The International Science and Technology Center:

Product of the Past or Prototype for the Future?

July 2018

CGSR

Center for Global Security Research

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July 2018

Abstract

The International Science and Technology Center (ISTC) – originally formed in the early 1990s to address the potential issue of "brain drain" from underemployed and underpaid nuclear weapons scientists, engineers, and technicians in the former Soviet Union – still exists to this day. Through more than two decades of changing circumstances and worldviews, the ISTC has had to reorganize, move countries, streamline its internal processes, and broaden its scope of work in an attempt to remain a relevant and useful tool for international science cooperation in the 21st century. Critics see it as a product of the past in a modern world that no longer requires the redirection of former Soviet scientists, while proponents argue that the established networks and trust from the international community that the ISTC has developed throughout its history make it a critical and useful tool for current and future science cooperation and threat reduction. Through historical and budget analysis, this paper hopes to answer the following questions: (1) how has the ISTC evolved throughout its history to become what it considers to be a useful tool for the future of science cooperation and threat reduction, and (2) if the ISTC still serves a purpose, what is that purpose, and how can they continue to adapt and evolve to better serve that purpose?

Introduction

As the Soviet Union headed towards collapse in 1991, the United States and its allies were focused on a variety of issues regarding the path forward for a post-Soviet world. Of these issues, the problems surrounding the future of the Soviet nuclear weapons program was of paramount importance. With a stockpile of approximately 35,000 warheads spread across four countries[1], and an industrial complex consisting of more than 20 separate research, testing, production, and enrichment facilities[2] staffed by countless scientists, engineers, and technicians with intimate knowledge of nuclear weapons design, the dangers of an unsecured nuclear complex in the political chaos of the early 1990s were unacceptably high.

To address these issues, in 1991, United States Senators Sam Nunn and Richard Lugar authored and cosponsored the Soviet Nuclear Threat Reduction Act, which amended the Arms Control

[1] Graham Allison, "What Happened to the Soviet Superpower's Nuclear Arsenal? Clues for the Nuclear Security Summit," Belfer Center for Science and International Affairs, March 2012, https://www.belfercenter.org/publication/what-happened-soviet-superpowers-nuclear-arsenal-clues-nuclear-security-summit

[2] "Weapons of Mass Destruction (WMD)," Global Security, https://www.globalsecurity.org/wmd/world/russia/nuclear_fac.htm

Export Act allowing for the transfer of designated Soviet military armaments and ordinances to NATO.[3] What followed was an era of nuclear cooperation known as Cooperative Threat Reduction (CTR), which spawned several different US and international programs catered towards the goal of reducing the threat of an unsecured post-Soviet nuclear complex.

One such organization that was born of this era was the International Science and Technology Center (ISTC). Building off of existing avenues of cooperation with the Soviet Union, the ISTC was formed as a way of redirecting Soviet nuclear weapons scientists towards peaceful uses. The impetus for formation of the ISTC was the fear that underemployed and underpaid post-Soviet nuclear weapons scientists would find opportunities to support themselves and their families by selling their technical knowledge and services to antagonistic countries around the world seeking nuclear weapons. By redirecting these scientists towards peaceful purposes, the hope was to prevent the proliferation of their knowledge and expertise, as well as help them integrate into the global scientific community.

At its height in the early 2000s, the ISTC was operating with budgets sometimes in excess of $80 million a year, hundreds of newly-funded projects per year, and redirecting the expertise of more than 20,000 scientists.[4] Over time, as facilities became more and more secure, and the threat of weapons scientists proliferating their knowledge dwindled, CTR work, including the ISTC, began to decline. Citing a belief that scientist redirection was over, along with renewed distaste for allowing Western influence into their national security complex, the Russian Federation – not only the host of the ISTC headquarters, but the largest beneficiary of the Center – withdrew as a member.

The ISTC, therefore, was forced to make several tough decisions as it struggled with the question of whether or not it still served a purpose. Recognizing themselves as an important and unique international organization with a mission applicable to future scenarios, the ISTC instituted several changes to their mission and charter and began to diversify its projects into areas that better serve the needs of the 21st century.

The first part of this paper will explore the evolution of the ISTC over the past 25 years by splitting its development as an organization into three phases. Each of these phases will include a fiscal analysis as well as a detailed study of the reactions to major turning points and criticisms that affected the growth of the Center. The second part will delve into more detail about how the ISTC has institutionally set itself up for future success, as well as provide recommendations for how to ensure a continuance in their mission to modernize and become a useful tool for the future. By doing so, this paper intends to not only serve as a useful historical analysis of how the Center has reached its current form, but also provide useful suggestions for how the Center can continue to be a valuable platform for future global science and technology cooperation.

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[3] Public Law 102-228, Government Publishing Office, December 12, 1991, https://www.gpo.gov/fdsys/pkg/STATUTE-105/pdf/STATUTE-105-Pg1691.pdf

[4] "Annual Report," International Science and Technology Center, 2000, p. 7, http://www.istc.int/upload/files/ovpnjg50hi8gosw4gk4g.pdf

Formation of the ISTC

With the collapse of the Soviet Union came severe economic inflation. Because of this, starting from the 1980s, science and technology budgets and spending power in the Soviet Union, and later Russia, sharply dropped. This led to a workforce composed of highly skilled, but underemployed and vastly underpaid nuclear weapons scientists and researchers. As an example, the Ioffe Physical-Technical Institute of the Russian Academy of Sciences experienced a budget decline of nearly 95% between 1991 and 1995. Due to this severe downturn in budget, salaries plummeted despite budget expenditures rising from 25% to 65% as the institute struggled to pay its employees, leaving very little money for research, equipment, infrastructure, or materials.[5]

Recognizing the need for international assistance to help support this vacuum of science and technology funding, Western countries began to institute several programs aimed at providing emergency support for the science community of the former Soviet Union (FSU). Internationally, programs like the International Science Foundation (ISF) made over 25,000 emergency grants of $500 to FSU scientists. The United States developed initiatives such as their lab-to-lab engagement program and Nuclear Cities Initiative (NCI). By 1994, the United States had also created the Industrial Partnering Program (IPP) to engage FSU weapons scientists and engineers in projects with commercial potential. This program later evolved into the Global Initiatives for Proliferation Prevention (GIPP) – which became the platform through which the United States Department of Energy funded projects to the ISTC and other related organizations.[6]

However, it was the Germans in 1991 who first proposed the concept of an international program dedicated to providing financial support to weapons scientists in the FSU. In January 1992, the Foreign Ministers of the United States (James Baker), newly-formed Russian Federation (Andrei Kozyrev), and unified Germany (Hans-Dietrich Genscher) met and released a tripartite statement calling for the formation of an International Science and Technology Center that would "support scientists and engineers of the former Soviet Union during the present critical period, which includes the transition to a market economy, the developing process of disarmament, and the conversion of industrial-technical potential from military to peaceful endeavors."[7] By November of that same year, Japan had joined the fold and the four parties initialed the first ISTC Agreement. Germany's representation as an establishing party had also been superseded by representatives of the greater European Atomic Energy Community and European Economic Community.

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[5] "An Assessment of the International Science and Technology Center," National Research Council, 1996, p. 4, https://www.nap.edu/read/5466/chapter/1

[6] Ibid., p. 5

[7] *Dispatch*, U.S. Department of State, Vol. 3, No. 8, February 24, 1992, http://dosfan.lib.uic.edu/ERC/briefing/dispatch/1992/html/Dispatchv3no08.html

The Agreement Establishing an International Science and Technology Center was signed on 27 November 1992. Article II of the Agreement laid out the Center's objectives as follows:

1. "To give weapons scientists and engineers, particularly those who possess knowledge and skills related to weapons of mass destruction or missile delivery systems, in the Russian Federation and, if interested in other states of the [Commonwealth of Independent States] CIS and Georgia, opportunities to redirect their talents to peaceful activities; and"

2. "To contribute thereby through its projects and activities: to the solution of national or international technical problems; and to the wider goals of reinforcing the transition to market-based economies responsive to civil needs, of supporting basic and applied research and technology development, *inter alia*, in the fields of environmental protection, energy production, and nuclear safety, and of promoting the future integration of scientists of the states of the CIS and Georgia into the international scientific community."[8]

While the possible avenues for redirection of weapons scientists were not specified, the Agreement maintained strict geographical rules (CIS and Georgia) as well as strict beneficiary requirements (weapons scientists and engineers). The Agreement also provided several benefits to the Center that were very uncommon and required significant negotiation with Russia– most notably tax exemption for the Center, its personnel, and funds received, as well as diplomatic privileges and immunities for personnel of the Center.[9]

In December 1993, the four parties again signed a document – a Protocol on the Provisional Application of the Agreement Establishing an International Science and Technology Center. This Protocol accomplished two things, it (1) provided for the provisional application of the ISTC Agreement until its full entry into force, and (2) provided technical provision necessary for application of the Agreement pertaining to review of the Agreement, withdrawal from the Protocol, and accession of new members to the ISTC.[10] By January 1994, the four parties had completed all internal procedures necessary for entry-into-force of the Agreement and Protocol[11], and the ISTC was officially established two months later. [12]

[8] National Research Council, p. 31
[9] Ibid., p. 32
[10] Ibid., p. 36
[11] Glenn Schweitzer, "Containing Russia's Nuclear Firebirds," University of Georgia Press, 2013, p. xv
[12] In 1993, a parallel, similar organization known as the Science and Technology Center in Ukraine (STCU). This organization was originally created to be very separate from the ISTC due to political differences between Russia and Ukraine. While the STCU was similar in scope, and also continues work to this day, his paper is focused solely on the ISTC.

Evolution of the ISTC

From 1994 to the present day, the ISTC has evolved and adapted to a multitude of changing internal and external circumstances. These evolutions can be broadly divided into three phases of development.[13] The first phase encompassed the original mission of the ISTC – to stabilize the situation of former weapons scientists in the FSU and prevent the proliferation of their knowledge and expertise. The second phase focused on adaptability and survivability – finding solutions for a rapidly changing world, and a Russia that no longer wanted to engage in scientist redirection. The third phase, which leads into present day, focuses on developing avenues for multilateral science and technology response to security threats, as well as broadening both the technological and geographical scope of the Center to approach a new era of threat reduction.[14]

Phase 1: 1994-2004

The first decade of the ISTC was a period of significant growth. Over the course of the ten years from 1994-2004, membership in the ISTC skyrocketed, funding reached its peak levels, branch offices were opened all over the FSU, and private industry partners became involved in the mission. Former Executive Director of the ISTC, Glenn Schweitzer, described much of this period as "an era of euphoria at the ISTC headquarters."[15]

By 2004, membership had grown from four countries to 37.[16] Over the course of that time period, funding for the ISTC skyrocketed. Although the earliest publicly-available budget data for the ISTC is from 1999, it is nevertheless clear that funding reached a peak from 2000-2002. As shown in Figure 1, from 1999-2000, the overall budget doubled from $42.6M to $85.8M, dipping slightly in 2001 before nearly matching the same height in 2002.

Over this same time frame, single-nation contributions peaked in 2000 at $61.5M, while partner contributions peaked in 2002 at $40.8M. Introduced in 1996, the partner program allowed public and private sector organizations with headquarters in member countries the opportunity to utilize the Center's services as a middleman to connect these organizations with scientists in the FSU. As traditional funding from member countries began to decline, the partner program continued to grow. While, during this period, funding for partner

[13] Adapted from personal communication with Andrew Hood, Director of Strategic Planning and Integration, NNSA Office of Defense Nuclear Nonproliferation, June 2018.
[14] All budget data in the following section is taken from the ISTC Annual Reports from each given year. Reports prior to 1999 were not available.
[15] Schweitzer, p. 35
[16] Finland, Sweden, Georgia, Armenia, and Belarus joined in 1994. Kazakhstan and Kyrgyzstan joined in 1995. Norway joined in 1997. Republic of Korea joined in 1998. Canada and Tajikistan joined in 2003. By 2004, EU membership had grown from 15 to 27, absorbing the membership of Finland and Sweden, and brought the total of member countries to 37.

projects never overtook that of traditional funding streams, where member governments directly provided funds to the ISTC for approved projects, it provided a second solid source of income and projects for the ISTC and former weapons scientists.

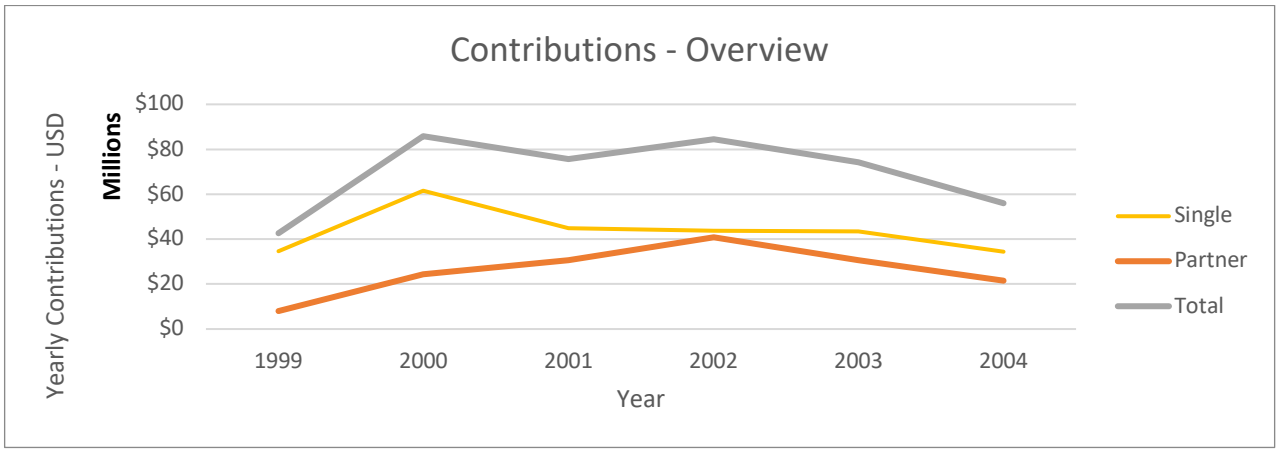

Figure 1: Overview of Monetary Contributions from 1999-2004

The set mission of this first phase of the ISTC was to stabilize the situation of former weapons scientists in the FSU and prevent the proliferation of their knowledge and expertise. By addressing the situation *in situ*, the parties of the ISTC sought to engage former weapons scientists in cooperative research grants, hoping to introduce and integrate them into international science communities, as well as redirect their weapon skills to peaceful technologies. In 2004, by the end of this phase, the ISTC was paying 27,104 scientists $47.3M in grant payments for "a total of 1,982,792 person-days of effort on ISTC projects."[17] As would be expected for this time frame, most of these scientists, 21,532, were located in Russia. As a result, the overwhelming majority of new projects per year during this phase were also located in Russia, as evidenced by Figure 2.

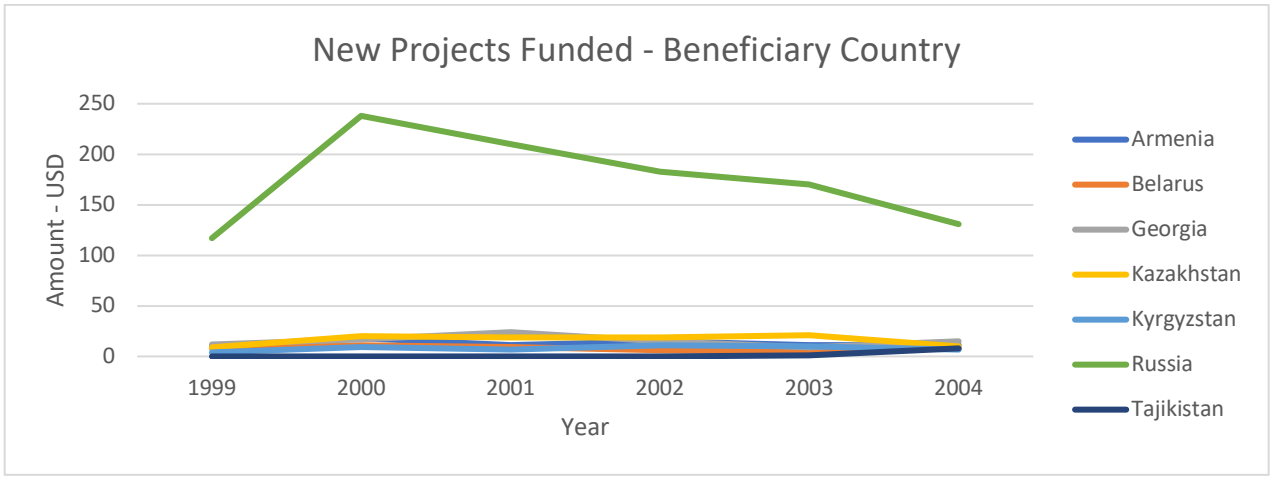

Figure 2: New Projects Funded by Beneficiary Country

[17] "Annual Report,"2000, p. 7

Project expenditures throughout this phase were divided among up to fourteen different issue areas: Biotechnology and Life Sciences; Chemistry; Environment; Fission Reactors; Fusion; Information and Communications; Instrumentation; Manufacturing Technology; Materials; Non-Nuclear Energy; Other; Other Basic Sciences; Physics; and Space, Aircraft, and Surface Transportation. The largest portion of the project expenditures from 1994-1999, around 21.76% of all project funding, went towards Environment projects, followed by Fission Reactor projects and Physics projects. However, Biotechnology and Life Sciences projects quickly took over as the largest project area after a big push in the early 2000s, thanks in part to advocacy work done by a group of US Congressional representatives led by Senator Richard Lugar.[18]

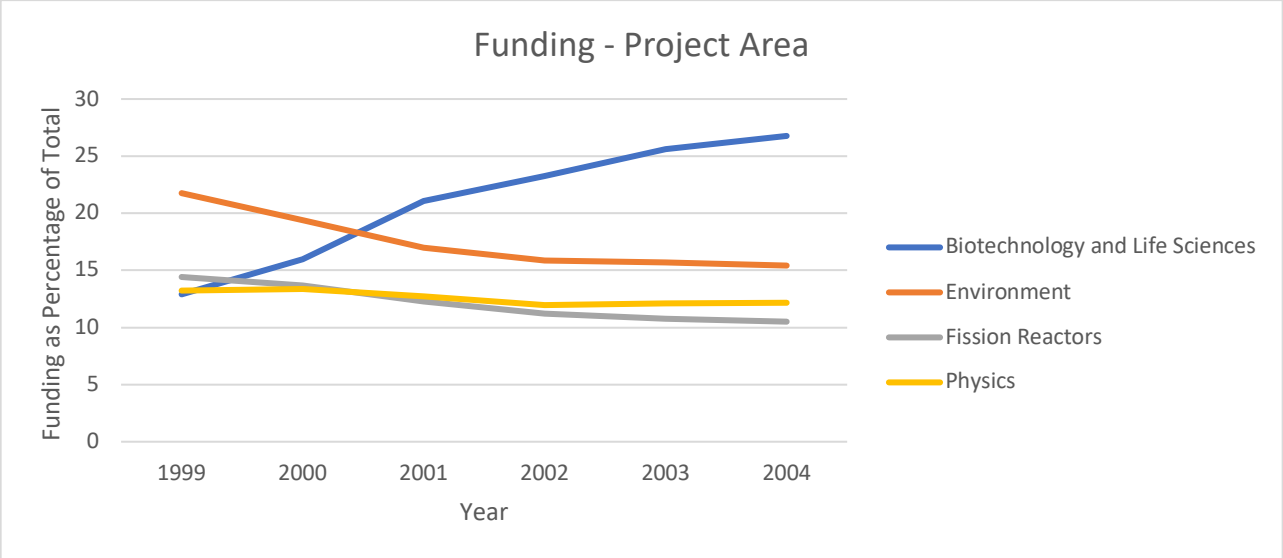

Figure 3: Funding by Project Area as a Percentage of Total Aggregate Funding per Year

Throughout this period, several third-party reviews and assessments were done on the operations of the ISTC. In 1996, the National Research Council (NRC), at the request of the Office of the Secretary of Defense of the United States, conducted an assessment of the ISTC. While the assessment was generally positive, stating that the ISTC "has met its primary objective of providing non-weapons-related work opportunities for weapons scientists and engineers," it noted some concerns[19]:

- ISTC project managers were responsible for an average of 16 projects each, which they found unacceptable for effective monitoring of ISTC-funded projects.
- The NRC claimed that the stated ISTC goal of transitioning Russia to a market-based economy was having "only limited success," citing the poor state of the economy of Russia and a lack of traditional connection between research and market needs, positing that the "private sector is simply not strong enough to give rise to a substantial domestic demand for innovations." In interviews with Russian science leaders, this point was underscored by one considering the goal "impractical," while

[18] Ibid., p. 11
[19] National Research Council, p. 11

another stated that it is important, but only achievable through active collaboration with U.S. and European industrial researchers, which was not a strong suit of the ISTC at the time.
- Only 7% of scientists funded by ISTC grants had a background in chemical or biological weapons, which they believed was not proportional to the threat, believing more emphasis should be placed on redirecting chemical and biological weapons scientists.[20] This was also a likely driving force behind the uptick in biotechnology and life sciences projects over the subsequent several years.

The NRC assessment also provided several recommendations for how the ISTC could adequately address these concerns. Major recommendations included: (1) organizing an industrial advisory council, (2) expanding the scope of Western collaboration and encourage more active participation by collaborators, and (3) allowing grants to fund communications equipment. While the ISTC disregarded the first recommendation due to their self-perception of a system already overburdened with bureaucracy, the other two recommendations were addressed. Over the course of the next several years, the ISTC encouraged use of its partner program to facilitate collaboration between FSU scientists and Western industry workers and academics. In addition, by 1999, internal expenditures on operations, facilities, and equipment at the ISTC were more than $1.6M for the year.[21] Due to lack of publicly-available budget data from before 1999, it is unclear whether this was significantly higher than previous years, however the ISTC adopted a major initiative in this area funded by the Japanese, according to former ISTC Executive Director Glenn Schweitzer.[22]

Several years later, in 2001, the United States General Accountability Office (GAO) released a report titled "State Department Oversight of Science Centers Program." While the analysis focused primarily on State Department-funded projects, and not the program in its entirety, this assessment took a much harsher tone than the NRC report. The GAO analysis found several issues with both the oversight process and operating assumptions of both the State Department and the ISTC. Notably, the GAO pointed out that:

- The lack of knowledge on the total number and location of weapons scientists throughout the post-Soviet complex, undermining the goal of truly reducing proliferation risks;
- An underrepresentation of State Department officials overseeing US-funded projects, leaving Russian specialists to oversee projects and their related budgets within their own territory;
- A lack of knowledge of what redirected scientists were doing outside of ISTC work, and relatedly;

[20] National Research Council, p. 17
[21] "Financial Statements for the Years Ended December 31, 1999 and 1998, and Independent Auditors' Report," ISTC, March 2000, http://www.istc.int/upload/files/26eiv9nnzzesksk400wo.pdf
[22] Schweitzer, p. 33

- A lack of redirection into full-time employment, leaving FSU weapons scientists the chance to continue to work in parallel on weapons-related projects.[23]

The State Department, upon review of this report, found it "technically accurate in most areas evaluated," concurring with its major findings.[24] However, they viewed the lack of recommendations given by the GAO report as a positive. While they went on to offer several clarifications on the issues brought up in the report, the GAO was not the first nor the only party bringing these concerns to the forefront, namely the issue of full-time employment for redirected scientists. In turn, several of these highlighted problems became pervasive issues for certain members of the ISTC and helped bring about an era of great change and struggle for the ISTC over the next decade.

Phase 2: 2005-2012

While the first phase saw the ISTC at its peak, the second phase can be described as the fall of the ISTC as it was originally conceived. This era saw the signaled departure of the Russian Federation, and with it, a severe decline in project funding (both in single and partner project contributions), a decrease in project area diversity, and the downsizing of the Center itself.

In 2006, the Russian government made an announcement to a meeting of the G8 that they believed the era of scientist redirection was over. Meetings with Russian officials were becoming increasingly more difficult to set up, and the Russians began sending lesser-ranked representatives to ISTC meetings. The Russian government had also started to question why they were continuing to allow access to Western scientists into their national security complex.

In what seemed to be an attempt to solicit public opinion that would stop or slow the impending withdrawal of Russia from the ISTC, the ISTC Secretariat solicited the views of Russian scientists on the value of the ISTC in 2009. Despite receiving some positive feedback from these scientists, and a last-ditch effort from Schweitzer for future ISTC operations in Russia, Russian President Dmitry Medvedev announced in August 2010 that the Russian Federation would officially withdrawal from the Center. However, it was not until 2011 that the Russians provided specific details on this withdrawal, stating that the withdrawal would be complete six months after the conclusion of the final active Russian ISTC project. This did not take place until 2015.[25]

Understandably, the harsh rhetoric of Russia on the international stage and subsequent withdrawal from the ISTC caused a significant downturn in funding to the Center. The Center was seen as a unidimensional organization set on redirecting FSU weapons scientists, and the loss of the largest FSU country caused significant damage to their stated mission. After reaching a second peak in 2002, the Center saw a funding stream that steadily decreased each year until 2011. By 2007, funding was approaching the level it was at in 1999, and from 2007-2011, it

[23] "State Department Oversight of Science Centers Program," Government Accountability Office, May 2001, https://www.gao.gov/new.items/d01582.pdf
[24] Ibid.
[25] Schweitzer, p. xviii

entered a freefall, bottoming out at $2.65M for the year in 2011 (Figure 4). In 2009, funding for partner projects overtook single member contributions as governments reacted to a clear message from the Russian government that, in their opinion, the usefulness of the ISTC was coming to an end.

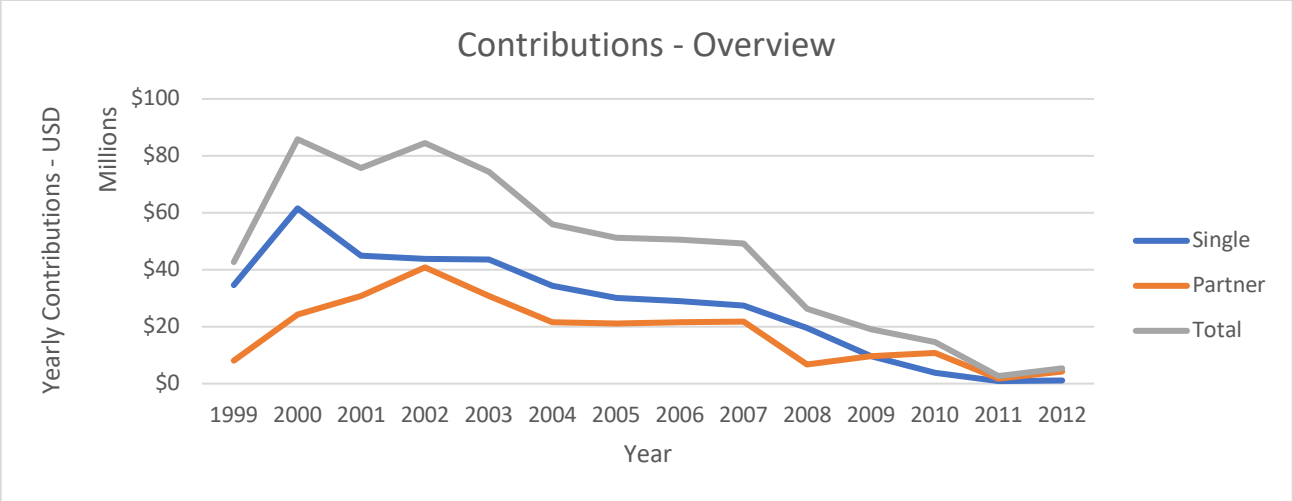

Figure 4: Overview of Monetary Contributions from 1999-2012

However, even partner project contributions were not spared from this freefall of funding. The largest funder of partner projects, the United States, severely cut that funding after 2007 following the release of a harsh US GAO report detailing severe problems with the US Department of Energy's (DOE) Global Initiatives for Proliferation Prevention (GIPP) program – the instrument through which DOE funds scientist redirection programs such as the ISTC. While only one US partner, the GIPP was a significant funder of projects to the ISTC.

This GAO analysis found several issues with the GIPP program including:

- More than half of the scientists funded by GIPP grants never claimed to have experience in the WMD field, running counter to the point of the program.
- Program funds from DOE were attracting, recruiting, and retaining younger weapons scientists at nuclear and biological institutions instead of the stated goal of minimizing proliferation risks.
- The inability of the GAO to substantiate the existence of a significant number of long-term, private sector jobs that the DOE program had claimed to have transitioned scientists into.[26]

[26] "Nuclear Nonproliferation: DOE's Program to Assist Weapons Scientists in Russia and Other Countries Needs to Be Reassessed," Government Accountability Office, December 12, 2007, https://www.gao.gov/products/GAO-08-189

After this report was released, partner project contributions from the United States dropped from a height of more than $19M in 2007 to just over $4M in 2008, recovering slightly over the next several years before plummeting under $1M in 2012.

At the beginning of this phase of the ISTC, Russia was still by far the largest beneficiary in terms of number of new projects funded per year. However, understandably, the same year that Russia made their announcement to the G8, the number of new projects in Russia began to steadily decline until reaching zero in 2011 (Figure 5), when Russia officially announced their withdrawal from the ISTC. Projects within the remaining countries remained relatively constant, but also began to experience slight decline starting around 2009.

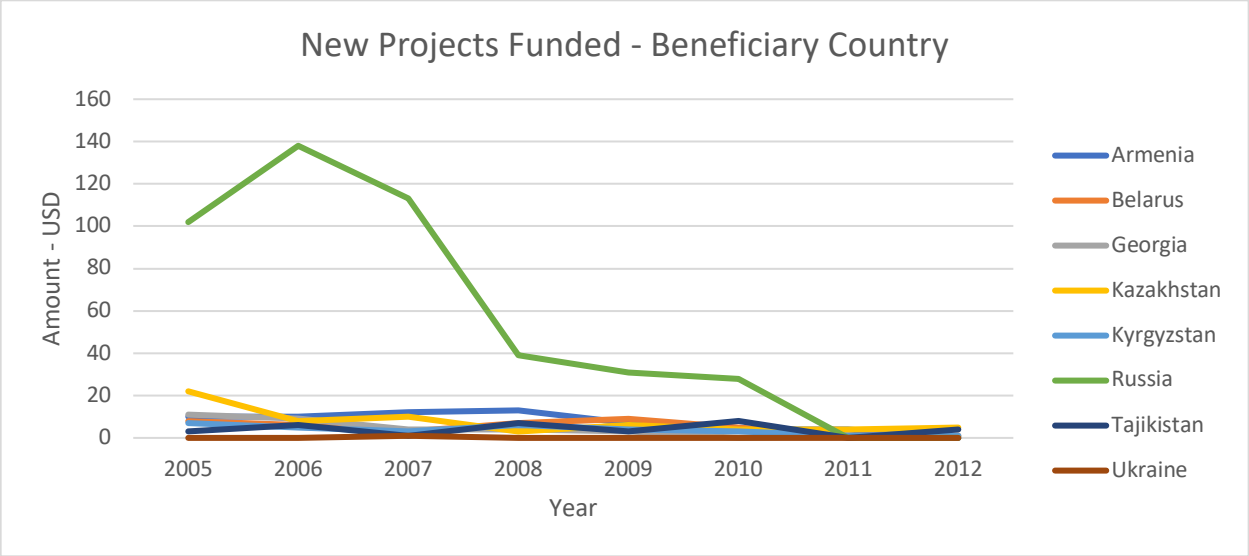

Figure 5: New Projects Funded by Beneficiary Country from 2005-2012

The diversity of project technology areas experienced both ups and downs during this time period. Biotechnology and Life Sciences projects continued to dominate for much of this era, and despite the decrease in funding, 2007 saw projects funded in sixteen different technology areas. However, project areas steadily lost funding and by 2011, active projects were being funded in only four different project areas – Biotechnology and Life Sciences, Instrumentation, Materials, and Medicine (Figure 6).

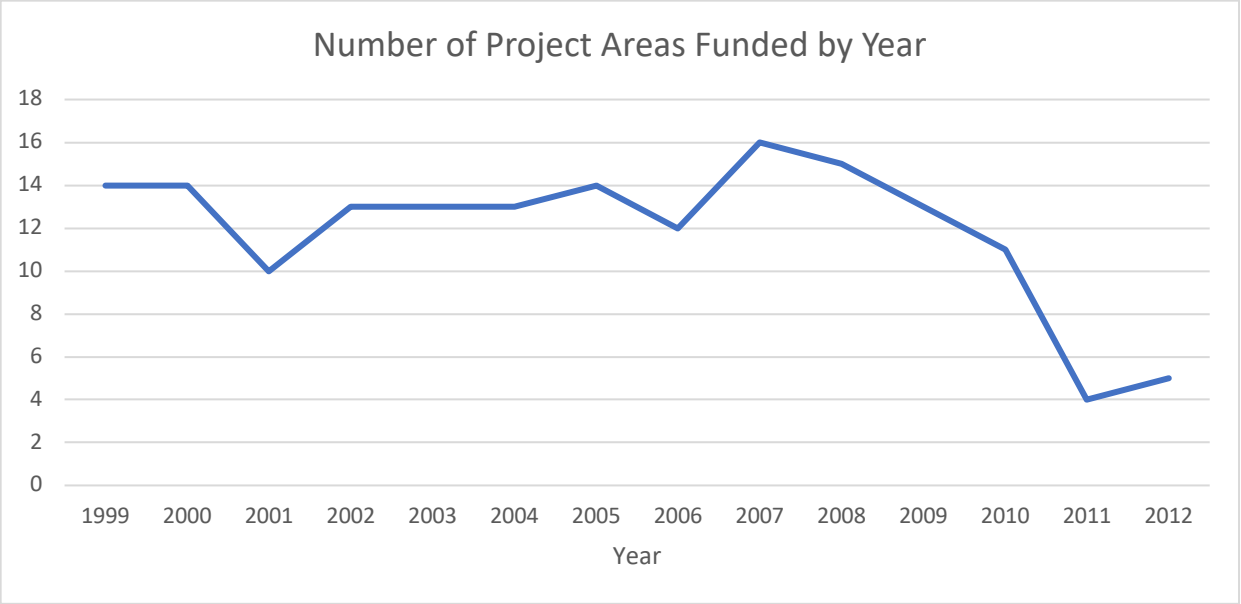

Figure 6: Number of Project Areas Funded by Year from 1999-2012

By the end of this era, the ISTC had lost most of its funding per year, its staffing had been cut by more than half since its peak of 253 in 2005 to 118 by the end of 2011, and the main beneficiary of the entire program, Russia, had announced it was withdrawing, stating that the work of the ISTC was no longer necessary. Despite reassurances from organizations like the G8 Global Partnership that the organization was still doing important work on the international stage, the loss of Russia and inability to effectively mitigate the sustained budgetary losses forced the ISTC to reassess the usefulness of the organization, as well as deliberate on what would need to be done to sustain the Center into the future.

Phase 3: 2013-2017

Despite the significant issues and changes that plagued the ISTC over the previous several years, the organization still looked to the future. In 2013, Chairman of the Board Ambassador Ronald Lehman laid out what he saw as the road ahead for the ISTC, which included focusing on the needs of the 21st century, engaging countries outside of the traditional area, promoting more co-funding of projects, reducing overhead and administrative costs, and increasing efficiency and agility.

By June 2014, the ISTC had officially opened their new headquarters at Nazarbayev University in Astana, Kazakhstan in anticipation of the final withdrawal of the Russian Federation. In December 2014, the final Russian project was completed and in the next month, Russia gave notice to the ISTC of its impending withdrawal. The ISTC Moscow office officially closed in July of that same year.

2016 marked the lowest point of funding for the ISTC since its inception, at approximately $1.75M total spent on only six projects spread across three technology areas (Figure 7).

Partner contributions dropped below that of single contributions from 2014-2016. However, the ISTC experienced a brief spike in 2017, operating with a project budget of $5.1M. This increase in funding was largely thanks to a spike in partner project funding from both the European Union (EU) and the United States.

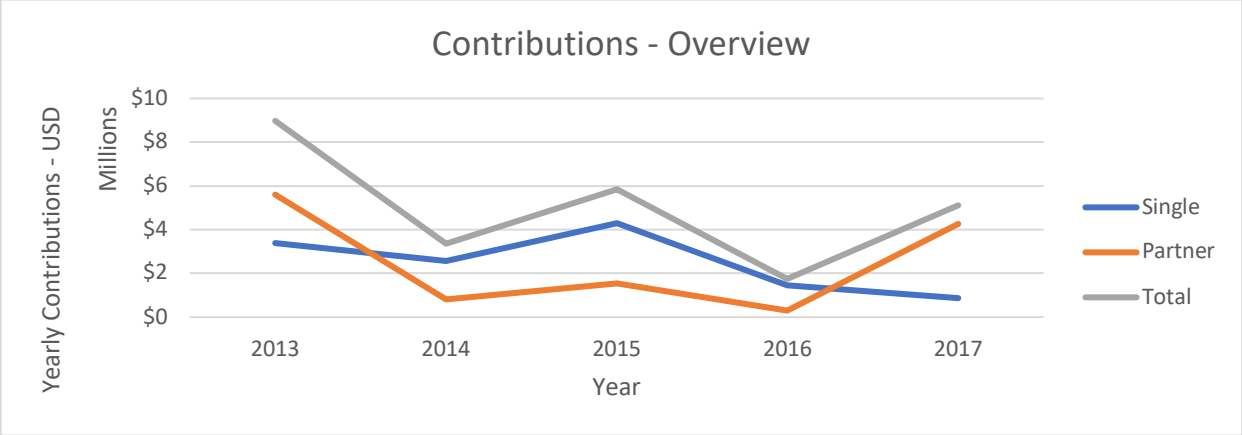

Figure 7: Overview of Monetary Contributions from 2013-2017

Consequently, the number of new projects funded per year also continued on a downward trend, experiencing brief spikes in 2015 and 2017 (Figure 8). By 2017, projects were only being funded in four geographical areas – Armenia, Kazakhstan, Jordan, and two trans-border regional projects. Despite the low number of beneficiaries, the latter two geographical areas were exciting for the ISTC as the project in Jordan marked the first non-CIS project.

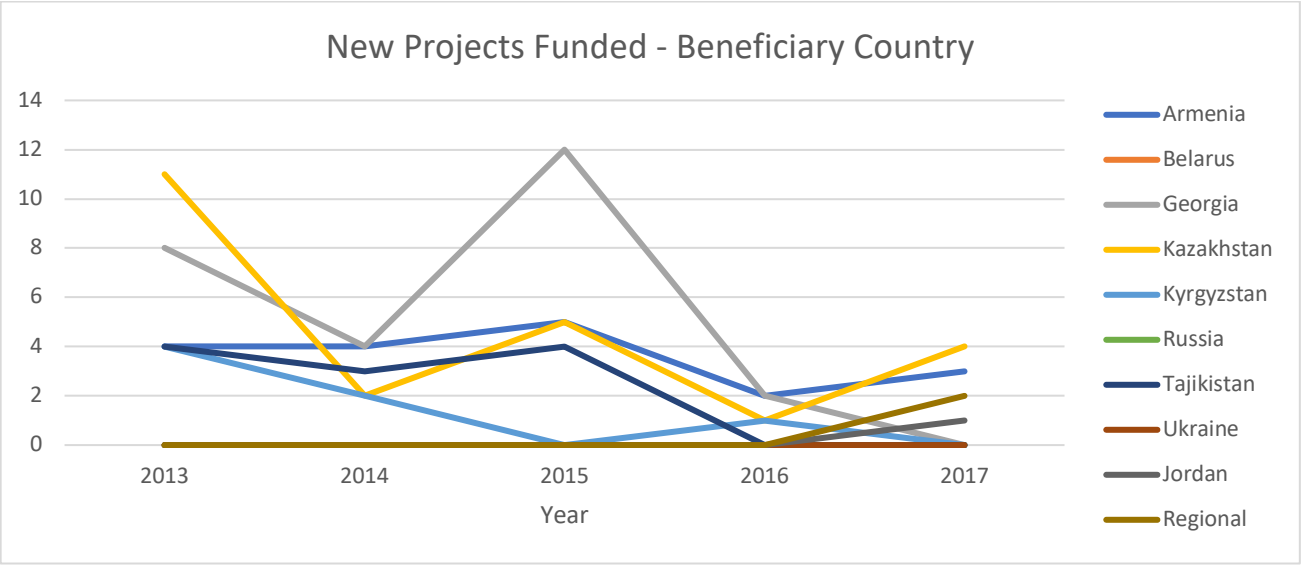

Figure 8: New Projects Funded by Beneficiary Country from 2013-2017

The number of technology areas funded remained steady at seven from 2013-2015, but again dropped to a low of three in 2016, before recovering slightly to five in 2017. The projects funded in 2017 were in the fields of Agriculture, Biotechnology and Life Sciences, Environment, Information and Communications, and Materials. Throughout this entire period, Biotechnology and Life Sciences projects continued to dominate the funding. From 1999-2017, Biotechnology and Life Sciences funding accounted for more than $212.3M of the approximately $664.2M of total project funding, or nearly 32% (Figure 9).

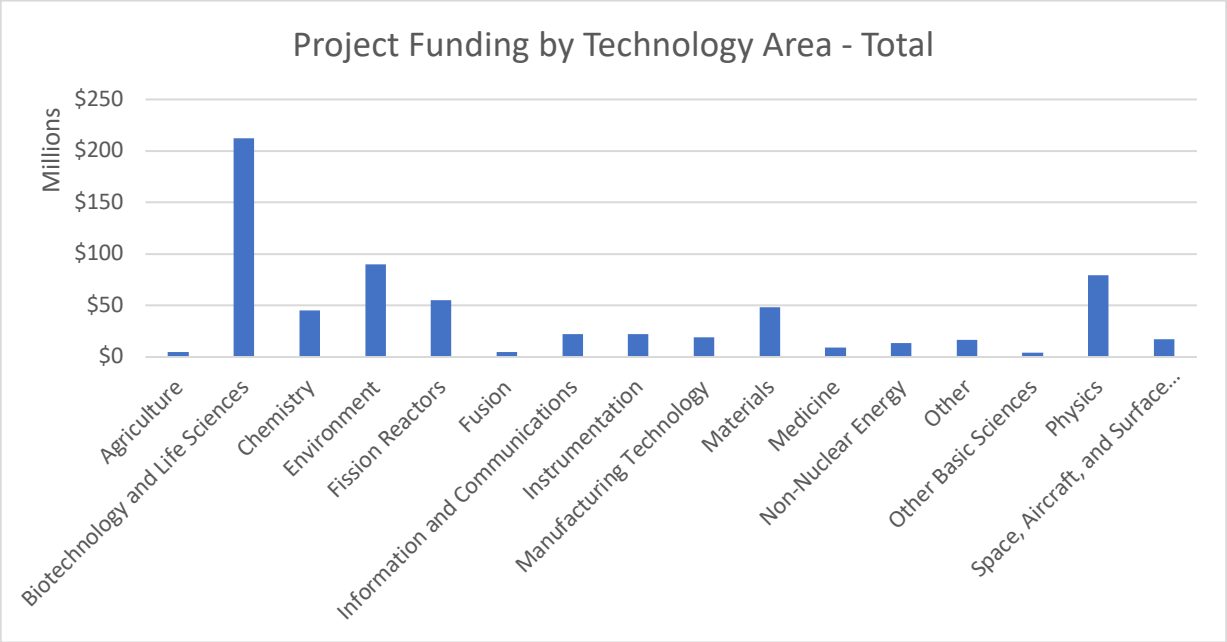

Figure 9: Total Project Funding by Technology Area from 1999-2017

As the ISTC continues its operations today, it has attempted to set itself up well for success in the future. Although the funding levels of the Center show a bleak picture, they did rise in 2017 as the ISTC not only diversified its geographical area, but also found new partner project funding streams. While one year is not indicative of a trend, the changes that the ISTC have instituted could potentially be taking hold, leading to renewed use in the Center.

The ISTC Today

The ISTC as an organization has attempted to set itself up well institutionally as a 'prototype for the future' rather than a 'product of the past'. Along with the move to a new country in 2015, the ten members of the ISTC – EU/EURATOM, Georgia, Japan, Norway, Kyrgyzstan, Armenia, Kazakhstan, South Korea, Tajikistan, and United States – signed a continuation agreement that reaffirmed the work that they had been doing for more than 20 years, while including several changes necessary to allow them the operational space to grow and function in new scenarios.

Objectives

The new ISTC agreement made several changes to the stated key objectives of the Center. The changes made attempted to accurately reflect the notion that the ISTC was adapting to a new global situation and preparing for the future. The new objectives of the ISTC are to:

1. *"Promote the improvement of international mechanisms for the prevention of the proliferation of WMD and their delivery systems, as well as of technologies, materials, and expertise that are key elements directly related to the development, production, use, or enhancement of WMD or their delivery systems (including dual-use technology, materials, and expertise);"*

   This objective is new, and considerably broadens the scope of work for the ISTC. "Promote the improvement of international mechanisms" signals that the Center may now conduct in activities related to capacity building, rather than simply engaging in scientist redirection, and allows for the building of international technical cooperation. In addition, this new objective provides significantly more specificity than the original agreement in terms of project selection and, consequently, opens the door for a wider variety of beneficiaries.

2. *"Give scientists and engineers with knowledge and skills applicable to WMD and their delivery systems, including dual-use knowledge and skills, opportunities for training and alternative employment where their knowledge and skills can be used for peaceful activities;"*

   This objective is much the same as in the original agreement. However, the addition of "dual-use knowledge and skills" in this objective as well as the last reaffirms the capacity of the ISTC to work with and alongside members of the civilian nuclear industries of project countries, rather than just weapons and delivery systems scientists and engineers.

3. *"Promote a culture of security with respect to the handling and use of materials, equipment, and technology which could be used for the design, development, production, or use of WMD or their means of delivery;"*

   This new objective takes a much different angle than the original agreement, broadening the scope of the work of the ISTC from pure weapons scientist redirection, to promoting an overarching culture of safety and security culture. This new objective allows for the ISTC to tackle problems such as export control, border control and interdiction of illicit trafficking issues, law enforcement, and various legal frameworks. In addition, it was previously a requirement of ISTC projects that at least 50% of the project staff must be scientists with WMD, weapons, or delivery system knowledge. The ISTC has since removed that requirement.

4. *"Contribute through its activities: to the development of international scientific partnership, strengthening global security, and fostering economic growth through innovation; to basic and applied research and technology development and commercialization, inter alia, in the fields of environment, energy, health, and nuclear, chemical, and biological safety and security; and to promoting the further integration of scientists with technologies, material, and expertise applicable to WMD into the international scientific community."*[27]

   This objective, while based off the original agreement, includes several significant changes. The addition of "strengthening global security, and fostering economic growth through innovation" point to a focus on integrating expertise into a broader global context that includes economic development. In addition, while the ISTC has always worked on issues related to all WMD topics, the addition of "chemical, and biological safety and security" is perhaps a response to past criticisms that it was not working on a number of biological and chemical weapons-related projects proportional to the perceived threat.

Operational Territory

Perhaps the most significant change in the new ISTC agreement is that it officially opens the door to operate beyond the original geographic confines of the Center. While the 1992 establishing agreement made it clear that the operational territory of the ISTC was to be in the "Russian Federation and, if interested, in other states of the CIS and Russia,"[28] the new agreement takes a much broader stance, stating that projects may be conducted in states that "are not Parties to this Agreement that have technologies, expertise, and related materials applicable to WMD…"[29]

Since 2015, the ISTC has taken full advantage of this change, having instituted or proposed several new projects outside of the Russia, CIS, and Georgia boundaries. In 2016, Executive Director of the ISTC David Cleave met with the Deputy Minister of International Relations and Cooperation of the Republic of South Africa to discuss the ISTC transition as well as highlight the "excellent relations" between the ISTC and the Embassy of South Africa in Kazakhstan. Out of this meeting came many "opportunities for cooperation between the ISTC and South African organizations, universities and research institutes" on topics relating to the capacity building of the South African Development Community's nuclear safety and security. Cleave also stated in the ISTC's Annual Report for 2016 that outreach for projects had been done in countries such as

[27] "Agreement Continuing the International Science and Technology Center," ISTC, December 9, 2015, http://www.istc.int/upload/userfiles/files/AgreementContinuingtheISTCsigned.PDF
[28] National Research Council, p. 31
[29] "Agreement Continuing the International Science and Technology Center"

Afghanistan, Pakistan, Mongolia, and Uzbekistan[30] – an FSU country, but never a member of the ISTC.[31]

In 2017, the ISTC began three projects outside of the FSU – two projects in Iraq that equipped both a mobile and static radiochemical laboratory for the Al Tuwaitha Nuclear Research Center in Baghdad, as well as one major project in Jordan regarding the establishment of a radiation detection training center at the Middle East Scientific Institute for Security (MESIS) in Amman. In addition, the ISTC provided support to the EU Chemical, Biological, Radiological, and Nuclear (CBRN) Centre of Excellence for Eastern and Central Africa in nuclear security – a center that involves at least twelve African nations.[32] As the Center looks towards the future, potential outreach countries could include Syria, Iran[33], Libya, and North Korea.

Internal Operations

The ISTC has undergone internal changes in an attempt to streamline their operation in the wake of diminished income from member countries. In 2005-2006, at a peak staff level of 253, the ISTC spent approximately $4.9M on personnel salaries. In stark comparison, 2016 saw an internal expenditure of $893,000 on personal salaries. If the salaries remained relatively constant over that time period, that would indicate a staff level of approximately 46 as of 2016. However, due to inflation and raised wages, that number is most likely even lower. These personnel cuts, as well as other cuts to the ISTC's administrative operating budget as part of their continued "commitment to efficiency and effectiveness," led to a 23% reduction in administrative spending from 2016 to 2017. While there may be benefits and challenges inherent in such a drastic reduction in staff, whether the ISTC has become more streamlined or fallen victim to the problem of understaffing remains to be seen.

The EU has also recently proposed that the Scientific Advisory Committee (SAC) – a committee that has been used to evaluate "regular project" proposals and provide funding recommendations to the Governing Board since the establishment of the ISTC – take on a larger role. Currently, the SAC only has the authority to provide recommendations on regular projects, which the EU argues is inadequate with the growth of other funding streams such as the partner projects and Targeted Initiatives. The EU proposal would expand the role of the SAC to provide support to the Governing Board on top-level issues such as:

- Giving recommendations to define the call for proposals for the Targeted Initiatives;
- Analyzing private entities requesting approval as partners and deciding if they are compliant with the role and mission of the ISTC;

[30] Uzbekistan has been a member of the STCU since the late 1990s, and although still technically an STCU party, the Uzbek government suspended STCU work in its country in 2010. However, recent changes in the Uzbek government could open up new possibilities to restart cooperation with the STCU and/or with the ISTC.
[31] "Annual Report," ISTC, 2016, p. 4-5, http://www.istc.int/upload/files/lfctcv0i3g0scw8k0gkg.pdf
[32] "Annual Report," ISTC, 2017
[33] International Science and Technology Centers are mentioned in Annex III of the Joint Comprehensive Plan of Action as potential participants in civil nuclear or scientific cooperation projects.

- Assessing partner project proposals;
- Providing feedback to institutes that made proposals but were not funded;
- Assessing the success of ongoing Targeted Initiatives; and,
- Assessing the impact of finished activities to identify success stories or lessons learned.[34]

While the status of this proposal is unknown, the expansion of the role of the SAC in the ISTC would be a key positive step towards modernizing and streamlining the internal operations of the Center.

However, the ISTC has maintained certain operational standards from the original agreement that have proven to be beneficial. Notably, the new ISTC agreement retained all diplomatic privileges and immunities of the original agreement, and the Center continues to enjoy tax exemption for its activities, personnel, and funds received.

Preparing for the Future

Findings

The ISTC has undergone extensive changes throughout its 24-year operational history, many of them having taken effect very recently. After a period of growth and success over the first decade of operation, the Center reached a turning point and subsequent downturn from which it has still not recovered. While there was a small increase in funding in 2017 from the previous year, one year is not indicative of a trend. However, the changes that the ISTC has enacted – a new agreement with new objectives, an expansion in operational territory, and streamlined internal processes – help make the point that the ISTC can serve a valid purpose in the world.

While countries no longer seem to place a significant emphasis on FSU weapons scientist redirection, the ISTC has done a good job institutionally of showing that it is a useful tool for more than just that one task. Without an impending need for nuclear weapons scientist *redirection*, the ISTC can still be used for a wide variety of science *cooperation* purposes. As previously stated, its new objectives allow the Center to engage in various capacity-building projects. By helping at-risk countries build capacity in security infrastructure, border control, and law enforcement, the ISTC can be used as an effective science cooperation tool.

The ISTC also presents several benefits. It enjoys tax-exemption on all funds received and properties, while commodities, supplies, and other property utilized are free from tariffs, dues, customs duties, import taxes, value added taxes, and any other similar taxes or charges. The ISTC also only charges a 10% overhead cost on new projects, which is relatively cheap compared to other competitive entities engaged in this work. These benefits are compounded by the established network of scientists and international partners that the ISTC has built over its

[34] 63rd Governing Board Meeting of the ISTC, 6th December 2016, Tbilisi, Georgia

history – a process that takes significant time and effort, and one that would most likely be difficult to recreate in a new setting.

Recommendations

Taking into account the benefits of working with an organization such as the ISTC, as well as its renewed, wider scope of work, the Center remains a relevant and useful tool for science and technology cooperation. However, in order for the ISTC to better adapt and respond to the needs of the world, as well as recover financially, more remains to be done. As the ISTC looks to the future, it must focus on public outreach and marketing, and continue modernizing their project scope as they adapt to the changing world.

1. *The ISTC should focus significant efforts over the next several on outreach to potential donor governments, in order to develop a steady funding stream with which to operate.*

   Continue to develop funding opportunities. With a new agreement, new location, broader scope of work, and streamlined administration, the ISTC has undergone significant changes, and the new form of the Center is now "open for business." However, despite a small uptick in funding in 2017, not all donor countries seem to be taking full advantage of the broader scope of work and lifted geographical restrictions. The EU and Japan were the only two countries to provide single party contributions to the ISTC in 2017. This means that the only funding stream coming from the United States in 2017 was through partner projects, marking the first year since at least 1999 that the United States government did not directly fund ISTC projects. In addition, the level of partner project funding coming from the United States has been exceptionally volatile since 2007 – ranging from as much as $19M to as little as zero, without any clear trend. Without a steady stream of funding from major donors, the ISTC will find itself hampered. Since 2013, the EU has been the only donor party that has steadily funded both single party and partner projects.

   Engage and educate about new project opportunities and benefits of working with the ISTC. The ISTC must rid itself of their reputation as a unidimensional and outdated FSU scientist redirection platform by actively re-engaging with countries such as the United States. Executives of the ISTC need to be proactive in showcasing new projects and talking to potential funding countries, either individually or at international meetings of leaders, while still being cautious of political sensitivities. While engaging with these governments and other potential donors, the ISTC should also present the many benefits to working through the Center – namely the diplomatic status for employees, tax exemption, and relatively cheap overhead cost on projects.

   Harness the outreach power of the internet. The administration of the ISTC should take full advantage of the power of internet outreach and completely redesign their website. While the website is updated fairly regularly and contains a significant amount

of relevant information, it is outdated in design and relatively confusing to navigate. By streamlining several aspects of the website, the ISTC could make it a much more useable platform for potential funders looking for information on how to get involved, potential beneficiaries to submit proposals for review, a tool for communication between parties, and as a tool of outreach. As technology becomes more and more intertwined in lives around the world, a simple, useable, and effective internet platform is of the utmost importance.

2. *The ISTC would benefit from further expanding their project topics by calling for proposals in issue areas that have become more important or relevant in the 21st century.*

Climate change. As the ISTC looks to the future, it is essential that they continue to innovate and adapt their potential project areas to better reflect the needs of the time, and therefore open up opportunity for new project funding. For instance, while there has always been a project area dedicated to the environment, these projects have largely focused on topics such as seismic monitoring, waste disposal, monitoring and instrumentation, and remediation and decontamination. In the wake of the movement towards a "greener" Earth, especially following the 2016 Paris Climate Accords signed by 195 countries of the world, future projects in the environmental sphere could focus on climate change and its related issues such as food and water security, resource security, renewable energy, and energy efficiency.

Cybersecurity. Another potential topic area for future projects is cybersecurity and its related issues. Despite oppressive regimes in several of the countries in which the ISTC operates, technology is still a prevalent tool that is increasingly interconnecting people and cultures across the globe. Unfortunately, this interconnectivity brings its own problems in terms of cybersecurity and cyber crime. Thanks to natural parallels between nuclear and cybersecurity, projects led and funded by the ISTC and Western countries, using international redirected scientists could be very useful in the future, as long as the funding parties take special care not to supersede local laws regarding the use of the internet.

North Korea. A final major issue area that the ISTC could become a very useful tool to address is North Korea. While much analysis has already been done by CTR experts on the parallels between scientist redirection in the FSU and scientist redirection in a potentially denuclearizing North Korea, such redirection projects would most likely only be accepted after an agreed, verifiable denuclearization process has started.[35] However, the ISTC could be a perfect platform through which to begin to integrate members of the North Korean scientific community into the international environment.

[35] "Redirecting North Korean Nuclear Scientists," Committee on the International Security and Arms Control, 2010, http://sites.nationalacademies.org/pga/cisac/PGA_085529

North Korea has recently begun to entertain the notion of opening themselves up more to the global community as evidenced by both the Panmunjom Declaration with South Korean President Moon Jae-In, and the recent meeting with United States President Donald Trump. Assuming the North Korean government is forthcoming, using the ISTC as a platform to connect scientific communities and promote broader science and technology cooperation would be a perfect opportunity to show that they are serious. As North Korea has been such a closed society for so long, there would be no shortage of basic infrastructure-related projects (railways, rural electricity and plumbing, irrigation and natural resource management, etc…) that would open pathways for international cooperation and global community integration without allowing access to the North Korean national security complex.

For the ISTC, this would be a significant step towards setting themselves up for many long-term projects, and given that South Korea is a member state, there are established partnerships on the Korean peninsula.[36] Should North Korea be averse to allowing access to the United States, both South Korea and Japan are member states of the ISTC and could take the lead on engagement. While this would be a challenging path given the history of relations between North Korea and several of the ISTC member states, engagement on these issues presents clear benefits to all involved.

Conclusion

The ISTC of today is a demonstrably different organization than it was when it was originally established in 1992. Over the course of nearly 25 years of operations, the ISTC has gone from a height of more than $85M in 2000 on project spending to as little as $1.75M in 2016. It has gone from a height of 253 staff to as little as 40, and potentially even lower. It has seen growth to more than 35 member countries from an initial four. Throughout all of this, the ISTC has attempted to adapt to the changing circumstances of the world. Originally a platform strictly for FSU scientist redirection, the ISTC today now operates well outside of the boundaries of the FSU on topics well outside of the realm of its initial planned project areas. However, despite the evolutions of the Center, more remains to be done to ensure that it remains relevant and funded into the future. By focusing heavily on outreach over the next several years and continuing to adapt their project areas to suit the needs of the 21st century, the ISTC can prove themselves as an important tool towards the continued prevention of the proliferation of weapons knowledge and expertise, wherever that need may arise.

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. LLNL-TR-755520

[36] At the 10th Anniversary of the ISTC in Moscow, the South Korean Ambassador to Moscow said in a speech that he looked forward to the day when the DPRK could be a member.