	30	6,859,930
Physics	419	108,825,099
Space, Aircraft and Surface Transportation	104	29,676,620
Total:	**2,764**	**868,047,032**

Canada

Canada joined the ISTC in 2004 and immediately became a major contributor and supporter of the Center's activities. Since that time, Canada has funded 149 projects in Russia, Georgia and the CIS to a total amount of US $ 35,376,624.
The projects below and completed during the year are representative of the successful implementation of their non-proliferation goals as applied to scientific and technical collaboration.

Project #A-1444

Accelerator in Medical Isotopes Production

Leading Institute:	**A.I. Alikhanyan National Science Laboratory, Yerevan, Armenia.**
Total funds allocated:	**US $475, 000**
Grants:	**US $348, 950.**

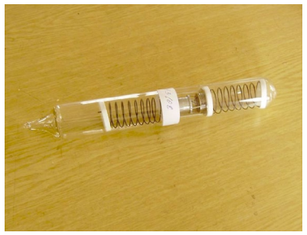
Trial amount of 99mTc with 55mCi of activity.

Main objectives and results:

Medical isotopes are commonly used in a wide range of applications, from diagnostic imaging to cancer treatments. Traditionally, medical isotopes are made using nuclear reactors or highly radioactive sources, which can provide the needed high flux of atomic particles to irradiate certain precursor compounds which become medical isotopes. However, nuclear reactors are very expensive to build and maintain and inherently pose potential environmental and proliferation risks. In contrast, if linear atomic particle accelerators, which are much smaller, more cost effective and less hazardous than nuclear reactors to operate, can be used to produce medical isotopes, then this approach could be more commercially and universally viable.

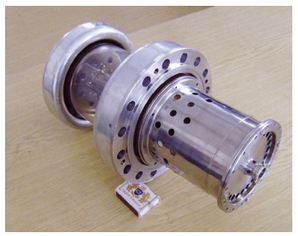
Such was the main objective of ISTC Project A-1444, which utilized a high-intensity linear electron accelerator (similar to technology used in X-ray imaging but at higher energy levels) at the A.I. Alikhanyan National Science Laboratory in Yerevan, Armenia (AANL-YerPhI) to produce the medical isotope 99mTc. The project also devised extraction methods to purify and concentrate the isotope and a transport/storage system, ensuring development of the entire process, from isotope production to end user delivery.

The next step, now underway, is to use a proton beam accelerator at AANL-YerPhI to increase isotope production to commercially useful levels, to supply the needs of Armenian hospitals and clinics and possibly provide a technology platform that could be exported to other regions, because such technology is sufficiently compact, economic and safe to be available for use at the actual sites where medical isotopes are used.



The new cathode in a transporting ampoule

Target capsule with full amount pressed powder of MoO3



Completely mounted gun

Project #G-1599

Fertilizers of Prolonged Action

Leading Institute:	**P. Melikishvili Institute of Physical and Organic Chemistry, Tbilisi, Georgia**
Total funds allocated:	**US $170,730**
Grants:	**US $129,080**

Project participant Dr. Eldar Gugava

Main objectives and results:

Increases in agricultural production and the maintenance of high crop yields are possible only by using fertilizers. Soluble fertilizers are applied in large quantities, significant proportions of which are lost to the environment through leaching. The pollution this causes has an adverse effect on ecosystems and the health of humans and animals.
To combat this problem, an environmentally friendly and economically efficient technology has been developed for production of a polymerized, multi-component and prolonged-action fertilizer. The fertilizer releases nutrients to plants in a controlled manner, thereby preventing losses and contamination of the environment. The application of controlled-release fertilizers enables a reduction by up to 50% of mineral fertilizers used. This new composition increases the coefficient of nitrogen assimilation by plants and improves germination. This in turn enables a 45-50% drop in the required seeding material volume and a 10-20% rise in the harvest.

European Union

The European Union, one of the signatories of the Agreement, establishing the International Science and Technology Center, is also a major contributor to the Center's activities, providing financial support to its science projects and programs. Projects completed within the reporting year encompass many diverse fields, ranging from the development of environmentally friendly and highly efficient sources of energy for stationary applications and creation of new advanced methods for treatment of oncologic diseases to engineering new materials for environmental protection. Projects funded by the EU in the CIS and Georgia are a clear indication of how science and technology priorities are addressed at a national level. Since 1994, the EU has funded 1118 projects to a total amount of US $242,568,010.

Project # G-1600

Variable Geometry Rotor

Leading Institute:	**Georgian Technical University, Tbilisi, Georgia**
Total funds allocated:	**EUR 186,716**
Grants:	**US $215,355**

VGR Dynamic Test Stand

Main objectives and results:

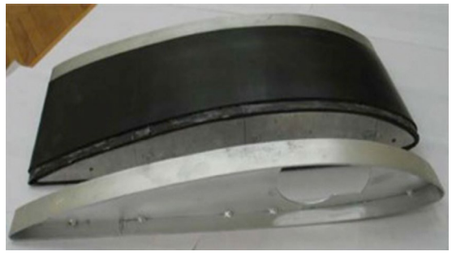
Each stage of aircraft flight (take-off, cruising at altitude, descent, landing approach and landing) requires special parameters to ensure optimal operating modes.

One way to achieve such an expanded range of these optimal operating modes is to use aircraft blade rotors with variable geometry capabilities. To these ends the focus of project G-1600 was the development of a Variable Geometry Rotor (VGR) design with the ability to alter rotor diameter and the twist of blades to optimize operation at each stage of flight and thus satisfy today's stringent requirements for efficiency and reduced environmental impact of aircraft flight.

The Project culminated in the successful design, manufacture and testing of a VGR demonstrator prototype that facilitates a 30-40% adjustment in diameter and a 28-300 change in blade twist.

The VGR prototype developed as part of project G-1600 has genuine potential for use in advanced rotorcraft and tilt rotor aircraft, as evidenced in discussions with DLR and Boeing, who have expressed interest in applications for wind turbines and heavy transport aircraft.

Visit to the Test Stand by the ISTC Secretariat and Collaborators from EU (DLR, Germany) and USA (Boeing).



VGR Blade Rib and Blade Section with Flexible Element

Project # T-1629

Fireball Network in Tajikistan

Leading Institute:	**Institute of Astrophysics, Dushanbe, Tajikistan**
Total funds allocated:	**EUR 158,477**
Grants:	**US $138,865**

ISTC monitoring of a new observation point at the Rasht meteorological station, Tajikistan

Main objectives and results:

Scientists are coming to recognize more and more the long-term cosmic threat associated with near-Earth asteroids (NEAs) and the systematic monitoring of all large objects is essential for forecasting and evaluating the potential hazards of an impact hazard with the Earth. This was most recently demonstrated when a small asteroid with an estimated mass of 10,000 tons exploded at a height of 23 kilometers with the force of approximately 400 kilotons of TNT over the Chelyabinsk Oblast of Russia on February 15, 2013 causing a fireball that was witnessed by thousands and widespread damage, but luckily no fatalities. This event is especially troubling because there was no prior knowledge of this asteroid before it entered the earth's atmosphere.

Thus project T-1629 seems particularly timely as it was designed to arrange a fireball network of 5 observation stations in Tajikistan to obtain new scientific knowledge of fireball/meteoroid physics and new data on the near-Earth meteoroid environment. The 5 stations, located 80-90 km from one another, have photographed more than 170 fireballs and their trajectory data, radians, orbits, lights curves, masses and densities have all been determined. In addition, observations by the stations of the 2009 Leonid activity (a family of near-Earth asteroids and its parent body, the 2004MB6 NEA) proved unique and confirmed forecasts previously made by foreign astrophysicists. Results and technical knowhow developed as part of T-1629 has added to the international scientific communities' knowledge of NEAs and our ability to detect and track asteroids that may pose a hazard to earth.

Japan

One of the founders of the ISTC, Japan has been actively engaged in activities, focused on forwarding comprehensive nonproliferation through the Center's operation. The mutual value of being involved in the ISTC Science Project Program has become especially clear within recent years following the accident at the Fukushima Nuclear Power Plant. As a member of the ISTC community, Japan in coordination with the Secretariat managed to mobilize the best regional expertise including Russia, Kazakhstan and Belarus to facilitate the process of rehabilitation in and around Fukushima. Since 1994, Japan has funded 293 projects to a total amount of US $64,370,999

Project #B-1603

Alkali-Based Borohydrides for Hydrogen Production

Leading Institute:	**Heat and Mass Transfer Institute NAS of Belarus, Minsk**
Total funds allocated:	**US $156,140**
Total Grants:	**US $105,600**

Photo of developed hydrogen generator

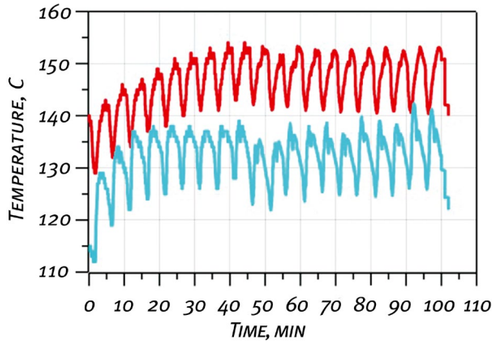
Main objectives and results:

The objective of project #B-1603 was to study the hydrolysis of aqueous alkaline solutions of sodium borohydride and develop efficient technologies for generating hydrogen, involving the fabrication of a pilot demonstration model hydrogen generator and kinetic models of hydrolysis of sodium borohydride at low and highly concentrated aqueous alkaline solutions.

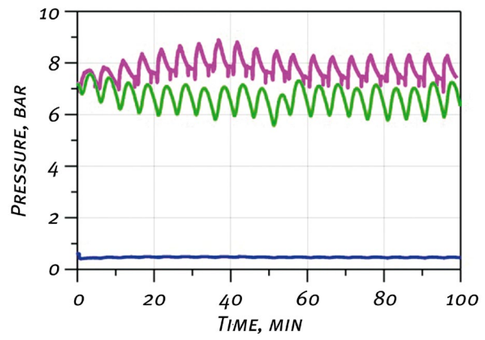
The hydrogen generator uses a flow-type reactor applying a circulation scheme, where there is no need to complete hydrolysis in a single pass, a less-effective and smaller-volume of catalyst can be used, where the thermal regimen of the catalyst is more uniform, and where the final degree of hydrolysis is easier to control.

A catalyst based on Raney nickel has been developed that offers substantial mechanical strength, which can be used in the form of easily removable cartridges, and which contains no precious metals, hence keeping costs low.

The generator produces 1.5 n.m^3/h of hydrogen in steady state, while the technical specifications of the generator allow it to obtain as much as 3 n.m^3/h and possibly higher. The project results may be applied for development of disposable sources of hydrogen in collaboration with the Institute of Catalysis SB RAS and the range of potential customers is considerable.



Evolution of solution temperature (red) and gas (cyan) inside reactor



Evolution of pressure inside reactor (magenta), receiver (green) in the dryer (blue)

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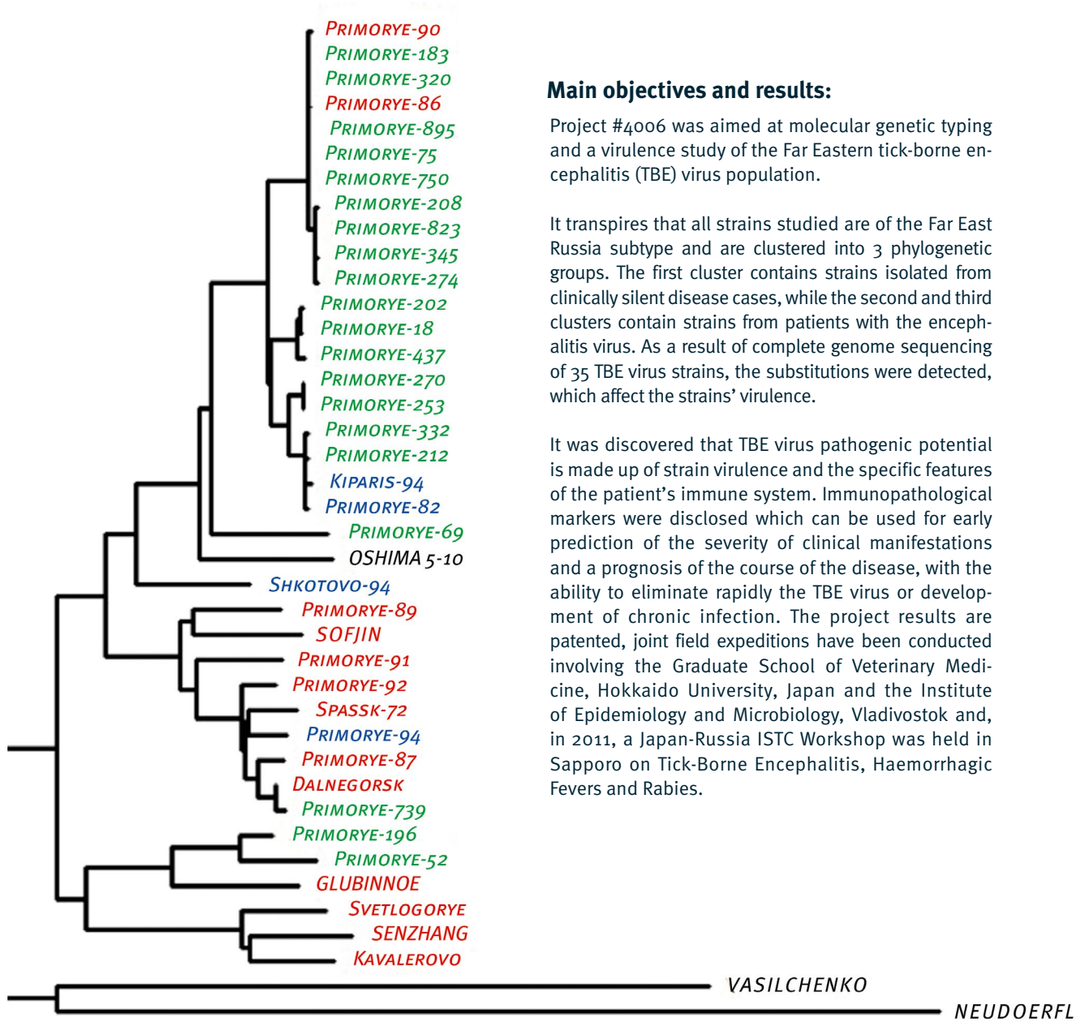
Project #4006

Tick-Borne Encephalitis Virus Population

Leading Institute:	**Research Institute of Epidemiology and Microbiology, Vladivostok, Russia**
Supporting Institute:	**Limnological Institute, Irkutsk, Russia**
Total funds allocated:	**US $300,000**
Total Grants:	**US $177,600**

Project manager Prof. Galina Leonova and Project Collaborator Prof. Ikuo Takashima in Vladivostok, 2010



Phylogenetic tree built on full-size genome sequencing analysis of Far East Russia Tick-Borne Encephalitis Virus isolates

Main objectives and results:

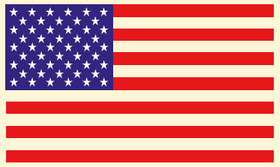
Project #4006 was aimed at molecular genetic typing and a virulence study of the Far Eastern tick-borne encephalitis (TBE) virus population.

It transpires that all strains studied are of the Far East Russia subtype and are clustered into 3 phylogenetic groups. The first cluster contains strains isolated from clinically silent disease cases, while the second and third clusters contain strains from patients with the encephalitis virus. As a result of complete genome sequencing of 35 TBE virus strains, the substitutions were detected, which affect the strains' virulence.

It was discovered that TBE virus pathogenic potential is made up of strain virulence and the specific features of the patient's immune system. Immunopathological markers were disclosed which can be used for early prediction of the severity of clinical manifestations and a prognosis of the course of the disease, with the ability to eliminate rapidly the TBE virus or development of chronic infection. The project results are patented, joint field expeditions have been conducted involving the Graduate School of Veterinary Medicine, Hokkaido University, Japan and the Institute of Epidemiology and Microbiology, Vladivostok and, in 2011, a Japan-Russia ISTC Workshop was held in Sapporo on Tick-Borne Encephalitis, Haemorrhagic Fevers and Rabies.

USA

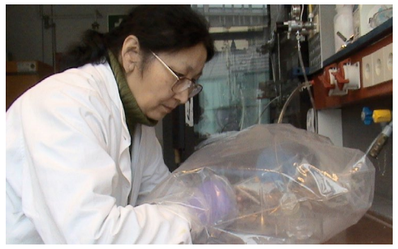
During 2012, the United States Party, an original signatory to the ISTC Agreement, continued its major contribution to ISTC operations and remained one of the largest contributors to the Center's Science Projects. Technology areas supported by US-funded projects include medicine, chemistry, agriculture, environmental science, fission reactors, new materials, and non-nuclear energy. Research efforts of CIS/Georgian scientists, supported by US funding, have resulted in the development of new vaccines, alternative methods for combating various diseases, and advanced materials and technologies to facilitate environmental monitoring, to name just a few. Also in 2012 the US Party has shown leadership and commitment to supporting the ISTC's planning for future project efforts in the CIS and Georgia. Since 1994 the USA has funded 1549 projects to a total amount of US $225,115,151



Project #KR-1880

Pectin-Based Composites for Biomedical Application

Leading Institute:	**Institute of Chemistry and Chemical Technology (National Academy of Sciences, Kyrgyz Republic)**
Total funds allocated:	**US $297,250**
Total Grants:	**US $248,800**



Project participant Dr Gulzhian Dzhardimalieva sampling obtained magnetic nanocomposites

Main objectives and results:

The goal of Project #KR-1880 is to fabricate metal-containing composite nanomaterials based on a natural biological polymer, to be ultimately applied as antitumor and chemo-sensitizing substances. The pulp of sugar beet Beta vulgaris was used to isolate pectic polysaccharides for this purpose.

Samples of metal-derived pectin nanoformulations were synthesized, including Cu(0), Fe_3O_4, Ag(0)-pectin nanocomposites. Nanoparticles of iron oxides Fe_3O_4 were produced both by an *ex situ* method, involving the precipitation of nanoparticles followed by their incorporation into the pectin matrix, and using chemical precipitation *in situ* when the magnetic particles are grown within the pectin matrix. Cu(0)-and Ag(0) pectin nanocomposites were formulated by reduction using quercetine and dialdehyde of pectic acid as reducing agents. These syntheses reliably produced systems that were stable in dry and colloidal state over periods of more than 3 months, as evidenced by a lack of observable precipitation.

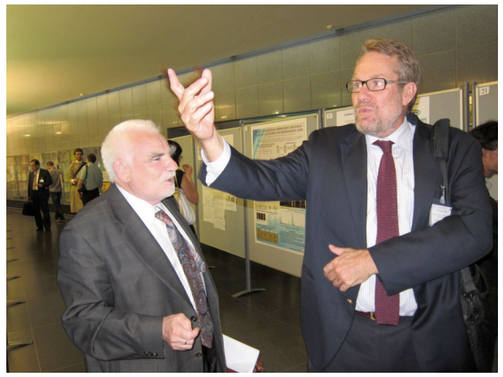
To prove the composition and structure of the fabricated composites, an entire arsenal of modern ultrahigh resolution techniques was used, including FTIR-, Mössbauer-, UV-, EPR-, ultrasound spectroscopies, XRD, SEM, TGA-DSC-thermal analyses.

Estimation of the anticancer potential of the bionanocomposites was performed on *Wistar* rats against the *Pliss* lymphosarcoma, *Walker* carcinosarcoma 256 (W256), and sarcoma 45. Testing of pectin formulations (400 mg/kg) on W256 and sarcoma 45 in experiments with *Wistar* rats showed high anticancer potential and a capacity to increase lifetime by up to 56%.

The concept of using a pectin-made hydrogel, as a potential strategy for synthesis of either nano- or microparticles, is based on its biodegradable nature and flexible structural networks, allowing the device to be designed to a specific shape. Moreover, a variety of pharmacological properties of pectins suggest them as a potential source of novel non-toxic drugs.

Samples of pectin-based nanoformulations: a set of purified native pectin samples, Cu (o) nanocomposite, Cu (II) complex, magnet liquid Fe_3O_4-Pec (from left to right)

Project participants and Prof. Bela Pukanzsky, Chairman of the International Conference on Biobased Polymers and Composites (BiPoCo 2012, 27- 31 May 2012, Siofok, Hungary)



Prof Anatoly Pomogaylo, Project Scientific Leader and Prof Kalle Levon, Polytechnic University of New York at the 14th IUPAC Int Symposium on MacroMolecular Complexes, MMC-14, August 14-17, 2011, Helsinki

Project #T-1257

Acute Intestinal Diseases in Tajikistan

Leading Institute:	**Republican Center for State Sanitary Epidemiological Control, Dushanbe, Tajikistan**
Total funds allocated:	**US $393,625**
Total Grants:	**US $201, 187**

The project team

Main objectives and results:

The goal of project T-1257 was to use modern biotechnology detection technologies to survey and characterize the origins and causative microbes of waterborne acute intestinal diseases found in human populations around the Republic of Tajikistan and to investigate potential methods of prevention and treatment.

Worldwide waterborne intestinal diseases afflict millions of people every year with infants and children often suffering the most, leading to death in severe cases. Although the symptoms of acute intestinal diseases can be very similar there are a myriad of different microbes that can cause them.

Working with collaborators from the bacteriological laboratory of the Research Institute of Medical Sciences of the U.S. Armed Forces (AFRIMS) the project team created the country's first functioning polymerase chain reaction (PCR) laboratory for diarrheal diseases, using conventional and real-time research methods.

As part of the project, the structure of diarrheal diseases was determined using state-of-the-art PCR methods and the sensitivity of detected pathogens to antibiotics was tested.

This study utilized modern and rapid PCR technologies for the first time in Tajikistan to identify and differentiate ten *(Shigellae, E. coli, Proteus, Klebciellae, Salmon. paratyphi, Salmon. paratyphi B, Salmonella, Enterobacter, Campylobacter, and Citrobacter)* of the most common bacterial pathogens that cause the vast majority of acute intestinal diseases in patients from different regions of Tajikistan. Another part of this project involved the testing of a wide range of antibiotics *in vivo* against bacterial pathogens with the drugs ciprofloxacin, chloramphenicol and cefazolin showing the greatest efficacy against the largest number of pathogenic isolates. As intestinal diseases of this type are by no means exclusive to Tajikistan and as the technology applied can generate results in 1-2 days, this study may prove also useful in other parts of the world.

Joint Funded/co-Funded Projects

A substantial volume of ISTC Projects is financed jointly by more than one party, or co-funded. A collaborative approach to funding is practicable for a number of reasons, such as interest in the project area and specific objectives shown by several funding parties at a time, ambitious tasks, claimed in the project, which require the involvement of multiple resources, and sharing expenses with a view to sharing anticipated gains.

Project # A-1591

Lead Free Glass Frits and Ceramics

Leading Institute:	**Institute of Electronic Materials, Ltd, ENI, Yerevan, Armenia**
Funding Party:	**EU and RK (233,477 EUR + US $ 120,000)**
Total funds allocated:	**US $491,114.49 ($120,000 + 233,477 EUR)**
Total Grants:	**US $ 329,800**

Experimental test of the developed glassmaking technique in the laboratory

Main objectives and results:

Glass materials are widely used both in industry and in our everyday lives. Glass compositions with a wide range of properties are irreplaceable in the production of various display solutions, hybrid films, magnetic heads and many other fabrications in electronics.

The most widespread industrial glass composites were developed about fifty years ago on the basis of PbO-B2O3 systems. Scientists are now actively investigating lead-free systems to identify structures able to replace toxic oxides of lead and cadmium in glass compositions.

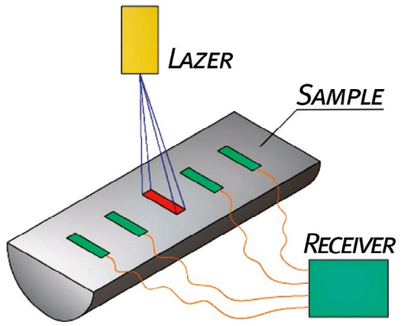
The main objective of this project was to optimize the process for identifying structural properties and then to apply them in glassmaking, including vitreous materials, glass-ceramics, and crystals.

The method used involves the construction of phase diagrams and glass-formation diagrams by way of the high-speed cooling of liquid melt. The imposition and analysis of the diagrams can then determine the family of eutectic and stoichiometric glass compositions and optimize the search and development of promising new vitreous and glass-ceramic materials. This method significantly reduces the time and cost required for creating promising materials with the necessary properties.

Project # B-1628

Optical Multi-Channel Interferometer

Leading Institute:	**B.I. Stepanov Institute of Physics, Minsk, Belarus**
Funding Party:	**RK: $150,000; IZFP/Fraunhofer institute, Saarbrücken, Germany: $150 000**
Total funds allocated:	**US $300,000**
Total Grants:	**US $210,362**



 # B-1628: General scheme of excitation of acoustic waves in a sample and receipt of information on surface vibrations in four areas. Information is received through optical channels (without contact with the surface)

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Main objectives and results:

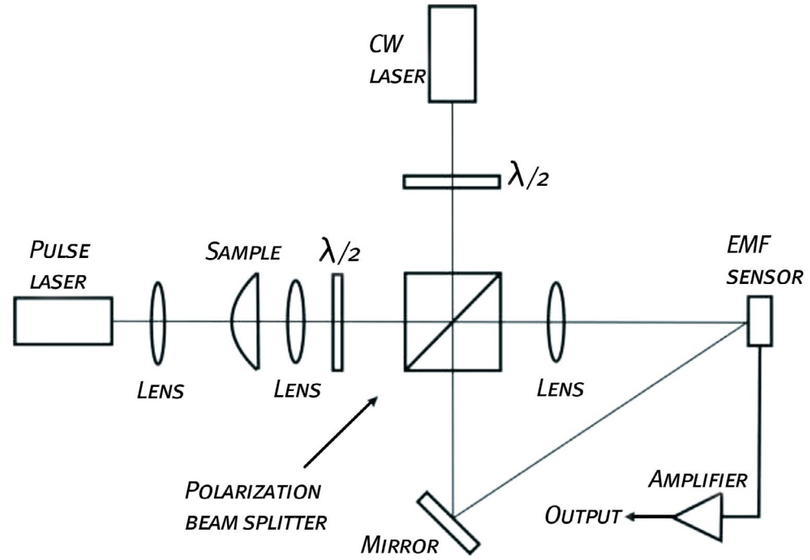
Project # B-1628 elaborated a new method for the laser-acoustic stimulation of acoustic waves in steel samples using an Electro-Refractive Crystal detector, offering a completely nondestructive and noncontact method for testing metallic components.

Two new four-channel laser ultrasonic defectoscopy prototypes were created and it was shown that a laser-acoustic defectoscope based on an optical multi-channel interferometer is suitable for industrial application because of its higher resistance to mechanical vibrations, acoustic noise, and ambient temperature fluctuations.

An added advantage is that recording equipment can be located up to 30 cm away from the investigated sample (›30 cm) which facilitates product quality control in places that are usually inaccessible because of high temperatures (up to 15,000C).

The device can be applied for quality testing of not only industrial samples used in metallurgy, machine-building and microelectronics, but also for the testing of biological objects.

The leading institute is B.I. Stepanov Institute of Physics, Minsk, Belarus.



Simplified scheme of one of four interferometer channels

Partner Projects

In 2012 Partner projects continued to be the main source of ISTC project funding. In particular, Partner projects funded by United States governmental Partners such as the DOE, DTRA, USDA-ARS, EPA and others played the most significant funding role at the ISTC. In addition to USG Partners the European Union Partner, the European Aid Co Cooperation Office, has also contributed significantly to the Partner project program. Some examples of Partner projects that came to fruition in 2012 are presented below.

Partner – The Department of Energy & Climate Change (DECC) of the United Kingdom of Great Britain and Northern Ireland.

Project #3913p

Production of Electroluminescent Light Sources

Leading Institute:	**Russian Federal Nuclear Center - All-Russian Scientific Research Institute of Experimental Physics, Sarov, Russia**
Supporting Institute:	**ELISAR, Ltd, Sarov, Russia**
Total funds allocated:	**US $ 400,938.00**
Total Grants:	**US $154,957.00**

Project #3913p: Overview of part of the production facility

Main objectives and results:

The objective of Project #3913p was to develop, test, establish pilot production and introduce into medical practice reasonably priced, low-density biochips for diagnostics of a limited set of bacteria and viruses for multiple purposes.

In the course of the project, the technology was fine-tuned for serial production of electroluminescent light sources using unique, domestically-sourced materials, the production of electroluminescent panels was established and 19 new workplaces were created, including 17 for former weapons specialists from the Russian Federal Nuclear Center - All-Russian Scientific Research Institute of Experimental Physics. ELLS panels have been certified and sales have commenced.

Project #A-1754p

Laboratory Furnace Production

Leading Institute:	**A.I. Alikhanyan National Science Laboratory Yerevan, Armenia.**
Total funds allocated:	**US $220,781**
Total Grants:	**US $74,708**

Project #A-1754p: Overview of developed laboratory furnaces

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Main objectives and results:

Project #A-1754p was focused on establishing a commercial enterprise under the auspices of the Laboratory for Low Temperature Physics (LLTP) of the Yerevan Physics Institute, for laboratory furnace development, production, upgrading and servicing.

LLTP was supplied with the necessary equipment and materials for initial laboratory furnace development and manufacturing and the necessary production benches were designed and produced. The first high-temperature furnaces have been manufactured and sales have commenced.

In addition to the laboratory furnaces, a range of electronic devices has also been designed and manufactured, including vibrating wire-based sensors, systems for high-temperature measurement in the presence of electromagnetic interferences, step motor PC and manual control drivers.

Project #K-1541p

Hydrogel Dressings

Leading Institute:	**Institute of Nuclear Physics of the National Nuclear Centre of the Republic of Kazakhstan, Almaty**
Total funds allocated:	**US $320,831**
Total Grants:	**US $77,575**

K-1541p: General view of the hydrogel dressing production area

Main objectives and results:

Project #K-1541p was directed to launch production of hydrogel dressings based on the Electron Accelerator ELV-4 at the Institute of Nuclear Physics of the National Nuclear Center of Kazakhstan.

All necessary authorizations/permissions were obtained for the production of hydrogel dressings in Kazakhstan, the necessary process equipment was procured, installed and commissioned, and a pilot batch of hydrogel dressings was produced. Additionally, all mandatory clinical tests of the pilot hydrogel dressings were successfully completed. The production area was accordingly certified and a commercial batch of 10,000 hydrogel dressings was produced, creating 22 new jobs.

Partner – EuropeAid of the European Commission (DEVCO), EU Bio-Safety Training in Central Asia

Project #K-1817p

Bio-safety Training in Kazakhstan

Leading Institute:	**Kazakh Scientific Center of Quarantine and Zoonotic Diseases (KSCQZD), Almaty, Kazakhstan.**
Total funds allocated:	**US $2,684,945**
Total Grants:	**US $446,050**

Biosafety&Biosecurity Training Center at the KSCQZD after renovation

Main objectives and results:

This project was implemented as part of a larger program that DEVCO is conducting through the ISTC with a focus on *Strengthening Bio-Safety and Bio-Security Capabilities in Central Asian Countries*. The overall objective of the 3-year project can be separated into two key elements: 1) renovation of the training facility (including a dormitory for trainees), and 2) provision of training for medical and bio-research personnel from Central Asia, to improve awareness of modern bio-security/bio-safety practices and concerns, thereby resulting in decreased risk of illicit acquisition/exportation of deadly pathogens, intentional/accidental release of a biological agent and employee contamination.

In 2012, the existing facility was fully renovated to become a state-of-the-art training facility, with new laboratory equipment, including real-time PCR and Biosafety cabinets, which now enables KSCQZD to conduct courses in classical and modern techniques. Additionally, a dormitory for trainees was renovated and equipped for 25 students to stay on campus for up to 6 months. To date a total of 226 specialists (physicians, biologists and lab technicians) from Central Asian beneficiary countries have been trained at the new training facility.

As part of the project, training curricula were updated and new approaches introduced, to cover the needs of Central Asian countries. Curricula were developed in line with international biorisk management standards, particularly the EU CWA 15793:2008 Laboratory Biorisk Management Standard and WHO recommendations.

Project #T-1818p

Bio-safety Assignment Training in Tajikistan

Leading Institute:	**Tajik Research Institute of Preventive Medicine, Dushanbe, Tajikistan**
Total funds allocated:	**US $104,726**
Total Grants:	**US $4,860**

Robert Koch Institute, Berlin, Germany

Main objectives and results:

The main objective of Project T-1818p was to send a Tajik scientist to Europe for one year of comprehensive biosafety and related laboratory training.

The trainee completed a one-month intensive English-language course in Tajikistan before granting of a place at the Robert Koch Institute in Berlin. There the person passed a probationary phase, received theoretical and continued practical training in biosafety, and engaged in practical lab work under the supervision of an RKI group leader. Upon returning to Dushanbe he was able to join an ISTC project as a biosafety trainer.

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Partner – US Defense Threat Reduction Agency (DTRA)

Project #3427p

Security System at Institute of Animal Health

Leading Institute:	**All-Russian Research Institute of Animal Health (ARRIAH), Vladimir, Russia**
Total funds allocated:	**US $3,789,800**
Total Grants:	**US $173,337**

Newly-built incinerator facility at ARRIAH

Main objectives and results:

Project #3427p was implemented as part of a larger program that DTRA is implementing through the ISTC in Russia, with a focus on cooperative research and upgrades in bio-security and bio-safety at institutes. The objective of this project is to study foot-and-mouth disease (FMD) strain characterization and enhance bio-safety at ARRIAH by enabling the institute to utilize on-site bio/medical waste according to Russian and international standards.

As part of the project, 35 FMD virus strains of the ARRIAH strain collection (pigs and cows) were refreshed. These and an additional 18 strains were used for genetic characterization that might assist in the development of rapid diagnostics for FMD.

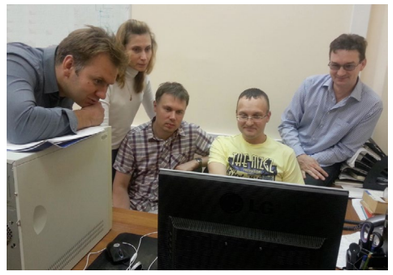
A new Incinerator Facility (IF) was designed, its location determined, and site preparations commenced in 2010. In 2012 the construction of the IF neared its completion, which will enable ARRIAH to incinerate bio/medical waste generated at the institute and also samples and livestock that they receive for further characterization and study from other veterinary stations and institutes in Russia.

Partner –US Department of Energy (DOE)

Project #3985p

Improving safeguards for nuclear-fuel processing

Leading Institute:	**VNIIEF, Sarov, Nizhny Novgorod Region, Russia**
Participating Institutes:	**NPO Mayak, Oziorsk, Chelyabinsk Region, Russia Siberian Chemical Combine, Seversk, Tomsk Region, Russia**
Total funds allocated:	**US $350,000**
Total Grants:	**US $320,840**



Project Team reviewing Simulation

Main objectives and results:

Enhancing state systems for the accounting and control of nuclear materials is both a requirement outlined in the IAEA comprehensive safeguards provisions and a priority for Nuclear Security Summit participating countries. Today, large–scale reprocessing facilities rely solely on Nuclear Material Accountancy (NMA) to detect material diversion attempts. This US Department of Energy (DOE)-ISTC project leveraged decades of experience from the US-Russian Material Protection Control and Accounting program to examine methods for enhancing diversion detection capabilities. Collaborators, including technical experts from VNIIEF, NPO Mayak, VNIITF and the Siberian Chemical Combine, focused on the backend of the nuclear fuel cycle to explore new applications of existing, and the development of new, material accounting software, environmental sampling and process monitoring technologies.

One of the most exciting outcomes of this collaboration was a computer model that not only simulates theft or diversion attempts, but incorporates the operational capabilities and detection errors of existing software and sensors to estimate the probability that those attempts would be detected. A generic reprocessing system, designed to simulate the PUREX facilities (like those at NPO Mayak, La Hague and Rokkasho), was used to model various scenarios, including one in which the liquid stream was diluted with nitric acid to obscure diversion, and one in which small amounts of liquid were diverted without an attempt to hide the change in total volume. Exchanging simulated sensors for those actually in use, this computer model could be used to evaluate the material diversion detection capabilities at reprocessing facilities worldwide. Responding to the need, identified by the IAEA, to enhance material controls, building on decades of experience, and leveraging existing technologies, this project effectively demonstrates the power of international collaboration and scientist engagement.

List of Projects Completed in 2012

No	Short title	Leading Institution	Funding Party	Collaborators
Agriculture				
#2625	GIS-Based Interactive Agricultural Atlas	St Petersburg State University / Geography and Geoecology Faculty, St Petersburg, Russia	Partners	
#2877	Ecotoxicological Risk Assessment of Transgenic Insecticidal Plants	Research Center of Toxicology and Hygienic Regulation of Biopreparations, Serpukhov, Moscow reg., Russia	Partners	USA
#3017	Isolation and Identification of Mycoplasmas	Federal Centre for Animal Health, Vladimir, Russia	Partners	USA
#3036	Wheat Diseases	Russian Research Institute of Biological Plant Protection, Krasnodar, Russia	Partners	USA
#3108	Bacteriocins and Lytic Bacterial Phages against Clostridium Perfringens to Control Chicken	State Research Center for Applied Microbiology and Biotechnology, Obolensk, Moscow reg., Russia	Partners	USA
#3219.2	Tuberculosis Pathogen of Human and Animals	Federal Centre of Toxicological and Radiation Safety of Animals, Kazan, Tatarstan, Russia	Canada	Canada
#3551	Multi-Channel Immunosensor	Institute of General Physics named after A.M. Prokhorov RAS / Natural Sciences Center, Moscow, Russia	Partners	
#G-1599	Fertilizers of Prolonged Action	Georgian Academy of Sciences / P. Melikishvili Institute of Physical and Organic Chemistry, Tbilisi, Georgia	Canada	Canada
Biotechnology and Health				
#2226	Catalytic Antibodies as Antiviral Therapeutics	Institute of Bioorganic Chemistry, Moscow, Russia	Partners	
#2654	Apoptosis and Gangliosides	Institute of Bioorganic Chemistry, Moscow, Russia	Partners	USA
#2825	Pre-Clinical Trials of Drugs	Research Center of Toxicology and Hygienic Regulation of Biopreparations, Serpukhov, Moscow reg., Russia	Partners	USA
#2828	Technology for Antitumor Strain Production	Institute of Biomedical Chemistry, Moscow, Russia	Partners	USA
#3171	Lyme Disease Immunopathogenesis	State Research Center for Applied Microbiology and Biotechnology, Obolensk, Moscow reg., Russia	Partners	USA
#3277	HIV-1 variability	Scientific Research Institute of Vaccines and Serums, Moscow, Russia	Partners	USA
#3526	Reference Preparations for Hepatitis C Diagnostics	State Research Center of Virology and Biotechnology VECTOR, Koltsovo, Novosibirsk reg., Russia	Partners	USA
#3645	Allowable Soil Contamination	Scientific Research Institute of Hygiene, Toxicology and Occupational Pathology, Koltsovo, Novosibirsk reg., Russia	Canada	Canada
#3826	Genetic Polymorphism of HIV-1	Ivanovsky Institute of Virology, Moscow, Russia	EU	The Netherlands
#4000	Functional Nutrition Synbiotic Product	Establishment of the Russian Academy of Medical Sciences Research Institute of Epidemiology and Microbiology, Siberian Branch of Russian Academy of Medical Sciences, Vladivostok, Primorsky reg., Russia	Japan	Japan
#4006	Tick-Borne Encephalitis Virus Population	Establishment of the Russian Academy of Medical Sciences Research Institute of Epidemiology and Microbiology, Siberian Branch of Russian Academy of Medical Sciences, Vladivostok, Primorsky reg., Russia	Japan	Japan
#B-1636	Colon Cancer and Inflammatory Bowel Diseases Cytoskeleton	Belarusian State Medical University, Minsk, Belarus	EU	USA, Germany
#CI-100	Production of Collahit material for medical and cosmetic applications	Collahit, LLC, Zheleznogorsk, Krasnoyarsk reg., Russia		
#G-1775	Crop Disease Resistance in the South Caucasus Region	Shota Rustaveli State University / Institute of Phytopathology, Batumi, Georgia	Partners	UK
#K-1313	Wheat Grain Treatment	National Center of Biotechnology, Stepnogorsk, Kazakstan	Partners	USA
#K-1322	Refined Enzymatic Preparations	National Center of Biotechnology, Stepnogorsk, Kazakstan	Partners	
#K-1477	Bioremediation of Mercury Contaminated Groundwater	Institute of Microbiology and Virology, Almaty, Kazakstan	Partners	UK, USA
#K-1533	Animal Disease Diagnostics	National Biotechnology Center of Kazakstan / Research Institute for Biological Safety Problems, Gvardeiski, Kazakstan	Partners	USA
#K-759	Genetic Effects of Nuclear Test Site	National Nuclear Center of the Republic of Kazakstan / Institute of Radiation Safety and Ecology, Kurchatov, Kazakstan	EU	Germany
#KR-1596	M.Tuberculosis Multi-Drug Resistance	National Center of Cardiology and Internal Medicine, Bishkek, Kyrgyzstan	EU	Germany

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No	Short title	Leading Institution	Funding Party	Collaborators
#KR-1632	Pollution of Kyrgyzstan by Anthrax Agents	National Academy of Sciences of Kyrgyzstan / Biotechnology Institution, Bishkek, Kyrgyzstan	EU	UK, France, Italy
#KR-1867	Monitoring of the Sheep and Goat Pox	Kyrgyz Research Institute of Veterinary named after A.Duysheev, Bishkek, Kyrgyzstan	Partners	USA
Chemistry				
#2478	Development of Obtaining Technology of LiAsF6 and LiPF6	State Research Institute of Organic Chemistry and Technology, Moscow, Russia	USA	USA
#2872	Siberian Chemical Complex Product Commercialization	Siberian Chemical Combine, Seversk, Tomsk reg., Russia	Partners	
#3140.2	Separator for Fuel Cells	VNIIEF, Sarov, N. Novgorod reg., Russia	Canada	Canada, France
#3155	Sovtol Detoxication	State Research Institute of Organic Chemistry and Technology, Moscow, Russia	Canada	Canada
#3221	Biodisel Based on Vegetable Oil Esters	State Research Institute of Organic Chemistry and Technology, Moscow, Russia	Canada	Canada
#3623	Trace Quantity of Explosives	MIFI, Moscow, Russia	USA, Canada	USA
#3847	Catalytic for Ozone Converters	Nikolaev Institute of Inorganic Chemistry, Siberian Branch of the Russian Academy of Sciences	Partners	
#3891	Biomimetics for Detection of Air Pollutants	Mendeleev Chemical Technological University, Moscow, Russia	EU Canada	France, Italy
#3913	Production of ElectroLuminescent Light Sources	VNIIEF, Sarov, N. Novgorod reg., Russia	Partners	
#3920	Electroluminescent Light Sources	VNIIEF, Sarov, N. Novgorod reg., Russia	Canada	Canada
#3923	Ultrasonic Technology of Purification of Acid Mine Waters	VNIITF, Snezhinsk, Chelyabinsk reg., Russia	EU, Canada	Germany, Canada, France
#A-1671	Remediation of Radiation-Contaminated Soils	Institute of Hydroponics Problems, Yerevan, Armenia	Canada	Canada
#A-1841	Biodegradable Fe-stents	The Scientific Centre of Radiation Medicine and Burns, Yerevan, Armenia	EU, Korea	Austria, Canada, Ireland, Korea, Portugal, Italy
#B-1872	Plasmachemical Treatment of Organic Waste	National Academy of Sciences of the Republic of Belarus / Institute of Heat and Mass Transfer, Minsk, Belarus	Canada, Partners	Czechia, Belgium
#CI-085	Noflan Technology (VOCCO)	JSC “Chimprom”, Volgograd, Russia		
#K-1363	Domestic Disinfectant against Infections	BO-NA, Almaty, Kazakstan	Partners	USA
#T-1436	Agricultural Chemicals to Ensure Food Safety	Institute of Chemistry named after V.I.Nikitin, Academy of Sciences, Republic of Tajikistan, Dushanbe, Tajikistan	Partners	USA
#T-1597	Materials on Base of Rare Earth Elements	Institute of Chemistry named after V.I.Nikitin, Academy of Sciences, Republic of Tajikistan, Dushanbe, Tajikistan	EU, USA	USA, Germany
#T-1598	Isolation of Antimony Mercurial Ores	Institute of Chemistry named after V.I.Nikitin, Academy of Sciences, Republic of Tajikistan, Dushanbe, Tajikistan	Canada	Canada
Environment				
#2262	Carbon-14 Recovery	Khlopin Radium Institute, St Petersburg, Russia	EU	Germany
#3032	Transport of Pollution to Pacific Region	Institute of Atmospheric Physics, Moscow, Russia	EU Japan	France, Japan, Germany
#3342	Radionuclide Sorbents for Deactivation	VNIIEF, Sarov, N. Novgorod reg., Russia	USA	USA
#3419.2	Soil Natural Self-Cleaning	VNIIEF, Sarov, N. Novgorod reg., Russia	EU	Austria, Germany, USA, Belgium, Canada
#3476	From Exposure to Disease Endpoints	Scientific Research Institute of Hygiene, Toxicology and Occupational Pathology, Volgograd, Russia	Partners	
#3529	Control of the Forest Carbon Balance	Kurchatov Research Center, Moscow, Russia	EU	Germany
#3654	Hydro-Litho-Sphere Around Kara-Balty Mining Complex	Federal State Enterprise – Russian Research Institute for Integrated Water Management and Protection, Ekaterinburg, Sverdlovsk reg., Russia	EU	France, Spain, Germany
#3695	Gas-and-Aerosol Emission from Forest Fires	NPO Mayak, Oziorsk, Chelyabinsk reg., Russia	EU, USA, Canada	Germany, Canada, USA
#3770	Hydroacoustical Underwater Array	Federal State Unitary enterprise “N. Andreyev Acoustics institute”, Moscow, Russia	EU	Greece, Norway
#3782	Hydrogenases from Phototrophic Bacteria	Institute of Basic Biological Problems,	Partners	
#3796	Weather Influence on Waterborne Infections	State Research Center of Virology and Biotechnology VECTOR, Koltsovo, Novosibirsk reg., Russia	Partners	USA
#3976	Geoceramic Matrices for Radioactive Waste	Research Institute of Technology, Sosnovy Bor, Leningrad reg., Russia	EU, Korea	Germany, Spain, Estonia, Korea, Finland

No	Short title	Leading Institution	Funding Party	Collaborators
#A-1243.2	Deactivating Polymeric Compositions	Yerevan Institute "Plastpolymer", Yerevan, Armenia	Canada	Canada
#A-1418	Natural Hazards in the Southern Caucasus and Central Asia	Scientific Foundation "International Center Garni", Yerevan, Armenia	EU, USA	France, USA, Greece, Italy
#B-1786	Water and Waste Water Technologies	Joint Institute of Energy and Nuclear Research - Sosny, Minsk, Sosny, Belarus	Partners	
#B-1809	Devices for Measuring Nitrosamines	Joint Institute of Energy and Nuclear Research - Sosny, Minsk, Sosny, Belarus	Partners	
#CI-095	Production line to manufacture filtering elements and equipment for water purification	FEI (IPPE), Obninsk, Kaluga reg., Russia		
#K-1474	Radioecology of River Shu in Kazakhstan and Kyrgyzstan	Kazakh National University / Center of Physical and Chemical Methods of Analysis, Almaty, Kazakstan	EU	UK, Norway
#K-1482	Contamination with Components of Rocket Fuel	Kazakh National University / Center of Physical and Chemical Methods of Analysis, Almaty, Kazakstan	EU	Denmark, Portugal
#KR-1327	Arbovirus infections in Kyrgyz Republic	Republican Center of Quarantine and Especially Dangerous Infections, Bishkek, Kyrgyzstan	Canada	USA, Canada, Egypt
#KR-1371	Greenhouse Gases over Kyrgyzstan	Kyrgyz State National University / Institute of Fundamental Sciences, Bishkek, Kyrgyzstan	Canada	Japan, Canada, USA
#KR-1527	Ozone Layer above the Middle Asia	Institute of Physics, Bishkek, Kyrgyzstan	EU	Germany
#T-1082.3	Burial Ground in Tajikistan	Physical-Technical Institute, Dushanbe, Tajikistan	Canada	Canada
#T-1635	Climate Change Influence on Wheat	Institute of Botany, Plant Physiology and Genetics, Dushanbe, Tajikistan	EU	Italy
#T-1688	Aerosol Pollution and Climate Change	Physical-Technical Institute, Dushanbe, Tajikistan	EU	USA, Portugal, France

Fission Reactors

#3119	Safety use of Dispersive Fuel	VNIIEF, Sarov, N. Novgorod reg., Russia	USA, Canada	Canada, USA
#3213	Channel-Type Reactor with Coolant of Supercritical Parameters	Federal State Unitary Enterprise Research and Development Institute of Power Engineering named after N.A.Dollezhal, Moscow, Russia	Canada	Canada
#3592	Corium Melt Interaction with Reactor Vessel Steel	Research Institute of Technology, Sosnovy Bor, Leningrad reg., Russia	EU	Germany, France, Finland, Korea
#3635	VVER Vessel in Severe Accident	Moscow Power Engineering Institute, Moscow, Russia	EU	France, Germany, Japan, USA, Sweden
#3751	Fission Product Yields	Khlopin Radium Institute, St Petersburg, Russia	EU	France, Austria
#3813	Phase Relations in Corium Systems	Research Institute of Technology, Sosnovy Bor, Leningrad reg., Russia	EU	Germany, France
#3814	Irregular Heterogeneous Effects in a LWR Reactor	Federal State Unitary Enterprise Research and Development Institute of Power Engineering named after N.A.Dollezhal, Moscow, Russia	EU	France
#3876	Thermo-Hydraulics of Oxidising Melt in Severe Accidents	Nuclear Safety Institute, Moscow, Russia	EU	France, Germany, Slovakia
#3938	Material Interactions in CANDU - Specific Corium	Research Institute of Technology, Sosnovy Bor, Leningrad reg., Russia	Partners	
#4012	Corium of Boiling Water Reactor (EPICOR)	Research Institute of Technology, Sosnovy Bor, Leningrad reg., Russia	Partners	
#A-1605	Basalt Fiber Based Filters	A.I. Alikhanyan National Science Laboratory, Yerevan, Armenia	Canada	Canada
#A-1810	Maintenance Simulator for NPP Equipment	Armenian Scientific-Research Institute of Nuclear Power Plants Exploitation, Yerevan, Armenia	Partners	
#B-1681	Technologies of the Joint Institute for Power and Nuclear Reason	Joint Institute of Energy and Nuclear Research - Sosny, Minsk, Sosny, Belarus	Partners	
#II-154	Encapsulation of Cs-137 Sources	Isotope Technologies, Minsk, Belarus	Other	
#K-1583	BN-350 Hot Cell Repository	Nuclear Technology Safety Center, Almaty, Kazakstan	Partners	USA, UK
#K-1770	Organization of Cd-109 Isotope Manufacture	National Nuclear Center of the Republic of Kazakstan / Institute of Nuclear Physics, Almaty, Kazakstan	Partners	
#K-512	Cesium Trap for BN-350 Reactor	Nuclear Technology Safety Center, Almaty, Kazakstan	USA, Other	USA, UK

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No	Short title	Leading Institution	Funding Party	Collaborators

Fusion

#2403	Monograph «Magnitocumulative Generators"	VNIIEF, Sarov, N. Novgorod reg., Russia	USA, Other	USA
#3828	Dust Technologies for Thermonuclear Fusion	Kurchatov Research Center, Moscow, Russia	EU	Germany

Information and Communications

#3148	Complex to Protect Objects from Terrorism	Institute of Robotics and Technical Cybernetics, St Petersburg, Russia	Partners	
#3195	Smart Vision Sensor development	VNIIEF, Sarov, N. Novgorod reg., Russia	USA	USA
#3744	Human Cardiovascular System Model	VNIIEF, Sarov, N. Novgorod reg., Russia	Partners	USA
#3985	Security at Nuclear Fuel Processing	VNIIEF, Sarov, N. Novgorod reg., Russia	Partners	USA

Instrumentation

#3753	Objects Revealing	VNIITF, Snezhinsk, Chelyabinsk reg., Russia	EU	Italy
#A-1306	Detectors for X-Ray Imaging	A.I. Alikhanyan National Science Laboratory, Yerevan, Armenia	EU, USA	USA, Switzerland, Germany, France
#A-1544	Spectrometer for Detecting Skin Cancer	Institute of Radiophysics and Electronics, Ashtarak-2, Armenia	Canada	Canada
#B-1569	Spectroscopic Ellipsometry	B.I. Stepanov Institute of Physics, Minsk, Belarus	Partners	
#KR-1587	Radioecological Monitoring Center for Issyk-Kul Region	Institute of Physics, Bishkek, Kyrgyzstan	EU	France, Germany

Manufacturing Technology

#3711	Robotic in Security	Institute of Robotics and Technical Cybernetics, St Petersburg, Russia	EU	France, Germany, Italy, Spain
#K-1324	Market Research for INP Technologies	National Nuclear Center of the Republic of Kazakstan / Institute of Nuclear Physics, Almaty, Kazakstan	Partners	
#K-1365	Market Technologies in Institute of Atomic Energy	National Nuclear Center of the Republic of Kazakstan / Institute of Atomic Energy (1), Almaty, Kazakstan	Partners	

Materials

#3073	Rods out of Intermetallic Alloys	Russian Academy of Sciences / Institute of Metals Superplasticity Problems, Ufa, Bashkiria, Russia	Partners	
#3895	Nanometer Structures	NIIEFA Efremov, St Petersburg, Russia	Partners	USA
#4051	Equal Channel Angular Pressing Die-Set	Ufa State Technical University of Aviation, Ufa, Bashkiria, Russia	Partners	
#A-1517	Liquid Crystals as Diffraction Grating	Institute for Physical Research, Ashtarak-2, Armenia	Canada	Canada
#A-1591	Lead Free Glass Frits and Ceramics	Institute of Electronic Materials, Yerevan, Armenia	EU, Korea	France, Germany, Korea, Spain, Finland
#A-1695	Transparent Conductive Nanomaterials for Solar Cell	State Engineering University of Armenia, Yerevan, Armenia	EU	Germany, Spain, Romania, UK, Portugal
#CI-110	Manufacture and Realization of WaterJet Complexes	NIKIMT (Institute of Assembly Technology), Moscow, Russia		

Medicine

#2738	Lyme Borrelioses in Ul'janov and Kirov Regions	State Research Center for Applied Microbiology, Obolensk, Moscow reg., Russia	Canada	Canada
#2981.2	Phago-immunotherapy of anthrax	Institute of Immunological Engineering, Lyubuchany, Moscow reg., Russia	Canada	Canada
#3070	Influenza Surveillance in Russia	RAMS / Research Institute of Influenza, St Petersburg, Russia	Partners	
#3139	Critical concentration of anti-TB drugs	State Research Center for Applied Microbiology, Obolensk, Moscow reg., Russia	Partners	USA
#3283	Center for New Drugs Development	Non-profit Partnership "Center for development of new potenial Medicines"ORCHEMED", Moscow, Russia	Partners	USA

No	Short title	Leading Institution	Funding Party	Collaborators
#3373	Rubella Control in Russia	Scientific Research Institute of Vaccines and Serums, Moscow, Russia	Partners	USA
#3516	Antiviral Agents against Variola	State Research Center of Virology and Biotechnology VECTOR, Koltsovo, Novosibirsk reg., Russia	Partners	France
#3533	Monitoring of Salmonella	Central Research Institute of Epidemioloigy, Moscow, Russia	Partners	USA
#3626	Recombinant Subunit Tuberculosis Vaccines	Gamalei Institute of Epidemiology and Microbiology, Moscow, Russia	Canada	USA, Canada
#3691	Medical Applications of Ultrasonic and Optoacoustic	MIFI, Moscow, Russia	EU	France
#3694	Laser Spectroscopy for Medicine	Khlopin Radium Institute, St Petersburg, Russia	EU	UK, Germany
#3803	Microarray Typing of Type A Influenza Virus	Siberian Branch of RAS / Institute of Chemical Biology and Fundamental Medicine, Novosibirsk, Russia	Partners	USA
#3995	Peptides for Metastatic Melanoma Treatment	Khlopin Radium Institute, St Petersburg, Russia	Partners	USA
#3996	Simultaneous Action of Radiation and Heating on Tumor	MIFI, Moscow, Russia	EU	The Netherlands
#4072	Immunological Diagnostics of Active Tuberculosis	Central Tuberculosis Research Institute, Moscow, Russia	Partners	USA
#A-1331	Botulinum Intoxication in Armenia	Armenian National Institute of Health, Yerevan, Armenia	Partners	USA
#A-1580	Molecular Basis of Familiar Mediterranean Fever	Center of Medical Genetics of NAS RA, Yerevan, Armenia	EU	France, Italy
#A-1677	Potential Active Amino Acids and Peptides	Scientific and Production Center "Armbiotechnology" NAS RA, Yerevan, Armenia	EU	Belgium, Italy, France
#A-1785	Production of Medical Isotopes	A.I. Alikhanyan National Science Laboratory, Yerevan, Armenia	Partners	
#CI-042	Brachytherapy Radiation Sources Pilot Production	FEI (IPPE), Obninsk, Kaluga reg., Russia	USA, Canada	
#CI-082	Pilot production of device for limb lengthening	Limited Liability Company "New Orthopaedics Instruments", Sarov, N. Novgorod reg., Russia		
#G-1761	Biochips for Diagnosis of Viral and Bacterial Diseases	Tbilisi State University / Institute of Physics (Ge), Tbilisi, Georgia	Partners	UK
#K-1347	Brucellosis in Kazakhstan	Kazakh Scientific Center for Quarantine and Zoonotic Diseases, Almaty, Kazakstan	EU, Canada	Canada, Spain, UK
#K-1541	Hydrogel Dressings	National Nuclear Center of the Republic of Kazakstan / Institute of Nuclear Physics, Almaty, Kazakstan	Partners	
#K-584	Plague Foci and Plague Strains in Kazakhstan and the U.S.	Kazakh Scientific Center for Quarantine and Zoonotic Diseases, Almaty, Kazakstan	Partners	
#T-1257	Acute Intestinal Diseases in Tajikistan	Republican Center for State Sanitary Epidemiological Control, Dushanbe, Tajikistan	USA	USA

Non-Nuclear Energy

#2904	Small Capacity Fuel Cells	VNIIEF, Sarov, N. Novgorod reg., Russia	EU, USA, Canada	Germany
#3361	Production of Solid Oxide Fuel Cells	VNIITF, Snezhinsk, Chelyabinsk reg., Russia	Partners	
#3908	Small Capacity Fuel Cells	VNIIEF, Sarov, N. Novgorod reg., Russia	EU, USA, Canada	
#G-1624	Bioprocess for Fuel Ethanol	Durmishidze Institute of Biochemistry and Biotechnology, Tbilisi, Georgia	EU, Korea	France, Korea

Other

#3756	Modular Constructions for Buildings	Mining and Chemical Complex, Zheleznogorsk, Krasnoyarsk reg., Russia	Partners	USA

Other Basic Sciences

#3590	Groundwater Dating	VNIIEF, Sarov, N. Novgorod reg., Russia	EU	Italy, Germany

Physics

#2888	Alvarez-Type Accelerating Structure	VNIIEF, Sarov, N. Novgorod reg., Russia	EU, Other	
#2889	Radio-Frequency Quadrupole Accelerating Structure	Institute for High Energy Physics (IHEP), Protvino, Moscow reg., Russia	EU	Switzerland
#3438	Scintillators for Calorimeter at LHC	Bogoroditsk Plant of Techno-Chemical Products, Bogoroditsk, Tula reg., Russia	Partners	
#3497	Aberrometric System for Surgery of Eyes	VNIIEF, Sarov, N. Novgorod reg., Russia	EU	UK, Ireland, Sweden
#3540	Strip Detector for Barionic Matter Investigations	Khlopin Radium Institute, St Petersburg, Russia	EU, Other	Germany France

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No	Short title	Leading Institution	Funding Party	Collaborators
#3605	Facility for Neutron Capture Therapy	Budker Institute of Nuclear Physics, Akademgorodok, Novosibirsk reg., Russia	EU	Germany
#3668	Protection from Explosion	VNIIEF, Sarov, N. Novgorod reg., Russia	Canada	Canada
#3726	Transport Processes in Turbulent Flows of Conducting Fluid	Institute of Continuous Media Mechanics, Perm, Russia	EU	France, Germany, USA, UK
#3748	Nuclear Data for Ion Beam Analysis	FEI (IPPE), Obninsk, Kaluga reg., Russia	Partners	
#3754	Electron Beam Pumped Semiconductor Lasers	Moscow State Technical University of Radioengineering, Electronics and Automation, Moscow, Russia	EU	France, Germany
#3755	Non-Ideal Plasma of the Sun	VNIITF, Snezhinsk, Chelyabinsk reg., Russia	EU	Italy, Germany, Denmark, USA
#3827	Tropical Hurricanes Beginning	Russian Academy of Sciences / Institute of Radioengineering and Electronics / Fryazino Branch, Fryazino, Moscow reg., Russia	EU	Spain, Italy, Greece
#3836	Single-Walled Carbon Nanotube Devices	Institute of Microelectronics Technology and High Purity Materials, Chernogolovka, Moscow reg., Russia	EU, Korea	Korea, Germany, France
#3857	Extreme Ultra Violet Lithography	Russian Academy of Sciences / Physical Technical Institute, St Petersburg, Russia	EU	Czechia, Ireland, Germany, France
#3861	Low-Energy Ion Beam Transport	Siberian Branch of RAS / Institute of High Current Electronics, Tomsk, Russia	Partners	USA
#3870	Wide-Band Semiconductor Detectors	Karpov Institute of Physical Chemistry (2), Obninsk, Kaluga reg., Russia	Canada	Canada, Korea, USA
#4019	DT Plasma Compression	VNIIEF, Sarov, N. Novgorod reg., Russia	Canada, Partners	
#A-1444	Accelerator in Medical Isotopes Production	A.I. Alikhanyan National Science Laboratory, Yerevan, Armenia	Canada	Canada
#A-1554	Planetary Space Weather	A.I. Alikhanyan National Science Laboratory, Yerevan, Armenia	EU	Germany, UK, USA
#A-1754	Laboratory Furnaces Production	A.I. Alikhanyan National Science Laboratory, Yerevan, Armenia	Partners	
#B-1679	Continuous Wave Laser with Intracavity Conversion	B.I. Stepanov Institute of Physics, Minsk, Belarus	EU	Italy, Poland, Germany, France

Space, Aircraft and Surface Transportation

#2836	In-Orbit Experiment with Inflatable Solar Generator	NPO Lavochkin, Khimki, Moscow reg., Russia	EU	France
#3151	Demonstrator for flight tests	Siberian Branch of RAS / Institute of Theoretical and Applied Mechanics (ITPMech), Novosibirsk, Russia	EU	Italy, The Netherlands, Belgium
#3779	Neutron Spectrometer for Spacecraft	Khlopin Radium Institute, St Petersburg, Russia	EU	Canada, Germany, Sweden
#3871	Thermal Diagnostics of Aerospace Structures	MAI (Moscow Aircraft Institute), Moscow, Russia	EU	Germany, France, The Netherlands, Italy, UK
#G-1600	Variable Geometry Rotor	Georgian Technical University, Tbilisi, Georgia	EU	Italy, USA
#T-1629	Fireball Network in Tajikistan	Institute of Astrophysics, Dushanbe, Tajikistan	EU	Czechia, UK

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
(Board Member
in 2012)


Belarus


Georgia
(Board Member
in 2013)


Kazakhstan


Kyrgyz Republic


Tajikistan

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Canada	Shawn Barber
European Union	Kristian Schmidt
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Members of the Scientific Advisory Committee:

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European Union	Jean-Pierre Contzen, André Syrota
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18 Years Supporting International Scientific Cooperation

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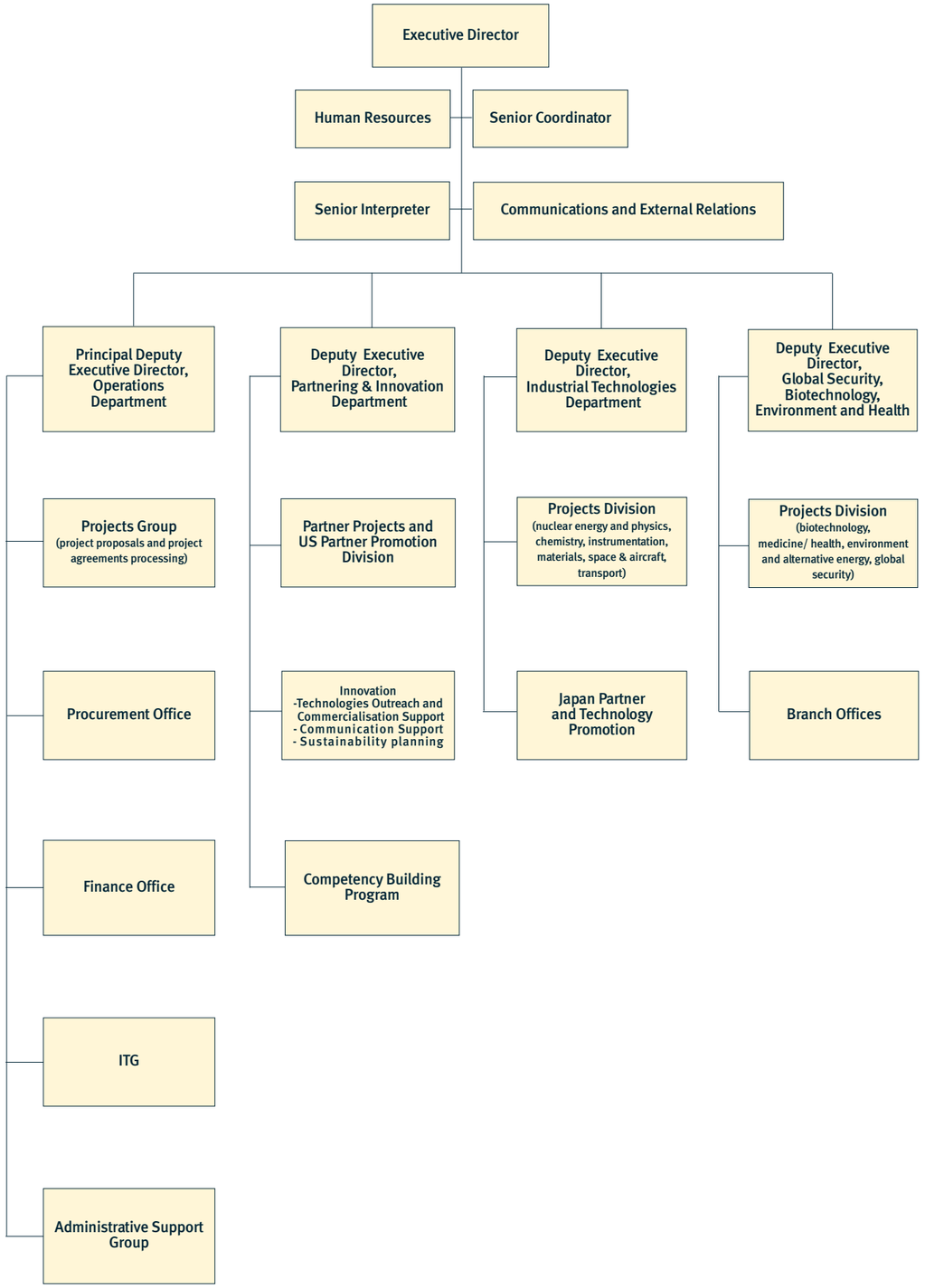

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Glossary of Main ISTC Terms and Programs

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

The **Commercialization 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 **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.

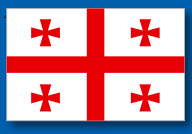
ISTC Targeted Initiatives

A number of targeted initiatives were continued and focused their approach and technical solutions on a number of topical problems of global interest.

- **Drug Design and Development**
- **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**

For Notes

18 Years Supporting International Scientific Cooperation



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