THE HENRY L.
STIMSON CENTER

USIC AND THE INITIATIVES FOR PROLIFERATION PREVENTION: A SURVEY OF COMPANIES DOING BUSINESS IN THE FORMER SOVIET UNION

FREDERICK P. KELLETT

THE HENRY L. STIMSON CENTER
MARCH 2007

REPORT NO. 60

The Henry L. Stimson Center
1111 19th Street, NW
12th Floor
Washington, DC 20036

Telephone: 202-223-5956
Fax: 202-238-9604

www.stimson.org
email: info@stimson.org

TABLE OF CONTENTS

— 1 —
EXECUTIVE SUMMARY

For roughly a decade the US Department of Energy's (DoE) Initiatives for Proliferation Prevention (IPP) program has successfully engaged a wide range of former Soviet scientists and technicians with knowledge critical to the design and fabrication of nuclear, chemical and biological weapons. **The program, however, has come under growing pressure from critics in Congress and the Administration**. Chief among current concerns is sustainability, without which there is no apparent end to the need for US Government support. Congress and the Administration are understandably reluctant to assume an open-ended commitment to providing security for weapons and materials as well as subsidizing the salaries of current and potential future generations of specialists engaged in the former Soviet Union's (FSU) vast weapons of mass destruction (WMD) complex. Instead, they are seeking an "exit strategy" for the array of threat reduction programs in the former Soviet Union. For those programs, such as IPP, that focus on the human dimension of the proliferation threat, a viable exit strategy requires a sufficiently robust domestic technology sector to draw on the excess labor of the complex and provide the next generation of talent with a more attractive alternative. **Unless IPP can demonstrate an ability to systematically generate commercially sustainable employment for this community, it appears likely that the program will lose funding before its critical mission is accomplished.**

Recognizing this increasingly hostile political environment and the enduring importance of programs like IPP to US national security, in January 2005, The Henry L. Stimson Center launched a multi-year effort to engage all major stakeholders in a process of rethinking and improving the full spectrum of US nonproliferation and threat reduction efforts in order to ensure that they are not terminated prematurely. **No US Government redirect program has previously undertaken a systematic survey of the industry actors involved in order to assess how the programs can better leverage private sector interests to effectively achieve their vital nonproliferation mission**. Given that the US Industry Coalition's (USIC) members represent the largest and most diverse pool of companies involved in redirect efforts, this was a logical place to look for new ideas.

Because of its unique position at the nexus of government programs and private sector participants, USIC has both an opportunity and a responsibility to provide the leadership necessary to facilitate the changes required for the success and survival of the IPP program. Moreover, based on the time committed and enthusiasm with which Industry Partners and Lab managers alike engaged in the interviews, USIC has a clear mandate to assume this role. Its membership is a tremendous resource whose capabilities and capacities to contribute to the permanent redirection of WMD specialists in the former Soviet Union are unmatched and underutilized. **With proper leadership, these companies have the ability to simultaneously articulate the much-needed vision of an improved IPP, ensure that it continues to receive adequate funding, and provide the employment necessary for successfully redirecting these specialists.** Modifying the program to increase the benefits of participation will also provide a strong incentive for more companies to join.

Furthermore, businesses that stand to benefit substantially from a reinvigorated IPP can form a formidable constituency to advocate for the necessary changes.

This survey is, effectively, the first step in a process of engaging and mobilizing this crucial constituency. Interviews with thirty-six USIC members and five I-Lab program managers produced a range of insights and recommendations that can significantly benefit efforts to improve the effectiveness of IPP. The following report offers an extensive exploration of their feedback, the policy implications of what was learned, and recommendations for changes to the existing structure.

FINDINGS

The USIC members are an incredibly diverse group of companies that have engaged a broad range of scientific and technological capabilities throughout the former Soviet Union's WMD complex. As outlined in the Findings section that follows, there are a wide range of business models and objectives being pursued by these companies under the auspices of IPP. Yet at the same time, **those surveyed broke down into essentially two evenly divided subgroups: companies with no prior exposure to the FSU and companies with clearly defined strategic interests in the region**. The needs and potential of these two subgroups are quite distinct and have important ramifications for modifying the program.

Generally speaking the first group adopts a more passive posture in the collaboration, leaving most of the work to the US National Labs and FSU WMD institutes. For these companies, the first and most important role IPP plays is validating the value of the region's science in general and the scientists with whom they collaborate in particular. Everyone interviewed rated the caliber of both very high. When a company has sufficient need for the expertise available, validating an individual's ability to contribute to the company's bottom-line can be all that is required for that company to become an employer or long-term customer.

Companies in the second group often make more productive and innovative use of IPP, stretching the boundaries of what the program can do and increasing the incidence of commercially sustainable activities resulting from it. Some companies are using IPP to fund serial production of prototypes or run clinical trials for new drugs, thus advancing the commercialization process beyond the initial proof of concept stage and initiating a contract manufacturing relationship between the Industry Partner and its counterparts in the FSU. There is also an increasing trend toward engaging local FSU private companies as collaborators; one Lab manager actually makes a point of including at least one such company in each of the projects he manages in the belief that it increases the odds of continuing commercial activity for the scientists after the project ends. This is perhaps the most significant innovation to date as it establishes a solid precedent for directly funding locally operating companies that hire former WMD specialists out of the institutes and production facilities.

All of the respondents took a keen interest in providing feedback and many offered insights and recommendations that went far beyond the questions posed by the survey instrument (It was, in fact, a challenge to adequately capture and distill these within the structure of this report.). Recommendations ranged from the concrete and immediate to broader, structural issues. Some can be quickly and easily implemented, others will require a lengthy process of building consensus and

advocating for change. All but one of the companies felt that a great deal needed to be done to reduce the bureaucracy and time involved in developing and executing a project. Some suggested reducing the number of steps and initiating more of them concurrently. Others recommended adopting a three-stage project structure similar to the Small Business Innovation Research (SBIR) and US Civilian Research and Development Foundation (CRDF) models in which initial projects would focus on quickly validating the technology on offer, utilizing relatively small amounts of money and requiring considerably less paperwork to get started. Subsequent projects would benefit in terms of both content and process as they would build on established research and relationships while much of the paper work required for the second stage could be assembled during the first.

Yet for all their interest and many recommendations, **few of the companies indicated an interest in or intent to employ the FSU collaborators after their project ends**. Some had not even considered the possibility. This is partly explained by the fact that commercializing technology, which is the primary objective of most projects, does not necessarily lead to future employment for the inventors. Another reason is that there is insufficient incentive and support in the field for most of the companies to seriously entertain the idea of establishing business operations in the region in which they can profitably employ their collaborators. This is due in large part to program design. There is no quid pro quo that would systematically engage the Industry Partners as *employers*, i.e. require them to hire the WMD specialists in exchange for use of program funds. Instead, the companies are essentially *customers* who, depending on their degree of strategic interest, are more or less involved in research that is largely undertaken within state-controlled institutes.

A third and underlying reason that the Industry Partners often do not identify with the employment objective of the program reflects the most astonishing insight of the survey: **there is no consensus about IPP's primary objective**. Not only did various respondents favor different objectives, individual respondents would often emphasize one objective over another depending on the subject under discussion. For most of the USIC members IPP's primary objective is commercializing technology, whether or not this leads to new jobs for their FSU collaborators. Among the Lab managers, it ranges from a pursuit of basic research to commercializing technology to creating permanent, commercially sustainable employment in non-weapons related fields. Often, however, the "real" objective was presented as developing and sustaining relationships of trust between erstwhile enemies. This is the single most important finding of the survey, for without agreement about the unifying or over-arching goal of the program, it is impossible to determine a course of change. Achieving a consensus on this issue must be the first and highest priority.

This lack of consensus also reflects a fundamental, structural peculiarity of the program: **IPP has an extraordinarily dispersed management structure**. Although there is a central office within DoE dedicated to IPP, it operates with a tiny staff and has essentially delegated most program management responsibility to the Labs. On the one hand this has afforded room for a degree of innovation that is important to the evolution of the program. On the other, it means that there is no focal point for collecting and disseminating program-wide feedback on lessons learned and successful innovations, making this evolutionary process much less powerful than it might otherwise be. More importantly, this structure appears to have resulted in something of a leadership vacuum. With the program imperiled as it is, there is a clearly unmet need for someone to call all hands on deck and effectively

manage these stakeholders' diverse, sometimes competing, yet critical capabilities for the benefit of one another and ultimately US national security.

RECOMMENDATIONS

USIC is uniquely well positioned to meet this challenge. As a first step, it needs to more **thoroughly and systematically engage its members** in order to document and understand the full range of business models, interests, and capabilities they bring to IPP. This should be done intensively with the existing members (essentially as a continuation of the current survey) and on an ongoing basis with new ones. **USIC should also establish its own marketing and recruiting operation** in order to maintain a strong and active membership that can effectively accomplish IPP's core nonproliferation objective and ensure continuing support from Congress and the Administration.

Through its members and as a DoE program manager, USIC should also **reach out to other government programs that can benefit from collaboration**. For instance, the government-wide SBIR program can be a valuable source of new members with clearly defined technology needs that might very profitably (for both companies and SBIR) benefit from the scientific expertise available through IPP. Similarly, DoE's own Materials Protection, Accounting, and Control (MPC&A) programs have great potential to make common cause with IPP if IPP can facilitate the establishment and growth of local suppliers that utilize former WMD specialists to produce and service safeguards for the region's substantial stockpiles of fissile materials. **The more stakeholders USIC can bring to the program, the greater the support it will enjoy in the Executive Branch and on Capitol Hill**.

To build consensus regarding the program's mission objective and how best to marshal its resources to this end, **USIC should convene a series of roundtables that bring together Industry Partners, Lab Managers, Principle Investigators, and DoE personnel**. Judging by the thoughtful and candid input provided by the I-Lab managers interviewed in the survey, **IPP enjoys a fortuitous moment when stakeholders with often competing interests are not only willing but seem eager to come together to find ways to make IPP a more productive and valuable program**.

Building on the results of this survey, Stimson has already identified a small pipeline of projects that will create employment for specific FSU WMD specialists currently collaborating with USIC members. With these in hand, the process of selling DoE, the Labs, and Congress on making the structural changes necessary can begin not in the abstract, but rather in the context of real jobs for particular weapons specialists.

— 2 —
METHODOLOGY

Creation of the survey instrument utilized for this research was an iterative process between The Henry L. Stimson Center and the US Industry Coalition. The Stimson Center's objective was to test the program's key assumptions as well as to identify opportunities to leverage USIC Members' interests to more systematically create long-term employment opportunities in the region. USIC representatives integrated several questions related to the companies' experiences with specific actors in the program, including very specific questions about their perceptions of and interactions with USIC directly. After execution of the first dozen interviews, the survey instrument was refined to elicit different information that was not forthcoming from the initial formulation of some questions.

Personnel at USIC were responsible for generating the list of companies from its membership for participation in the survey. All of the companies were "active" IPP participants in the sense that they either had a project funded in the past or currently have a project underway. We were assured that this list included companies whose experience in the IPP program ranged significantly. The companies varied greatly in size, technology focus, reasons for being engaged in the IPP program, and level of involvement in the region. In addition, in order to facilitate the Stimson Center's initial outreach to the companies, the CEO and former president of USIC, Victor Alessi, sent out an introductory letter to the target list of Members. Interviews were requested with all fifty-four companies provided by USIC, and a total of thirty-six interviews were concluded for the preparation of this report.

In the process of interviewing the companies provided by USIC, the key role and wide range of experiences with the National Laboratory managers became evident. For this reason, the Stimson team and its USIC counterparts determined that interviews with I-Lab managers might be particularly insightful regarding strengths and weaknesses of the program as well as specific ideas for change. Five interviews were conducted with I-Lab managers from a variety of Lab facilities. Although no formal survey instrument was designed for this set of interviews, the discussions clarified many key aspects of the program's structural shortfalls and were beneficial to Stimson's research objectives.

The interviewer and author, Frederick Kellett, is a Senior Business Fellow at The Henry L. Stimson Center and has no formal association with the IPP program, the US Industry Coalition, or any of the companies interviewed for this project. Prior to joining Stimson on this project, Mr. Kellett was the Regional Director of a management consulting operation focused on local entrepreneurs in Central Asia, and more recently served as the Executive Vice President of Byelocorp Scientific, Inc. BSI is one of the few western companies to have successfully utilized former Soviet weapons research and manufacturing capabilities to create commercially viable civilian enterprises. Mr. Kellett has a wealth of experience with the various US Government programs designed to redirect scientific expertise and substantial experience in the region.

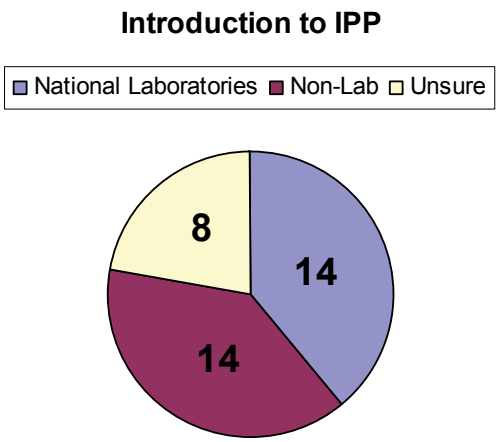
The participation of USIC Members was overwhelmingly positive. Despite the introductory letter having stated that the interviews should only take half an hour, most interviews took at least two. This was universally due to the fact that the participants were eager to share their stories and advocate for improvements of the program.

— 3 —
FINDINGS

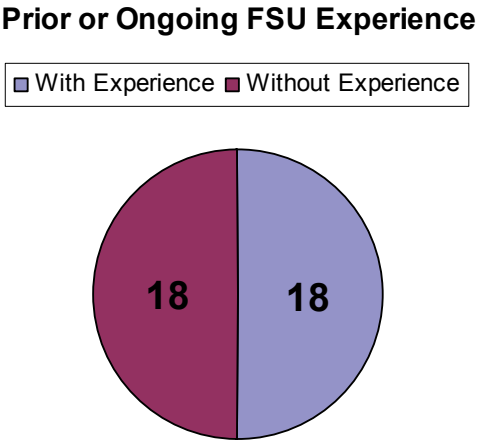
Questions One through Five on the survey instrument established basic facts about the respondents' projects such as research topics, which US Lab and FSU institutes were involved, and the current stage of the project (application, in process, completed).

RECRUITMENT AND FSU EXPERIENCE (QUESTIONS 6 & 7)

At first glance it appears that most of the companies involved in IPP are recruited by the US National Labs. This impression is shared by the companies, the Lab managers, and USIC staff, and is probably due to the fact that by program design the Labs are tasked with marketing the FSU technologies and recruiting companies to IPP. However, it turns out that more than half of the companies learned of the program by other means, half had prior experience in the region, and that the first correlates closely to the second.



Of the thirty-six companies interviewed for this survey, only fourteen were unfamiliar with the program before being approached by a Lab employee. Fourteen others were either introduced to it by their FSU collaborators, knew about the program because of prior involvement with the DoE or its Labs, or sought it out on their own. One found it quickly through an internet search, while it took another six months of making the rounds in Washington to discover the program. What is so astonishing about the latter is that the company was specifically looking for US Government support to commercialize a Russian technology with significant defense/homeland security application. The remaining eight companies were not clear as to exactly how they were introduced to IPP. Some of them were large companies that have been engaged for many years; others were already actively involved with both the Lab and FSU collaborators and did not recall who first suggested using IPP. Although USIC was the first point of contact for a few of the companies and was credited by at least one of the I-Lab managers with having brought a company into the program, none of the members surveyed indicated that USIC had recruited them.



Fully half of the thirty-six companies interviewed had prior or ongoing business relations in the region. Most, but not all, of the remaining had absolutely no exposure

to the FSU prior to engaging in an IPP project. For this latter group IPP has played a critical role in validating the broad value and capability of science and scientists in the former Soviet Union. Through scientific publications, a few of these companies were aware of the research some of the scientists were doing, but had little or no direct contact.

As might be expected, there is a strong correlation between companies that found their way to IPP and prior experience in the FSU. Of the fourteen that were not actively recruited, all had prior experience in the region. Of the eight that were not sure how they became involved in the program, seven had prior FSU experience. Only one company with experience in the FSU did not know about the program before being recruited by a Lab.

Those companies with established relationships in the FSU, tend for obvious reasons to be more deeply invested in doing business in the region and therefore have been more likely to become future employers or customers of the scientists engaged through IPP.

ANTICIPATED BENEFITS AND VALUE OF IPP (QUESTIONS 8 & 25)

Because of the way IPP is structured, everyone uses the program to validate the technology being offered and to advance its development towards commercialization. In some cases, they have a strong strategic interest in the technology. In others, they take a wait-and-see approach with the hope of picking up an interesting new technology with minimal investment. Most of the companies indicated that ultimately they are involved in the IPP program because of the prospect of leveraging US Government money, in spite of the fact that they have no direct access to it. **What they get for the money, how much they value it, and how much it contributes to the program's nonproliferation goals varies widely.**

FUNDING COMMERCIALIZATION AND BUILDING REGIONAL CAPACITY

The savviest companies (and Labs) have figured out how to use IPP to fund the first stages of commercialization or to build up their capabilities in the region. These companies are all actively involved in the region and in most cases had prior relationships with their IPP collaborators. Because of the limited ways in which IPP funds can be utilized they have to be relatively creative in how they leverage the program to support their businesses. One company is having the FSU team fabricate a series of prototypes (proven technology) for field-testing in the US. This gives prospective clients an opportunity to try out the new product and allows the company to make improvements that are responsive to the client's needs while building a relationship that will serve as a basis for future sales. All of this is done at lower cost to the Industry Partner and its prospective clients, thereby reducing the risk to both and increasing the likelihood of success.

In cases like these, the benefits to the Industry Partner are considerable and therefore they tend to value the IPP program quite highly. However, success for the companies does not necessarily result in program success when measured by commercially sustainable employment. Unless the Russian team continues to produce the finished product for the US Industry Partner, they will not continue to be employed beyond the project. To remain the primary supplier, the Russians have to be able to make the product at a quality level and price point that is competitive in a global market place. **Unless they have some significant strategic advantage over alternative Chinese, Indian, or even**

US producers, they are unlikely to remain involved as suppliers. The reasons for this are many and apply to Russia as a whole as much as to the scientists in particular. But the most fundamental reason the scientists are unlikely to be long-term producers or suppliers is that they are researchers not manufacturers. As such, **sustainable employment is most likely to involve ongoing research and development (R&D) activities rather than serial production**.

AUGMENTING MANPOWER

A few of the companies see IPP as a way of augmenting their R&D teams to increase the manpower they can field in developing new products or services. This is particularly true of the companies already working with local research teams, with business operations in the region, or, in a select few cases, for which there is a truly fortuitous match of the technology on offer with their own product development strategies. The first two types of Industry Partners come to the program with clear research objectives that fit into their business development strategies and make more direct and productive use of the FSU researchers accessed through the program. The last type of company seems to be quite rare, probably because of the statistically lower likelihood of a really good match taking place between two established research programs (at the institute and at the company respectively) that have not taken each other into account in developing their research strategies. However, **once an FSU institute's capabilities are well understood and appreciated by a US company, the odds of the two parties' finding areas of common interest are higher and subsequent IPP projects are often more productive for this reason**.

When there are complimentary roles for the two parties (and sometimes for the I-Lab as well), the value of the project to all parties can be significant. Again, however, the odds that it will lead to sustainable employment of the FSU collaborators depend not so much on a successful outcome for the project, but on the nature of the business model. **If there is an ongoing R&D requirement that the FSU team can support on a commercially viable basis, the broader program goals may be accomplished.**

MATERIAL AND COMPONENT SUPPLIERS

Some companies come to the program looking for suppliers of new or lower-cost materials and components for their products. A few are actually hoping to produce and, in some cases, even market their own products through the institutes or former weapons production facilities. In these cases, the odds of long-term, sustainable employment resulting from a project appear to be greater because the US Industry Partner is specifically engaging IPP in the hope of identifying a new supplier. However, once again, everything depends on the Russians' ability to consistently produce at the requisite quality and price points, and the author saw little evidence among the projects surveyed for this report that either the Russians or the US Industry Partners have the ability to ensure this outcome.

WMD INSTITUTE ACCESS AND EXPOSURE

Another benefit sought by some of the larger companies and one or two of the smaller ones was simply to gain exposure and access to the former WMD institutes as a part of their regional technology prospecting and mining operations. This approach to engaging IPP is limited to companies with a well-developed ability to operate in the former Soviet Union and to identify and package novel technologies for sale to other divisions of the large companies or to strategic investors in the case of the smaller companies. It tends to be a first step towards more substantial commercial

engagement that may or may not involve IPP. It would be useful for program managers to track these cases to learn more about what these particularly able companies do once they find an interesting technology. Anecdotal evidence suggests that when they do find something valuable, they do not involve IPP because it is too slow and inefficient. **It was also reported that a number of the FSU researchers involved in early IPP projects of this sort have since found work in the US** – an outcome that is not a stated objective of the program but that certainly satisfies its broader nonproliferation goal.

LOW-COST ACQUISITION OF TECHNOLOGY

Companies with no prior experience in the region tend to take a fairly passive role, at least initially, and appear to be engaged because of the potential for the Labs and FSU institutes to provide them with a novel technology at minimal cost. However, **the greatest benefit to them and perhaps to the program as a whole is that IPP validates the basic value of Russian science** even if the project is not successful from the technology development perspective. At this point it seems that most of these companies become enthusiastic participants of the program and of pursuing technology development in the FSU more broadly. As noted above, **companies that return to do a second IPP project generally make more productive use of the program**.

LOW-COST PATENTS AND ACCESS TO THE RUSSIAN GOVERNMENT

A couple of additional benefits noted by individual companies included a low-cost way of patenting the technologies being developed and access to the Russian government as a client. Both are interesting because they are examples of how IPP effectively leverages other US Government resources for the benefit of program participants. In the case of patents, some of the Labs pay for these with non-IPP funds, which essentially enhance the resources available for this purpose to any amount that the Lab can justify in terms of value created through intellectual property. What remains unclear is how much of that value will ever be realized through the commercialization of the underlying technology. In the other case, the value to the US Government writ large can be quite considerable. Project success in this particular case would result in the commercialization and use of a technology that may be instrumental in solving a nuclear waste management problem that impacts bilateral agreements of a strategic nature.

TECHNICAL COLLABORATION WITH THE US LABS

Finally, although many of the companies value the technical role played by the Labs in validating the research done in the FSU, a more limited number of them cited the value of the Labs as technical collaborators as a key benefit of the program. **This is perhaps a missed opportunity as the Labs' technical competence is surely the greatest value they bring to the program.** Among the smallest companies there is considerable appreciation of the credibility they obtain through association with a National Lab when marketing the technology to prospective clients or investors.

ROLES OF PARTIES AND TROUBLE SHOOTING (QUESTIONS 9, 10, & 22)

I-LABS

The Labs are the heart of the IPP program as it is currently configured (See Annex C: Current IPP diagram). They do the bulk of the recruiting as well as the vetting of Industry Partners and the technologies being offered by the FSU institutes. They validate the research results and provide

virtually all of the program and project management, including negotiating contracts with both the FSU institutes and the Industry Partners. As the primary (and sometimes only) point of contact for both the US companies and the researchers in the FSU, they are also the face of the program.

For the most part, the companies value the Labs' participation. Virtually all of them welcome the buffering role the Labs play in dealing with the DoE and FSU bureaucracies. Of course, if there were a more streamlined and efficient process of applying for and implementing projects, there would be considerably less need for this buffer. In the projects where the labs have a technical collaborative role their input is seen as valuable, although in at least one case it was extremely problematic.

Companies that are new to the FSU are very happy to leave project management to the Lab. However, those who have considerable project management expertise, more experience in the region, or an existing relationship with the FSU institutes often find the Lab's project management role more problematic. Some find the Lab Principle Investigators (PIs) are not good project managers, while others complain that the institutes will only take direction from the Labs because it is with them that they have a contract for the work being done. **When the US company has a particularly close relationship with the institute these problems tend to be less pronounced as the FSU researchers already identify with the Industry Partner and both have usually established good systems for managing their collaboration, which in turn requires less involvement of the Lab.**

ISTC, STCU, AND CRDF

These three organizations facilitate project management for the Labs. Among the companies most actively involved in the projects, there was considerable grumbling about the International Science and Technology Center (ISTC) and to a lesser extent the Science and Technology Center in Ukraine (STCU) and CRDF. Only one company related a bad experience with CRDF. **Most felt that CRDF was much more agile and responsive to project needs than the others. Conversely, the ISTC was seen as extraordinarily bureaucratic**. Some respondents indicated that the ISTC had a say in project approval, implementation, and decisions regarding what equipment to purchase. Another respondent felt strongly that the ISTC's only role should be to handle disbursements and that it should stay out of project review and implementation completely. "Why," he asked, "should ISTC have any say when the DoE has already approved the expenses and is providing the money?"

The I-Lab managers tended to defend the STCs. Most of the delays, they contended, are due not to ISTC bureaucracy but to obtaining host country approval, a process over which they have no control. However, one did note that ISTC imposes a rigid forty-five day review period on all projects, regardless of how quickly the actual review is accomplished. **What most felt the STCs do well is keep the institutes honest by closely monitoring detailed work plans**.

Moreover, if the Industry Partner reaches the point of truly collaborating with and being a client of the research team, it is hard to imagine that it would not have both more incentive and a greater ability to ensure that program funds are spent productively by the institute. However, even with the Lab and STC in place, ineffective business practices on the part of some institutes continue to present a problem.

FSU INSTITUTES

Respondents were universally positive about the quality of science coming from the institutes. Beyond that, however, what they know about the scientists and their labs depends on the company's level of involvement in the research.

Because the Labs manage the projects there are few complaints about the performance of the FSU institutes. The companies that have existing relationships with the institutes are more aware of problems such as delays in payments, problems with procurement through the ISTC, or trouble shipping materials or equipment in or out of the region.

Among the companies new to the FSU there are problems with language and culture, but again the Labs usually, though not always, overcome these. Because these companies have less invested in the program they are less concerned about what is going on at the institutes. **Yet when the results come in and the value of the science is validated they become much more interested and involved. Often, they regret that they did not establish more direct contact earlier.**

USIC

The single most common response regarding the role of USIC was, "I don't know what it does." Everyone surveyed made an effort to think of at least minor dealings he or she had had with USIC (mostly communications such as the annual report, email updates/leads, annual meeting, etc.). In the cases where there was more contact, USIC was credited with helping to overcome (sometimes major) obstacles, advocating for continued DoE funding, or providing publicity for the companies.

Direct criticism of USIC was rare. The most common complaint was that the companies do not see what they get in return for their membership dues - other than access to IPP. As one respondent put it, "When I was told that I had to join USIC to get access to the IPP money, I was a little put off, but subsequently I found USIC to be supportive. There's been no direct value to us, but I think that they have an indirect value in ensuring that funding keeps coming." Another felt that USIC does not primarily represent the interests of the membership but rather those of DoE, which provides most of the financial support. A third said that USIC was created as a way for DoE to avoid "competing" the grants. It wasn't clear how this would be the case. In USIC's defense, one respondent said that "USIC's hands are tied. They are doing the best they can under the circumstances."

DOE IPP HQ

The respondents had even less to say about DoE HQ than USIC. **Almost no one had direct contact with the DoE.** In the rare cases that contact occurred, it was with Jim Noble, either because company representatives knew him before engaging in the program or because they were asked to participate in a conference call with him about funding from Congress.

TROUBLE SHOOTING

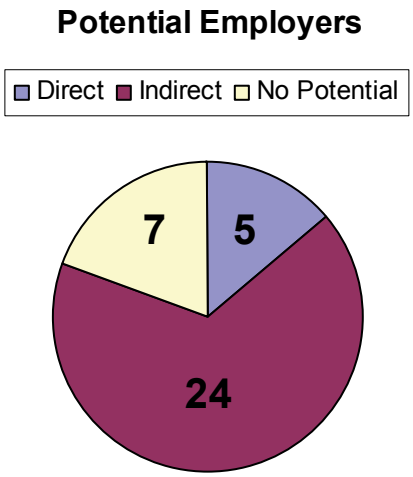
The **Labs appear to do most of the trouble-shooting**. When companies were asked how they overcame delays in project approval, start-up, or implementation the answer was almost universally that the Lab took care of it (The author subsequently interviewed five of the Lab managers because so much about **how the program works was unknown to most of the companies**.).

When the Lab was the problem most companies dug in and worked things out on a bilateral basis. Sometimes this led to a change of Principle Investigator or a long negotiation over intellectual property. In cases where they were unable to work things out directly, the companies turned to USIC or DoE HQ. Because this report only included interviews with companies that are still involved, it is not clear how often, if at all, some also walked away. **Needless to say, when the Labs do not solve problems quickly or effectively the program suffers.**

FUTURE PLANS (QUESTIONS 12, 13, & 14)

Many of the companies interviewed are still at the proof of concept stage and were uncertain whether or how they might continue to work with the FSU scientists after the project is completed. Among those with little or nothing at stake the answer was consistently: Let's see what happens. For the others, there are a variety of plans, but overall, the Industry Partners' ability and willingness to provide ongoing employment, directly or indirectly, could not be determined in this iteration of discussions.

Some companies are hoping that they will be able to buy materials or components for existing or new products. But many of these products are being developed through the program. If they fail to be commercialized, they will not be the basis for future employment for their inventors. Yet, even if these products are commercialized it is unclear that the scientists will be able or even interested in producing materials or components of a consistent and sufficiently high quality to meet the commercial requirements of the market. Many of the companies interviewed indicated that the Russians would not be able to contribute at the commercialization stage for a variety of reasons ranging from inappropriate skills to being far from customers whose needs influence final product design. A few added that in their experience most of the scientists would not be interested anyway. The scientists want to do research and that, after all, is what they are good at.



The questionnaire did not ask the companies about their potential to directly or indirectly employ the scientists engaged on their projects and very few expressed any interest (let alone intention) of employing them after completion of the project. Nevertheless, based on the interviews, **the author believes that of the thirty-six companies surveyed, twenty-four have some potential to provide ongoing indirect employment for their FSU collaborators as suppliers of materials, components, or ongoing privately funded contract research**. Five of the companies appear to have some real potential to directly employ a handful of the scientists at their US facilities. Fourteen appear to have the potential to be direct employers of the scientist through subsidiaries or joint ventures established in the region, but of these only a handful are actually thinking along such lines. Again, the likelihood this potential will be realized remains extremely unclear.

Virtually all of the companies would consider doing another IPP project and many already have. As previously mentioned, as companies do more projects they get better at making productive use of the program. There is clearly a significant amount of learning that goes on with the first project. Most accept it on its terms and have little enough invested that they are quite tolerant of the delays. When they come back for another project **they know more about how the system works, how to work it, and how to design a project to provide themselves with more value.**

CONTRACTS AND INTELLECTUAL PROPERTY RIGHTS (QUESTIONS 16 & 17)

The companies had very little to say about their experiences negotiating contracts with either the US Labs or the FSU institutes. Most sign the Cooperative Research and Development Agreement (CRADA) as drafted by the Lab or with minor modifications and appear quite comfortable with its terms. The Labs in turn contract bilaterally with the institutes for work that is done on the IPP project. **Most companies do not conclude any direct contracts with the FSU teams until they are ready to move to the commercialization stage.** Most of the companies with existing relations with the institutes already have such agreements in place.

Only two companies had a serious problem with the CRADA. In one case the company objected to the Lab owning the intellectual property (IP) when it had made no technical contribution to the product's creation; in this case there was also a significant amount of company IP being used to create the project's new IP. In the other case, the Lab ownership and high license fees will be a problem if the company tries to sell the technology in the future. It may not have come up more often because the companies surveyed have not gotten to the point where they have not only succeeded in commercialization but are selling out to a strategic investor.

POLITICAL ISSUES (QUESTIONS 20 & 21)

Astonishingly, no one had any serious political problems, though one company commented that if they ever started making money in Russia they surely would.

PROBLEMS AND RESPONSES (QUESTIONS 11 & 26)

By far the most frequent complaint is that it takes too long to get an IPP project started.

TIME AND BUREAUCRACY

There was only one company that did not cite an unacceptably long project start-up time and burdensome bureaucracy as problems that need to be addressed to improve the program. Although the reasons for delays and the inefficiencies in project flow are not well understood by the companies, the other parties (DoE, the Labs, and USIC) are all thoroughly familiar with them. It is the author's understanding that a good deal of effort has been and continues to be made to improve administrative processes (particularly with regard to the management of program funds) and reduce the time it takes to initiate a project, though it is far from clear that these efforts are adequately addressing these two related issues.

Given, on the one hand, how little the company interviewees know about the causes of problems with program administration and, on the other, how complex they appear to be (as one I-Lab respondent put it, "Our tech-transfer office has never seen a program that is more complicated."), comprehensive

solutions are beyond the scope of this report. However, contextualizing these problems by viewing them from the Industry Partners' perspective should be helpful.

When asked what they did to move things along, participants' answers ranged from "there is nothing you can do, just forget about the project until it comes back out of its black hole" to "push, push, push, call the Lab regularly, get USIC involved, or go above the Lab to DoE HQ." The passive response was the most frequent and is a measure of the limited investment many of the companies interviewed are willing to make.

Another measure of the problem is the money to time ratio for most, if not all, of the projects. The Labs receive a maximum of 30% of project funds for managing the bulk of the work required to prepare, approve and implement an IPP project. It is hard to see how projects funded at less than $500K over 2 years can cover the Labs' expenses. This also begs the question of how much technical input a Lab can actually justify with the funds provided. The Labs have confirmed that they are forced to do a lot of work that is not adequately funded out of project budgets and that they are less involved on a technical basis than they would like to be. Given that nine months was by far the shortest time it took a company to go from writing the proposal to getting the project started (the norm was two to three years) the minimum any Lab can expect to administer a project is three years. As a result of congressionally-mandated funding ratios and average project timelines, **the Labs are either doing a lot of work that does not get paid for out of program funds or they provide less support than the projects probably need.**

Asked what they would have done differently if they had known how long it would take to start and complete projects, the companies offered a variety of answers: declined to participate; not have invested so much of their time; advised their FSU partners accordingly; done more themselves; gone to CRDF for a First Steps to Market grant to get the FSU team started (two companies actually did this); focused the project on technology that was not central to their company's success; or picked something easier to do such as software development.

When asked for suggestions about what could be done to streamline the process, most referred the author to the Labs as they are responsible for overseeing the project implementation. A few however, suggested that it should be possible to **use metrics as any reasonably well-managed company does to measure performance at each step in the process in order to analyze the problem and identify solutions.** They suggested that it would not be difficult to establish maximum turn around times for each step and hold implementers and decision makers accountable for accomplishing each of their tasks in the allotted time. Similarly, it should be possible to initiate some of the procedures concurrently rather than sequentially. For instance, once an Industry Partner has been vetted by a Lab and a proposal has been submitted, it should be possible to initiate the approval process simultaneously in the US and the FSU.

Such an approach would apply as much to project implementation as to approval and would hold the ISTC, STCU, and CRDF accountable for performance as well as the Labs, DoE HQ, and the interagency review boards. To be effective, DoE would have to be able to find and utilize alternative approaches to accomplish or eliminate the need for each step. **Among companies more invested in**

the program and already operating in the FSU, many felt that it would be far more efficient to give them both more control and more responsibility for managing project funds and implementation.

The consequences of a time consuming and burdensome bureaucratic process are significant. There is, for example, a detrimental effect on recruiting. As one I-Lab manager dryly observed, "Any company that can wait two to three years is probably not the kind of partner you want." For the companies that cannot wait the consequences can be worse. One company lost a strategic investor and almost went bankrupt. Others have lost credibility with customers and investors – existing and prospective. Quite a few said that they risked falling behind fast moving advances in technology while they waited. Some actually had this happen.[1]

COMPANY (CONSUMER)-INSTITUTE (SUPPLIER) RELATIONS

Considering that the research is being funded so that the company can commercialize the technology, it is striking that such a problem can arise. That it does reveals a structural flaw and a certain pretense of the program. On the one hand, **the company is supposed to be deeply invested in the research due to its cost sharing contribution,[2] while on the other it often does not have sufficient control of project implementation to ensure an appropriate outcome.** In some cases the Labs do virtually everything from writing the scope of work to overseeing the research and validating the results. In such instances, one would imagine that the Industry Partners could be left out and only approached after proof of concept was achieved by the institute and validated by the Lab.

Everyone benefits from a closer relationship between the FSU institutes and the Industry Partners. However, because roughly half of the companies have little or no experience in the FSU and start out skeptical about the competence of the scientists and the value of their work from a commercial perspective, **significant engagement between the two parties tends to be a consequence of the project rather than a fundamental basis for it**. Quite a few of these companies indicated that had they known how good the science was going to be, they would have engaged the researchers more directly and sooner. This applies not only to companies that had little or no direct contact beyond email, but also to companies that actually sent staff to the institutes multiple times, but would have done so even more often.[3]

---

[1] Such experiences further reinforce the view that IPP should only be used to pursue technology that is of secondary interest to a company and for which long delays or failure can be tolerated. The consequence of this approach is that the companies are less committed to the project and less likely to contribute to IPP's core mission of engaging (former) WMD scientists in civilian, commercially sustainable activities.

[2] Technically, the Industry Partner makes an *in-kind* contribution that many companies are able to make without measurably adding to their expenses, thus minimizing the opportunity cost of participating in IPP. This means that Industry Partners do not, by and large, have much to lose and can therefore tolerate a good deal of programmatic inefficiency.

[3] When asked how the program could be made more responsive to the company's needs, one respondent answered, "Fund US partner travel. I went twice, but it would have been better to have gone sooner and more often. I wasn't willing to spend money on travel until I knew the Russians really had something of value to offer. If I had understood that sooner and had the means to meet with them more often, I would have made more productive use of the project."

When asked what could be done to address this issue, companies suggested a variety of solutions. All three parties should meet personally at the very start of the process in order to more quickly validate for the Americans the quality of work being done at the FSU institutes and build a stronger relationship between the parties. Part of the project budget should cover travel for the US companies and FSU researchers to regularly visit each other. A number of companies suggested that IPP should copy the CRDF or SBIR models, which provide a series of grants and require cost sharing (in cash as well as in kind) in progressively larger amounts as the value of continuing engagement is established for each and all parties.

OTHER LESSONS LEARNED

Other things companies wish they had known at the start and what they would have done differently or what they would advise newcomers included:

- The need for and burdensome process of obtaining an export license to work with some of the FSU institutes. These companies recommended that companies new to the program:
    - Start the process immediately;
    - Find a work-around such as contracting with a private FSU company that engages the same research team without requiring an export license; or
    - Maintain a completely passive role, obviating the need for the license.
- Knowing more about how the Labs function and how the IPP program works - and how "to work it" to increase the value of participating.
- That they did not have to accept the IPP program entirely on its own terms:
    - As one respondent put it: "I wish I'd insisted on certain things earlier;"
    - Some would have put off joining USIC;
    - Others would have tried to change their PI or Lab earlier;
    - One would not have agreed to do the project in conjunction with other US Industry Partners;
    - A few would have dealt with the CRADA differently – negotiating more, changing Labs to obtain more appropriate or agreeable terms, etc.
- How hard it is to work in the FSU and what lessons have been learned by other companies, by the Labs, and by the US Government more broadly:
    - "How slowly the Russians can work. We would have been better off doing some things ourselves."
    - How hard it is to ship materials in and out of the region.
    - The impossibility of operating a business in a closed nuclear city.

ADDITIONAL SUPPORT FROM USIC (QUESTION 23)

Much of the forgoing can and should be addressed by USIC as a membership organization. Yet, when asked what additional support they would like from USIC, most companies did not have an answer. When pressed, some made suggestions for services that USIC is in fact already providing such as: help understanding and dealing with the Labs and DoE; speeding up the application process; information about what other companies are doing; and help promoting their technologies. Among those who have moved closer to commercialization there were frequent requests for help attracting capital and developing a greater capacity to operate in the FSU. Some would also like help marketing their technologies or services to other parts of the DoE or US Government.

CORE VALUE OF THE IPP PROGRAM (QUESTION 25)

Virtually all respondents agreed that the most valuable aspects of the IPP program are:

- Validating the quality of FSU science;
- Engaging a team of extremely talented people at very little cost; and
- Getting proof of concept for a particular technology.

Quite a few added:

- Having a system in place for managing projects and agreeing on terms for intellectual property; and
- The role of the Labs as a buffer that protects the Industry Partners from the problems associated with cultural differences and the government bureaucracies.

OTHER ISSUES FROM THE I-LABS

Much of what the I-Lab managers had to say is related in other parts of this section. However, because the interviews with them were less structured and did not focus on the same questions asked of the USIC membership, there are insights and other forms of feedback that do not fit thematically elsewhere and are therefore presented here.

I-Lab managers have learned a great deal about what makes for a poor or successful project and have developed techniques for increasing the latter. The Labs no longer see their job as filling the pipeline with projects that simply link a US company to a technology being offered up for commercialization by a WMD institute in the former Soviet Union. They have developed a sense of what kinds of technologies lend themselves to commercialization and what attributes make companies more likely to succeed in not only taking them to the market, but in employing the scientists beyond that.

Characteristics of successful projects often include:

- Market pull;
- A clear path to commercialization; and
- All the elements of a business plan that a venture capitalist would require.

One of the most fruitful questions asked of this group was, “What are the attributes of the ideal Industry Partner?” This question not only led to direct answers but also gave rise to discussions about program goals and measuring success.

Attributes of the ideal Industry Partner include:

- A strategic interest in the FSU;
- Sufficient technical capability to evaluate and utilize the science/R&D;
- A sincere interested in making a business out of the technology;
- Active engagement in project implementation including regular travel to the FSU;
- An existing relationship with the scientists;
- Willingness to invest in some way in the FSU;
- Strong connectivity with a market;
- Capacity to commercialize following proof of concept;
- Managerial competence to operate effectively in the FSU; and
- Diversification within the US company.

In terms of program goals and measuring success one of the managers offered the following, "Each project needs to be assessed at the end to understand if it has achieved the desired results and what lessons have been learned. It is important to look at results on both the US and Russian sides. Sometimes there are valuable results on the Russian side, even when the project is not successful from a commercial perspective. Nevertheless, at the end of the day, success should be measured in terms of sustainable jobs created."

The last two sentences are not contradictory but arise from the respondent's experience with projects that did not result in commercialization, but which did ultimately lead to sustainable employment that the scientists involved created for themselves as a result of the lessons they learned and connections they made. His point is that it is important to have both a clear definition of success as well as a real measure of it relative to program goals. Because IPP does not track the consequences of projects in the FSU it misses opportunities to learn more lessons and better assess the results and overall value of the program.

Unfortunately, from this respondent's point of view, the program lacks a clear definition of success. Program goals still vary from Lab to Lab. Some are more interested in the research in its own right or the relationships they have developed with scientists at the FSU institutes, while others are much more focused on commercialization and a few put the highest priority on creating sustainable employment. **Overall, the program has drifted into a more commercially focused objective, but it has not been modified to support this change. This means that it does not benefit as much as it might from the innovations and insights of the various participants and is less successful at achieving its ultimate mission.**

IMPROVING IPP (QUESTION 24)

The single most important step DoE can take to improve the program is to accelerate the processes involved in the approval and execution of IPP projects. In its attempt to control risks and keep track of monies, the program has added layer upon layer of bureaucracy. The system for administering funds is highly complicated, with different channels and procedures of varying complexity used for projects handled through the STCs or CRDF. A less circuitous route for the flow of program funds would seem an appropriate measure to take in order to minimize the steps required for each project's execution and expedite payments to the FSU scientists.

There are also many inefficiencies that arise from having multiple layers of project administration. Part of the reason it takes so long to get a project started is that so many people have to review and approve it: within the Labs, USIC, an interagency review board, DoE HQ, the STCs, and the host governments (which have their own Byzantine bureaucracies to navigate). This same multi-layered administrative structure inhibits the program's ability to respond to unforeseen opportunities on the ground as well as to quickly adjust internal project objectives resulting from technological breakthroughs.

Beyond this problematic nexus of time and bureaucracy, USIC companies and I-Lab managers did offer a wide range of thoughtful suggestions for improving the program in less sweeping ways. These

break down into two categories: those which can be implemented within the existing structure and those that will require structural change, but which fall short of a fundamental transformation.

SIMPLE CHANGES

To increase the incidence of projects leading to commercially sustainable work for the scientists, respondents suggest IPP **focus on technologies in which there is an inherent ongoing role for the scientists**. Software development is one example, as it requires regular updates. There have also been a number of projects focused on technologies useful to a variety of industries that require modification for each application. In other cases, an important element of the technology is only produced in the FSU.[4] However this will only ensure an ongoing role for the scientists if they have a stake or role in the provision of the materials.

A significant means of increasing the program's overall effectiveness, according to I-Lab respondents, would be to **improve the quality of companies recruited into the program**. As noted above, they have learned quite a lot about the attributes of both projects and companies most likely to succeed in commercializing technologies or employing the FSU collaborators.

All of the I-Lab managers felt that the **companies must have direct contact with the FSU scientists and to the greatest extent possible be actively engaged in collaborating** with them. It was generally agreed that the least productive projects are those in which the Industry Partner took a passive position.

Additionally**, the companies should have a sincere interest in the technology developed under the auspices of IPP**. That this is even an issue says a good deal about the program's shortcomings. Some went further saying that the **companies should have a strategic interest in the FSU** and ideally would already be working with the FSU researchers or at least have business interests in the region. Yet, they also felt there was value in introducing new US companies to the region in order to expand an otherwise very limited pool and introduce specific technology competencies and the expanded market connectivity new companies bring to the program.

Each of the I-Lab managers has developed his own particular approaches to selecting Industry Partners or structuring the projects, which reflect insights garnered through experience. For example, one lab manager tries to **overcome the passivity problem by requiring the Industry Partner to build into the scope of work an active role for itself.** Another I-Lab manager **requires companies to demonstrate a market for the technology and an ability to connect effectively with that market.** A third **requires each project to include a local (Russian, Ukrainian, etc.) private enterprise** in the belief that this increases the likelihood of continuing FSU involvement when the technology proceeds to the commercialization stage. At present, these innovations are being implemented on an *ad hoc* basis.

[4] Additionally, there are quite a few projects in which the US company would like to procure materials or components from the FSU researchers, but it is far from clear that the researchers or their institutes will ever be able to reliably supply the goods at the quality and price points required. In this case, the technology will flounder or the US company will have to produce it elsewhere.

Quite a few of the USIC members thought that **more could be done to promote Russian/FSU science in the US** and that this would also **help attract more companies with a strategic interest.** Although the Labs do the bulk of the recruiting, many of them felt it would be productive for USIC to engage in more direct recruiting of companies with well defined technology needs that could be met by the FSU scientists. Shifting to a greater focus on this market pull approach should increase the number of projects in which the Industry Partners have a vested interest in success.

STRUCTURAL CHANGES

Everyone interviewed believes that, in one way or another, the IPP program needs to be restructured. Their reasons and the changes they recommend vary widely, but **virtually all agree that there needs to be greater flexibility in how program funds are spent**.

There is broad consensus that the 30/70 rule should be eliminated and that pay rates need to be adjusted to reflect current market conditions. Because of the great disparity in wages between the US and the former Soviet Union, the 30/70 rule frequently results in budgets that either under-fund the Lab or over-fund the FSU institute. Consequently, on a two year, $400,000 project that ends up taking four years from start to finish, the Lab team either does only what it gets paid for, which inevitably is less than is really needed to make the project successful, or it does work that is not paid for out of the project budget. The alternative is to increase the total budget to a point at which the Lab is able to cover its costs with the result that the number of scientists required to justify the budget will likely exceed the number needed to do the research.

Companies that are more deeply invested in their IPP projects and the region as a whole have repeatedly advised that Industry Partners should have **more control of the money and of project implementation and a few argued that I-Lab participation should be optional and variable**. The closer the company is to the FSU research team and the more they know about doing business in the FSU, the less value the I-Lab often provides. USIC companies should be allowed to decide whether and to what degree they want to involve the Labs. This would not only ensure that the Labs' contributions are actually valued by other program participants, but might well increase the overall value of their participation by allowing them to concentrate on activities for which they are particularly well qualified.

Interestingly, at least one of the I-Lab managers concurred. **The Labs have recognized that the companies most actively involved with their FSU collaborators and in the region as a whole are the ones most likely to bring the requisite capability and capacity to make long-term, productive, and commercially sustainable use of the researchers**. Giving them more leeway in how they achieve their business objectives through IPP increases the odds that the FSU scientists will continue to be involved after the project has ended.

It is also the case that the bureaucratic burden on the Labs is an unwelcome distraction from the technical work for which they are particularly well suited. As was made clear in the discussions of the funding to time ratio and the 30/70 rule, there are a wide variety of administrative tasks the Labs have to accomplish regardless of the adequacy of funds available. These unfunded mandates make their project management role less appealing. In fact, **the Labs prefer to be involved in technical**

matters and solving problems that result in real programmatic success rather than administering and troubleshooting the DoE and FSU bureaucracies.

To increase the quality and number of companies with long-term strategic interest in the region and its science, **most of the I-Lab managers and a few of the Industry Partners would like to see recruitment expanded**. They envision **two new approaches**. One would **focus on identifying US companies with strong connectivity to technology markets** to increase the incidence of successful commercialization. The other would focus on **recruiting companies operating in the FSU (domestic or foreign) as Industry Partners** in order to increase the rate at which the collaborating scientists find commercially sustainable work outside the WMD complex.

Most saw this as a role for USIC. One respondent suggested that **USIC change its dues structure to attract more members** and then increase the rate as companies increase the value they place on working with USIC. Of course, this would also require a substantial increase in the value of services provided by USIC.

Another recommendation was to **add a step before the current starting point that would use smaller, less bureaucratically encumbered funds** to introduce US companies to the FSU institutes in order to validate the science, technology and scientists at an early stage. This should **include funds for travel to and from the region** to ensure that a meaningful working relationship develops between the parties. In this way, IPP will only fund full-scale projects that have demonstrated commitment from both sides. This approach essentially follows the CRDF or SBIR models of gradually increasing grants to and cost sharing contributions from private sector contractors as the value of engagement grows.

By starting with small amounts of money that can be quickly dispersed, **the problem of the current program's long start-up time can be eliminated**. Projects could be started, and if they progress to a second stage, much of the work necessary for vetting them will have been done during Stage One, making a relatively seamless transition possible. This approach would presumably increase the quality of full-scale projects by selecting the best from a larger pool of proposals, which themselves will have benefited from a closer relationship between collaborators.

For those companies that have reached or are nearing commercialization, more support is a frequent and urgent request. Specific suggestions include: **help accessing US Government markets; help identifying sources of capital; and a variety of support starting up and building new ventures in the FSU including direct IPP funding on a cost-sharing basis.**

Much of the technology being funded through IPP has applications that address needs of other parts of the US Government, particularly in defense and homeland security. A great deal more could be done to **connect these projects to other government programs** and to **help the Industry Partners secure government contracts for goods and services (including research)**. For example, the Law Enforcement Targeted Initiative (LETI) is one such model that could be replicated to great effect in creating sustainable jobs with connectivity to government markets. Other opportunities range from research contracts with the National Institute of Justice (NIJ), the Defense Advanced Research

Projects Agency (DARPA), or SBIR to contracts for the provision of commercialized IPP technologies for programs such as DoE's MPC&A and the Defense Threat Reduction Agency's (DTRA's) related programs targeting excess weapons systems or stockpiles. These and many other federal programs could also be fertile territory for recruiting new companies with proven US Government interest.

USIC should **cultivate and maintain a network of government and private sector lenders and investors** that understand the value of Russian science and technology as well as the challenges and opportunities associated with commercializing it. It is critical for the companies moving beyond the current IPP program support to have access to a community of knowledgeable and interested investors. One respondent has engaged and introduced USIC to the Overseas Private Investment Corporation (OPIC), a US Government political risk insurer and investment agency with a strong interest in lending to US companies doing business in the former Soviet Union.

Quite a few of the respondents, however, did not believe that USIC will find many interested investors. As one company explained, **"VC has a harder time achieving success in industries other than IT and software."** As a result, venture capitalists' tolerance for risk is low for the kinds of technologies prevalent in IPP. When one introduces the FSU into the equation, they are usually not interested. Even Russian venture capitalists move intellectual property offshore before doing more development.[5]

Many of the companies argue that if IPP really wants to see an increase in commercialization success, particularly in ways that lead to commercially sustainable employment for the scientists, it must establish some new mechanism to **make matching funds available at the commercialization and new business start-up stages directly to those companies that commit to commercializing the technology in the FSU and to ensuring an ongoing role for the scientists**.

A small number of respondents would like IPP to **do more to help them establish or build business in the region**. One company related having tremendous problems finding qualified workers and bearing a heavy expense training them. Because so many of the companies are new to the region, they cannot imagine establishing operations there without a significant amount of support.

Finally, a number of companies already operating in Russia and Ukraine spoke of the need for **support from the US Embassy and DoE to provide political cover** to keep corrupt local government officials at bay. In Russian this is called a "roof" and it is critical to success. As one of the non-USIC companies interviewed related, a US Government roof is sometimes a company's only defense and recourse in countries where laws are flexible and often superseded by personal networks to which an outsider can never entirely gain access.

NEW MODELS (QUESTION 30)

Many of the companies had a hard time stepping out of the IPP box to imagine alternative models. After all, they are companies for which the program as currently structured has some value and most engage IPP on its own terms. Those that find the program lacking in substantive ways have elected

[5] One of the IPP companies is an example of this.

not to participate and therefore are not among the interviewees.[6] The only response that really went beyond changes to the current model of pursuing research and commercialization as steps towards employment was to **follow an angel investor model: pick and finance companies to build businesses in the FSU that will employ former WMD specialists.**

The few who did see IPP in a broader context and in terms of its ultimate objective of creating employment tended to be those most invested in the FSU. As noted earlier, companies familiar with CRDF and SBIR recommended following their approach of gradually increasing grants up to and including commercialization.

I-Lab managers, though deeply invested in the program, had an easier time seeing it in the broader context of meeting its mission objective. While they also lacked concrete proposals, they felt that **a new model should build on the strengths of each party. The Labs and FSU institutes have strong technical competencies while the Industry Partners understand the market potential of the technologies better and bring much needed business acumen including managerial capabilities and operational capacity.** As much as possible the companies should be connected directly to the scientists. Sometimes there will not be a technical role for the Labs. At least one of the Lab managers felt that in these cases it would be better to have a good project manager involved rather than the Labs' Principle Investigators whose focus and competency is more scientific. On the whole, they would prefer a role that makes productive use of their competencies and have little to lose from being relieved of unfunded mandates.

[6] The author interviewed a number of companies pursuing business activities in the FSU that will employ scientists and technicians currently working in the WMD complex which were unable to find a way to work with either IPP or NCI.

— 4 —
ANALYSIS

The objective of this survey and report is to assess the strengths and weakness of the IPP program and recommend steps that will enable the program to more effectively achieve its mission: to reduce the likelihood of WMD expertise proliferating from the former Soviet Union by providing commercially sustainable employment to underemployed specialists in the FSU's WMD complex. Although, as is clear from the Findings section above, IPP has benefited from the insights, innovations, and determination of both I-Lab managers and Industry Partners, the program as a whole needs to continue its evolution in order to more consistently achieve this mission. USIC, because its membership is ultimately the means to this end, has a critical leadership role to play.

ACHIEVING IPP'S MISSION

Commercially sustainable employment for the scientists targeted by the program requires *employers* – private sector companies that are able to manage these scientists to produce goods or services for which there is a viable market. As currently structured, IPP more frequently engages these companies as *customers for* the scientists' research outputs. If the institutes in which the scientists undertake this research were effective managers and the IPP Industry Partners were reliable, ongoing customers, the program might achieve its mission. But IPP and other US Government programs were created because the institutes are not viable employers.

To systematically achieve its job creation mission, **IPP needs to engage the private sector as employers rather than as customers**.[7] Such a shift has broad implications for the program, from the attributes for which the Industry Partners are selected to how they are recruited and from the nature of the agreements they sign to how projects and program funds are managed. It means focusing on research and the commercialization of technology only in so far as these activities lead to new jobs for WMD specialists. And it requires a major commitment to operating in the former Soviet Union.

For political reasons, the employment has to be provided in the FSU. Because of sensitivities about "brain drain," hiring the scientists to work for companies in the US cannot be a direct objective of the program.[8] This means that IPP has to facilitate employment by companies already operating in the region or introduce new employers to it.

---

[7] This does not mean that IPP should not also recruit customers. Quite the opposite, each of the employers will need customers. But for obvious reasons the primary focus of the program has to be on companies as employers.

[8] Employment in the US can and has been an unintended consequence. A number of USIC companies related such incidents. One, which has been in the program a long time, indicated that many of the lead scientists with whom they collaborated in early projects are now in the US working for this member's American suppliers.

The number of viable employers already operating in the FSU is inherently limited due to the region's less developed markets. Therefore, a substantial part of the program will have to be focused on bringing companies into the region. This will require different incentives and a good deal more support than the program is currently structured to provide.

The US Government has essentially five tools with which to engage the private sector in achieving the IPP mission:

- Capital;
- Markets/Contracts (DTRA, DARPA, NIH, SBIR, MPC&A, etc.);
- Technical expertise;
- Operational support; and
- Political cover or, as the Russians say, a "Roof."

As currently configured, the IPP program is only using two of these in *direct* support of US companies: technical expertise (I-Labs and FSU institutes) and operational support (I-Labs, STCs, and CRDF.) The lack of the others is keenly felt by both the Labs and the few Industry Partners who are attempting to build businesses that employ former WMD scientists in the region.

In terms of capital, there are a variety of possible mechanisms from outright grants to forgivable loans to paying the salaries of qualified scientists as is done under the current IPP structure. In each case, the money should be provided on condition that the Industry Partner employs the former WMD specialists directly.

Money, of course, is the most significant (but not always the most important) tool. As the Labs have understood, to be effective and successful as businesses and employers in the region, companies must have a strategic reason for being there and for employing the scientists. There are really only two reasons for IPP companies to go into the FSU: access to unique science or materials for a market they already serve, or access to a new or expanded market. At the same time, there are dozens of good reasons not to go. It is far from companies' existing markets and local markets are still undeveloped. It is hard to do business there because of corruption, poor and inefficient infrastructure, poor attention to quality, and, at times, it is just dangerous. As most western companies learned in the 1990s, the region is high risk, low return.

IPP has become quite good at validating the high caliber of science available, but, as the Labs are only too aware, this is usually not sufficient motivation for companies to undertake the arduous and risky task of setting up shop in Russia, Ukraine, or Kazakhstan. To mitigate the risks and increase the companies' capacity for success, IPP also needs to provide political cover and, to the degree that it is able, facilitate access to other government programs in need of technological solutions or services that could be derived from IPP funded projects. This further increases companies' strategic interests while also reducing program risk. It can also increase performance within the other programs.

For example, within DoE itself there are opportunities to coordinate programs to their mutual benefit. MPC&A is a significant consumer of the goods and services needed to secure fissile materials throughout the FSU. IPP could, in principle, finance the start-up of a local subsidiary of one of

MPC&A's American suppliers in exchange for employing former nuclear weapons scientists, while MPC&A, by providing contracts for the goods or service, would essentially be an anchor market for the new venture. From IPP's perspective, this simultaneously increases the strategic value of entering the FSU for the company and reduces the risk of failure. For MPC&A having high quality, local suppliers is critical to the long-term sustainability of the program and currently an acute need at DoE.

EVOLUTION OF THE PROGRAM

IPP was not, of course, originally designed to engage the private sector as employers. Although it has benefited from the many insights and innovative steps the Labs and Industry Partners have taken in this direction, the program has not evolved to realize the full potential of lessons learned and the capabilities resident in the USIC membership. This is a **consequence of what turns out to be a very dispersed leadership structure**.

While DoE has overall management responsibility, it does not appear to play a very direct or active role in program implementation. This may be due to the original program design, but is probably also a result of a relatively small headquarters staff facing daily demands that are more political in nature.

The Labs therefore operate on a largely autonomous basis, following basic guidelines but allowed a fair amount of leeway in how they manage the process of choosing FSU research teams and their technologies, recruiting Industry Partners, and managing project implementation. On the one hand, this autonomy has had afforded the Labs opportunities to innovate; on the other hand, it has meant that there is little systematic integration of these innovations and the insights that gave rise to them into program design and implementation. More problematically, it also appears to have given rise to a situation in which there is little consensus among Lab managers about the program's primary objective. As one of them observed: **"Program goals vary from Lab to Lab and there is no clear policy from HQ." The goals he went on to enumerate include research, relationships between the US Labs and the FSU institutes, commercialization, and jobs.**

The order in which these goals were listed is not random, but rather **reflects the evolution of the program** as the Lab manager has experienced it. When the program began more than ten years ago there was urgency associated with shoring up a massive WMD complex in a country collapsing into chaos. Engaging the experts, whose knowledge could lead to the proliferation of these dangerous weapons technologies, in non-weapons related research was a top priority. In many respects it did not matter what these people were doing, so long as they were not contributing to the proliferation of WMD outside their countries.

At the same time, old adversaries all of a sudden had an opportunity to meet and learn about each other under non-threatening conditions. It quickly became apparent to the Lab representatives that there was a great deal of interesting and valuable science in the FSU's vast R&D complex. So, increasingly the Labs pursued and realized the benefits of building bridges to their erstwhile enemies in the nuclear, chemical, and biological weapons complexes of the former Soviet Union.

The problem with this approach was that it was aimless beyond a certain core objective and moment in history. Most of the research funded through the early nonproliferation of expertise programs was

seldom valued beyond the FSU researchers themselves (even then one wonders if they would not have preferred to be involved in something bigger, they were after all their countries' leading scientists). The **great innovation of IPP was that it introduced private sector consumers who, in principle, would value the research outputs.**

Tasked with creating demand for the FSU scientists, the Labs began marketing technologies with commercial applications that had been developed at the weapons institutes to US companies. **There were great expectations for these companies, dubbed Industry Partners, who would commercialize the technologies and employ the inventors on a commercially sustainable basis.** The Labs turned first to companies with which they were themselves engaged in joint research. This made the process of recruiting and vetting them relatively easy and entrenched the Labs in this role. But most of the companies had little or no experience with the former Soviet Union and were initially skeptical about the value of the technology on offer.

For this reason, **the Labs and IPP as a program ask little of the Industry Partners, with the consequence that some of the companies assume a fairly passive role in the "collaboration."**[9] As projects progress, however, many of the companies become more enthusiastic participants and real believers in the quality of science coming out of the institutes. Gradually, the program has become more and more focused on moving from R&D to commercialization. Patterns have begun to emerge regarding, on the one hand, technologies that more naturally lend themselves to this process and, on the other, companies that are more likely to succeed in bringing them to the market.

But with a cherished few successes has come the realization that commercialization does not necessarily involve the technology's FSU inventors. In fact, it seldom does, not only in the context of IPP but in product development efforts everywhere.[10] Scientists give way to engineers who in turn hand off to sales and marketing teams. Even when there is an interest on the part of the Industry Partners to hire the FSU researchers and build a new business on the basis of their expertise, it has been very difficult for the companies to raise the necessary start-up capital.

This is a problem that, according to USIC members and Lab managers alike, has plagued IPP. As currently configured, **the program is unable to provide the necessary capital itself and there is little evidence from the companies surveyed that anyone has been able to attract or even identify investors that are sufficiently interested in technologies emerging from it.** The one exception the author is aware of is the project involving OPIC. The linkage with OPIC is an excellent example of both how the USIC membership can play a critical role in improving the IPP and how working closely with other government agencies can leverage the resources of each for mutually beneficial outcomes.

---

[9] Although they are required to share in the costs of the program, the only cash payment they usually have to make is their annual USIC dues. Their contribution to the project can generally be made in-kind with few if any demands on them to be directly engaged in collaboration with the IPP funded research at the FSU institute.

[10] One of the larger companies interviewed indicated that 10-15% of technology development efforts are successfully commercialized.

A few of the I-Lab managers have begun to look beyond commercialization. Cognizant of its limitations in creating employment for the scientists, they are increasingly focusing on another set of attributes as applied to the Industry Partners. Chief among these is a strategic interest in the FSU. It has become clear that **companies who know the region well are likely to make more effective use of the local research team. And businesses with local operations are more likely to employ the scientists directly**.

REDEFINING IPP

For IPP to complete its evolution and achieve its mission, program managers must come to understand that IPP is not a contract research organization, nor even a government technology development program. IPP does not commission research. It just pays for it. **Functionally, IPP is a match-maker, an angel investor and, if it follows the job creation approach laid out at the beginning of this section, will increasingly become a market builder**.

Unlike NIH, DARPA, or In-Q-Tel, IPP has no technology needs of its own. Each of these organizations is responding to market demand signals from clients with clearly articulated needs. By contrast, IPP technologies are most often defined by scientists in isolated institutes with little or no market connectivity. Instead, the market, or more precisely, the people who know the market well (USIC members) should determine the focus of the research.[11]

As the Lab managers have discovered, **when the IPP companies define the research, they value it and the scientists working on it more highly. This in turn increases the chances of them developing a long-term relationship with the scientists either as customers or employers.**

MATCHMAKER

This is probably IPP's most important function. **Every lasting match made is a job**. Working from the demand side of this equation is critical to success. Some of the Labs have understood this and argue for recruiting to focus more on **engaging companies with their own technology interests, then looking for scientists in the FSU with skills that match the companies' needs. Such companies inevitably make more effective use of IPP funding.** Recruiting also needs to target companies already in the FSU as a number of respondents from both the USIC membership and the Labs have recommended. The obvious value of doing so is that these companies are not only in a better position to engage the scientists directly and actively, they are also more likely to become employers.

Shifting the emphasis to identifying companies that are more likely to provide employment will require the program to administer marketing and recruiting on a more centralized basis. This is a function perhaps best suited to USIC, which as a membership organization should logically have an active role in recruiting its members. Expanding and diversifying the recruiting process will require USIC and/or the Labs to develop new capabilities and spend a good deal more time in the region documenting both the skills of the scientists available through IPP and the local landscape of private

[11] The technology being pushed out of the FSU institutes can still be marketed to the private sector, for as IPP has demonstrated it can meet market needs; however, it should not be the sole or even primary basis for engaging the private sector.

technology development including both companies and investors. It will also require the administrator to acquire the marketing and business assessment expertise that would be necessary to promote the program more widely and to bring a greater understanding of business models and how they achieve success to discussions with Industry Partners.

From the perspective of recruiting, IPP is almost all sales and no marketing. As the survey made clear, half of recruiting a future employer is validating the value of the prospective employee. **This is the single greatest benefit of most projects, but is accomplished at significant expense in terms of dollars and time spent.** Yet the companies with the greatest capacity for providing employment are often the ones that find IPP on their own. To attract more of these companies, IPP has to make a better offer, which means giving Industry Partners more control and helping them establish new enterprises that will employ the target population in the region.

ANGEL INVESTOR

IPP is essentially playing the role of an angel investor. It puts up cash to finance the development of a new product in the hope that the return on investment will come in the form of new employment for the scientists/inventors. With almost $200 million in US Government funding invested over nearly a decade, it has created approximately 2,800 jobs. To increase this number, IPP needs to reverse its emphasis from technology to companies.

As one of the USIC members explained, "VC bets on good management more than on business concept and product potential". Of course, the business case for a new technology has to be sound, but without the right management team no matter how good the technology or its business case is, it will not successfully make it to market. IPP does not have market connectivity to pick the technologies. That is properly a role for the Industry Partners to play. But in the current IPP model they are not in control of either the research or the capital. So, they are neither sufficiently motivated nor empowered to achieve success in what is a high-risk venture under the best conditions.

To bring them on board, IPP has to engage them as beneficiaries of the program rather than merely as "partners." They should be contracted by IPP in order to empower them and hold them accountable simultaneously as they utilize program resources, human as well as financial, to achieve their business goals. Companies are actually very good at managing resources efficiently. **Because the companies are the key to solving the employment problem, the more IPP enables them to take ownership of the process (of engaging the scientists to create goods and services valued by markets), the more quickly and efficiently IPP will achieve its mission.**[12]

MARKET BUILDER

Regardless of changes in recruiting efforts, many of the companies likely will be new to the former Soviet Union and need to learn how to operate there effectively. Helping them do so is critical to the success of the program, because **ultimately they must succeed as businesses in the region to provide the long-term employment needed.** This can be facilitated by the Labs, the STCs, and

[12] For those Industry Partners which lack experience in the FSU, the Labs can, in principle, continue to act as project managers and the STCs/CRDF can manage procurement and salary disbursements. In this case, the role of each party is predicated on the value it creates.

CRDF, but will require services the program is currently not well structured to provide, particularly when focusing on the needs of new enterprises.

As noted above, a significant effort should be made to link IPP to other government programs including both research programs like SBIR, NIH, or the Office of Naval Research (which, together with its counterparts from the other services, is actively prospecting for technologies in the FSU) as well as other nonproliferation and threat reduction programs such as MPC&A and those managed by DTRA. **There also needs to be a serious effort to build credibility with suppliers of capital in the US and Russia from both the public and private sectors.** OPIC, of course, is already engaged and a steady pipeline of projects should be marketed to it. But it is equally **important to engage Russian sources of capital**. For example, German Gref is responsible for a very large state investment fund, which is expected to make substantial investments in Russia's civilian nuclear industries in an effort to make them competitive in a global market place. There is also a growing cadre of Russian and US venture funds and investment banks targeting technology investments. Draper Fisher Jurvetson, a Silicon Valley venture capital firm, has announced a $50 million fund focused on IT and biotech investments in Russia and Ukraine. One of the USIC members was, in fact, financed by a Russian VC fund.

STEWARDSHIP

A number of the Lab managers indicated that stewardship of the American taxpayers' dollars was an essential role played by the Labs and that for this reason program funds could not be given to the companies to manage. By their accounts, the Labs ensure that the FSU institutes (or the Industry Partners if they were given more control) do not steal the taxpayers' money and that the companies do not steal the FSU scientists'/institutes' intellectual property. As one expressed it, "If you let the corporate partners just go off and do things on their own, there would be no control. For instance, they would take all the intellectual property from the Russians, so the Labs are protecting the Russians."

These two notions of stewardship – protecting the taxpayers and protecting the scientists - will be critical to any debate about what IPP is or should be and about the value and viability of modifying the program's structure in the ways discussed in both this section and the Findings chapter.

Apart from the fact that the latter comment makes clear what a misnomer Industry "Partner" is, it raises important questions about value. In the case of intellectual property from the FSU, it presupposes that the technology targeted for commercialization has inherent value. Absent a company (US or FSU) that can successfully bring the technology to market, it has no realizable value. In other words, in the absence of the US Government's intervention through IPP, the value of intellectual property would not even be an issue.

More significant is the degree to which taxpayer money is effectively utilized to create sustainable employment for a community of weapons experts at risk. Based on the interviews with current Industry Partners in our sample, it appears unlikely that many of them will employ the scientists with whom they are collaborating after completing their projects.

WHAT'S THE DOWNSIDE?

"Treat the projects as venture investments and just take a chance – what's the downside?" From the perspective of opportunity costs, there is little risk to shifting more of the responsibility for program implementation to the private sector if that means that they will commit to hiring the specialists out of the institutes.[13] Alternatively, the US Government has to keep contracting these scientists until they retire, their local governments employ them fulltime, or they find new jobs on their own. Furthermore, anecdotal evidence from USIC members, as well as studies concluded by the National Research Council,[14] suggests that there is a growing cadre of younger WMD specialists being trained by the older generation and that retirement will not substantially reduce the number of experts. In this light, there may be opportunity costs from not modifying the program. Congress and the Administration appear ever more inclined to see the costs of the program outweighing its benefits.[15] A reduction in or end to IPP funding would be unfortunate because much remains to be done in preventing the proliferation of expertise and there are significant additional benefits to be had from a modified program.

THE VALUE OF SECONDARY BENEFITS

The benefits or detriments of secondary effects are all but ignored in programs like this. IPP can provide a great deal of value to US Government research initiatives like SBIR, NIH, and DARPA by expanding the knowledge base and increasing the manpower available. The caliber of FSU science, particularly in Russia, is still very high and is often technically distinct from and complimentary to knowledge currently available in the US. Because IPP is funding the scientists, these US-based research programs stand to benefit from a substantial increase in manpower at no additional cost.

Were US companies to enter markets like Russia through IPP, the benefits would be even greater. As noted above, the performance and sustainability of MPC&A and other threat reduction programs would be enhanced if their US suppliers established Russian subsidiaries that could build, maintain, and improve upon the equipment and services they are supplying to safeguard WMD facilities and materials. There are also a variety of economic and political benefits, which accrue from the start-up

---

[13] In fact, this is already happening informally with at least one Lab manager strongly encouraging the projects he oversees to include a local private enterprise.

[14] National Research Council, *Biological Science and Biotechnology in Russia* (Washington: National Academies Press, 2006).

[15] This is well illustrated by a 2000 House Armed Services Committee report: "The committee is concerned that funding collaborative research efforts with Russian scientists in the area of biological defense may serve to perpetuate a knowledge base and set of skills among Russian scientists that might make them more attractive targets for recruitment by foreign states seeking to develop their own biological weapons programs. Such an outcome would be precisely the opposite of that intended. As the GAO recently testified, 'supplementing the salaries of these scientists is no guarantee that they will not in the future sell their services to individuals or countries that pose national security risks to the United States.' Moreover, the GAO's April 2000 report concludes that 'sustained U.S. support of institutes, especially through research aimed at advancing U.S. biodefense capabilities, may help to preserve Russian scientists' knowledge and skills and otherwise help to maintain these institutes' capacity to research and develop biological weapons.'" See Committee on Armed Services House of Representatives, "Report on H.R. 4205: The Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001," Report 106-616 (May 12, 2000), accessed at: <http://thomas.loc.gov/cgi-bin/cpquery/R?cp106:FLD010:@1(hr616)>.

of US companies in the region such as advocacy for legal and economic reform, professional training, creating markets for other local enterprise, etc. Finally, by engaging other government initiatives to increase the benefits derived from the program, IPP increases the number of stakeholders who value it and therefore have an interest in ensuring ongoing program funding. A properly restructured IPP program **will therefore simultaneously neutralize concerns about detrimental effects while increasing the benefits to the US taxpayer**.

BYELKAMIT

An example of the broad range of secondary benefits that can be achieved is well illustrated by a US Department of Defense project from the mid-1990s. It was one of the only US Government projects that successfully introduced a US company into the region for threat reduction purposes. DOD made a $3 million grant to a US company, Byelocorp Scientific, Inc., to convert a weapons factory in Kazakhstan.[16] Beyond the primary objective of eliminating a specific weapons production line, it created commercially sustainable jobs and introduced new technology and industrial capability to the region. It also provided extensive training in business management, quality assurance, and quality control. As the converted factory grew, it created demand for goods and services that supported other companies in the local economy, thus broadening the economic development impact of the program. Because of the hostile nature of the local business environment, management was constantly advocating for changes in both the laws that affected their operations, as well as how those laws were enforced. Finally, in an unplanned but remarkable twist, the plant fabricated virtually all the equipment needed to shut down a local plutonium-producing reactor in a nonproliferation project undertaken by DoE. Ideally, this sort of synergistic activity would be designed into future nonproliferation programs. The return on investment from this modest $3 million has been extraordinary.

IMAGINING AN IMPROVED IPP

An IPP focused on engaging private sector companies as employers will recruit companies with a strategic interest in the FSU and/or with technology objectives well suited to utilizing the expertise of scientists from the region's WMD complex, match them with scientists that have the requisite skills, and support the establishment of new or expanded enterprises in the host countries that employ the scientists in commercially productive activities.

These companies will be contracted by DoE to engage in activities that make commercially productive use of scientists or technicians from the complex. For those that do not already have FSU experience or are unfamiliar with the scientists they will be engaging, it will be necessary to validate the value of working with these WMD specialists. This will be accomplished through small cost-sharing contracts that the companies will be responsible for managing. Many of them will need in-country support to handle such things as logistics, procurement, and payroll. Existing mechanisms such as the STCs and CRDF, as well as project management support from the Labs can be available to them for these purposes. They would, of course, also have the choice of finding alternative, more efficient or effective ways of managing these initial collaborations, which might have the additional effect of improving the quality of service being provided by the incumbent organizations.

[16] The author was previously the Executive Vice President of Byelocorp.

Upon successful completion of these small, Stage One projects, companies will have the opportunity to apply for larger Stage Two projects that advance the collaboration towards the establishment of a local venture that will employ some of the research team on a commercially sustainable basis. These projects are most similar in funding levels and duration to current IPP projects. For those companies that successfully complete Stage Two projects or which have the necessary attributes for establishing/expanding a local enterprise employing qualified WMD specialists, there will be an opportunity to apply for a Stage Three or "Business Building" contract. These contracts will consist of detailed business plans that demonstrate the applicant's ability to employ the scientists in developing or producing products or services for established commercial and/or government markets. Compensation for the companies' efforts will be provided in a variety of forms.

As in the current program structure, IPP could pay the salaries of the scientists, but in this case it would be done on a cost-sharing basis with the IPP portion decreasing over time. For instance, IPP may pay 100% of the salaries of employees who qualify as former WMD specialists for the first year, 75-80% in year two and so on until the company assumes 100% of the salary burden in year five or six. This lowers the risk to companies trying out new employees who will probably need a considerable amount of on-the-job training, while discouraging them from padding their payrolls.

To address start-up or operational costs, IPP could make grants paid on a reimbursement basis for specified expenses or forgivable loans that are tied to the number of scientist/technicians hired and the duration of their employment. In the former case, IPP assumes some risk on the ultimate performance of the business, in the latter case there is only a risk due to default. If the company performs as planned the loan is forgiven (essentially becoming a grant), but if it does not the company will be responsible for repaying the loan. This approach provides a clear incentive for companies to establish operations in the FSU, but a strong disincentive for them to do so for any reason other than that agreed upon with IPP.

From an operational perspective, the program will have to acquire new competencies and capabilities. A database of skills available within the WMD complex will be needed to market the scientists and technicians to companies. More developed and centrally administered recruiting capable of marketing the program to companies consuming similar skills to those on offer as well as to companies already operating in the region will be needed. Both functions would logically be assumed by USIC.

IPP will also have to develop a capability of vetting companies for their ability to make commercially viable use of the scientists or technicians in the former Soviet Union. This will necessitate the acquisition of new competencies akin to those of angel investors, but should also make full use of the technical competence of the Labs as well as their relationships in the FSU's WMD complex.

Finally, IPP will need to establish a fulltime presence in the region to develop and maintain the skills bank database, recruit locally operating companies, and support US-based companies that are entering the FSU for the first time. It does not need to be a large operation, but must be well connected to the US Labs, the FSU institutes, and the business community both locally and in the US. This is a function that is too important to the success of the program to be outsourced to the ISTC or CRDF and would be more appropriately assigned to USIC.

— 5 —
RECOMMENDATIONS

This report has attempted to articulate strengths and weaknesses of the IPP program, sketch a vision of what might be made of the considerable resources and capabilities at its disposal, and recommend steps USIC can take towards this end. These are the first steps in constructing a comprehensive vision of what the program should be and developing a concrete action plan for realizing it. Most importantly, IPP needs to clarify for all participants the program's primary objective: research, relationships, commercialization, or jobs. Defining this and working out the details of how the program can (as distinct from "should") evolve can only be determined through a process of engaging all stakeholders (current and future) to determine specific modifications and to build the consensus necessary for change.

The USIC membership is a uniquely well-qualified and capable resource that, with the appropriate leadership, can contribute a great deal to articulating a detailed vision and ensuring that it is realized. Because of the IPP program's decentralized management structure, it is unlikely that sufficient change will come about without a grassroots effort led by this key constituency. For example, even simple changes like paying for Industry Partner travel to the FSU are not possible within the program's current structure. More structural changes, such as contracting the companies directly and allowing them to manage project funds, will require a consensus and considerable advocacy for such change with policymakers in Washington.

USIC's dual role as DoE's liaison to the private sector and as an industry association charged with representing the companies' interests makes it ideally positioned to lead and manage the process of change. By collecting, coalescing, and disseminating the lessons learned, insights, and innovations acquired by each of these constituencies, USIC has a crucial leadership role to play in ensuring the ongoing evolution of the program. Based on the membership's willingness to give generously of its time and the enthusiasm with which the participants engaged in the interviews for this survey, USIC also has a clear mandate to assume this role. The recommendations that follow therefore focus on the many valuable and productive steps USIC can take to facilitate this process.

SHORT-TERM RECOMMENDATIONS FOR USIC

As a first step, USIC should continue the engagement of its membership begun by this survey. Each member's business model, IPP objectives, and its strategies for accomplishing these should be characterized and documented. For instance, which companies are using IPP to fund the first stages of commercialization or to build operational capacity in the FSU? Which are using the program to augment R&D manpower or to identify/develop new material or component suppliers? It is also necessary to ask what modifications to the way IPP supports these efforts would better meet the objectives of companies and the program as a whole. As noted in the findings section, USIC should track the companies using IPP as part of their technology prospecting efforts in order to learn more about what they do once they find an interesting technology. Finally, it is important to assess each

company's interest in and ability to employ members of the target community and consider how USIC or the Labs might increase the likelihood of them doing so. In a similar way, USIC should characterize and document each Lab's approach to program management, the objectives they are pursuing both programmatically and on an individual project basis, and the strategies they have adopted for accomplishing these objectives.

It is also important to continue to collect and catalogue feedback on the strengths and weaknesses of the program and lessons learned by both Industry Partners and Lab staff (program managers and Principle Investigators) including insights and innovative approaches each of these parties have developed. What are the attributes of Industry Partners that are most likely to become employers or long-term customers of the scientists? What are the attributes of scientists most likely to be employed or succeed in establishing their own commercially sustainable businesses? Are some Lab managers or PIs more successful at attaining program objectives than others? If so, why? What are the characteristics of the most productive collaborations? It is important to also look back and reach out to former USIC members to understand what they have accomplished since leaving the program and what insights they might offer.

As a matter of general practice, USIC should engage all new Industry Partners in a similar way and track their projects from start to finish. A profile of each company including its business model, expectations, networks, etc. should be prepared as they come into the program. USIC staff should make sure the companies understand the process they, the Labs, and their FSU partners will undertake from application through to project completion. As projects proceed, USIC should note the time each step takes and help troubleshoot whenever possible. Causes of delays, solutions, and work-arounds should also be documented. An ongoing accounting of lessons learned, innovations developed, and needs that remain unmet should be maintained. All of this should be compiled in a comprehensive catalogue of lessons learned, insights, and innovations and, as appropriate, disseminated to members, Labs, and DoE HQ.

It would also be very helpful to conduct a survey of stakeholders in the FSU. What do the scientists think will lead to new jobs? What are the attributes (business models, goals, capabilities, etc.) of the local companies already involved in IPP as collaborators? What other companies or local investors might be interested in joining IPP? By mapping the region's emerging technology sector it will be possible to better understand the potential for IPP to accelerate the redirection of WMD specialists into commercially sustainable activities outside the institutes. A concerted effort should also be made to recruit companies already operating in the region – both local and foreign. If it is not already allowed, make it possible for FSU companies to join the program as Industry Partners.

On the whole, much more needs to be done to market the program. Some of the most active and valuable Industry Partners are not actually recruited but learn about the program by other means. Increasing the number of motivated participants can only benefit the program. At the same time, recruiting should focus more heavily on companies that have a strategic interest in the FSU and/or clearly defined research and development objectives. As a number of the Lab respondents suggested, it would be both appropriate and beneficial for USIC to play a more active role in this regard. To this end, USIC staff might survey other membership organizations such as the American Chambers of

Commerce in the region and other US Government programs such as the Special American Business Internship Training (SABIT) program at the Department of Commerce. To recruit companies in the second category, USIC should engage the many government technology development programs such as SBIR, DARPA, and NIJ as well as other nonproliferation and threat reduction efforts such as DoE's MPC&A and DTRA.

As recruiting shifts its primary focus to the demand side of the equation, it will be necessary to have a detailed database of the specialists available in the FSU. USIC has apparently already made considerable progress in developing a database of the capabilities on offer at nearly 100 institutes in the region. Continuing to develop and expand this database to include details of individual specialists' skills and knowledge will be invaluable in assisting the process by which they are matched with prospective employers. More data can no doubt be added by the STCs, CRDF, and the Labs. The community of peers reviewing the research proposals currently coming in from the FSU institutes can also be a valuable source of insight about both the skills and knowledge of the scientists as well as industries or even specific companies that may be interested in employing them.

Once created, this skills bank will have to be maintained. For that, and a number of other important reasons, USIC needs to establish a permanent presence in Moscow. Russia's National Industry Coalition (NIC), which has already been set up and is funded by USIC, is an ideal platform on which to build. However, a distinct IPP/USIC operation is necessary to ensure that the program's interests in all IPP countries are adequately met. For instance, this office will engage in recruiting of local companies, stakeholders, and service providers in all of the program countries, not just Russia. As the program increasingly engages companies as employers starting or expanding their own business operations in the region, it will be important to assist them in learning how to navigate the local bureaucracies and deal with cultural differences. This perfectly matches USIC's role helping US companies learn how to do business in the FSU, but will require the organization to increase its knowledge, networks, and capacity to meet the Industry Partners' needs. A concerted effort should be made to develop a network of service providers and local sources of capital that can ensure the success of these new ventures.

In parallel to the above activities, USIC should develop a small pipeline of projects that expressly and deterministically provide open-ended employment for specific FSU WMD specialists within USIC-member enterprises. These projects may or may not follow current program guidelines, but would clearly accomplish the program's job creation objective. They should represent a variety of business models and areas of weapons expertise and effectively serve as test cases or prototypes of new, more efficient models of engaging the private sector in order to realize the IPP program's nonproliferation mission on a sustainable basis.

Stimson has already committed to identifying a number of candidates from the pool of companies interviewed and will prepare a report that sketches out each potential project. A more in depth and detailed dialogue with each of the companies will then be needed to establish exactly what innovations or changes in the program will be necessary to realize each project. With these in hand, the process of selling DoE, the Labs, and Congress on making the structural changes necessary can begin not in the abstract, but rather in the context of real jobs for particular weapons specialists.

To this end and in support of the broader effort to articulate and realize an expanded vision of IPP, roundtables consisting of Industry Partners, Lab managers, and DoE HQ staff should be convened to identify common interests and discuss ways, both near- and long-term, to improve the IPP program. These roundtables are critical to building consensus among stakeholders. Given the time both Industry Partners and Lab managers took and the enthusiasm and candidness with which they engaged in the interviews conducted for this survey, USIC has both an opportunity and a mandate that is perhaps unique in the program's history to bring these parties together to make common cause in spite of their often disparate and sometimes competing interests. The convening of roundtables should be an ongoing process of information sharing and consensus building and should embrace new stakeholders as they are brought to the program.

It will probably make sense to convene the roundtables along a number of thematic lines with care given to selecting participants for each based on their ability to make productive contributions to both the discussion initiated at the table as well as how they might contribute to building consensus beyond it. The roundtables should begin by considering all of the major issues brought to the fore by this survey together with many that will undoubtedly emerge from the process itself. Some key issues for initial discussions include:

- Attributes of an Industry Partner that are conducive to the company's becoming an employer or long-term customer;
- Innovations and ways in which the program structure has already been stretched;
- How an FSU research team becomes self-sustaining;
- How to ensure early and close collaboration between US and FSU collaborators;
- How to make the most of each party's strengths:
    - Project management;
    - Technical expertise;
    - Efficient utilization of resources;
    - Developing new businesses in the FSU;
- Financing new ventures;
- Establishing and operating businesses in the FSU;
    - Lesson learned;
    - What can IPP do to support USIC members in these activities?

LONGER-TERM RECOMMENDATIONS

Looking ahead, IPP needs to continue its evolution. How this happens will emerge from the process outlined above. As discussed in the Analysis section above, this should include developing a Three-stage project structure; making Lab participation customizable; contracting companies (rather than "partnering" with them at arms length); creating new mechanisms for funding start-ups or expanding of existing business in the FSU that will hire former WMD specialists; and recruiting new stakeholders such as MPC&A or SBIR. To what degree any of these recommendations will actually be implemented will depend on the process of bringing stakeholders together to build consensus and enable change. Initiating and sustaining this dialogue is the single most important role USIC can play.

ANNEX 1
QUESTIONNAIRE

A. Please tell me about your IPP project:

1. I understand you are working with . . .

2. What is your technology/product area? _____

3. How would you categorize it?
    a. Biotechnology
    b. Detection Technologies
    c. Energy
    d. Environment
    e. IT & Telecom
    f. Manufacturing & Instrumentation
    g. Medical Devices
    h. Nanotech & Advanced Materials
    i. Radioisotopes & Radiopharmaceuticals
    j. Other _____

4. At what stage are you currently with your IPP project?
    a. Awaiting IPP approval and funding
    b. Start-up phase with Lab and FSU partners
    c. Underway
    d. Project completed
    e. Marketing – capitalization - commercialization
    f. Other _____

5. Please describe the structure of your business relationship with your FSU partner (either now or planned post-IPP):
    a. IPP project only – no other business arrangement
    b. Joint venture
    c. Contract manufacturing or R&D
    d. Joint patents – technology licensing
    e. Joint sales – marketing - distribution
    f. Other _____

B. Now, please tell me about your experience with the IPP program?

6. How did you learn of the IPP program?

7. Did you consider going directly to the FSU partner? YES___ NO___
   Why or why not? _____

8. What were the benefits you anticipated by working through IPP?

9. What has worked well? What problems have you encountered? Why?
   a. I-LAB partner
   b. FSU partner
   c. USIC
   d. DoE IPP HQ office

10. How have you worked to overcome them? Are there any approaches that have been particularly effective? NOT effective?

11. What do you wish you'd known at the beginning of this process that you've learned along the way? And, what would you have done differently?

12. What is your plan for the future with your FSU partners? How can you expand the work you are doing with your FSU collaborator?

13. What is your potential to employ members of your FSU team directly or indirectly?

14. Would you consider launching a second IPP project? Why or why not?

15. How would you advise others who are considering starting an IPP project?

C. We are trying to identify recommendations for streamlining the IPP process or suggestions for alternative mechanisms to improve these partnerships.

16. What has been your experience negotiating a CRADA/working with your I-Lab partner?

17. What has been your experience negotiating contracts or JVs with your FSU partner?

18. What roadblocks did you encounter?
   a. Negotiating the IPR?
   b. Export/import issues?
   c. Business practices?
   d. Quality control?
   e. Language barrier?
   f. Other?

19. How did you overcome or circumvent these challenges?

20. Were there political issues in the FSU that affected your project?

21. How did you overcome or circumvent these challenges?

22. How has USIC supported your work?
    a. Assistance in identifying potential financial/capital resources
    b. Assistance during CRADA negotiation/IPR issues
    c. Assistance with export control, other issues
    d. Assistance with partner searches/FSU technology opportunities
    e. Other _____

23. What additional support would you like from USIC?

24. How would you improve the IPP program overall?

25. What is most valuable about the existing programming?

26. What would you change to make the system more responsive to your company's needs? Your FSU partner's needs?

27. If another model were to be developed, what would be its key attributes?

28. Are there other comments or recommendations that you would like to make?

Thank you for your participation in this survey.

ANNEX 2
LIST OF COMPANIES

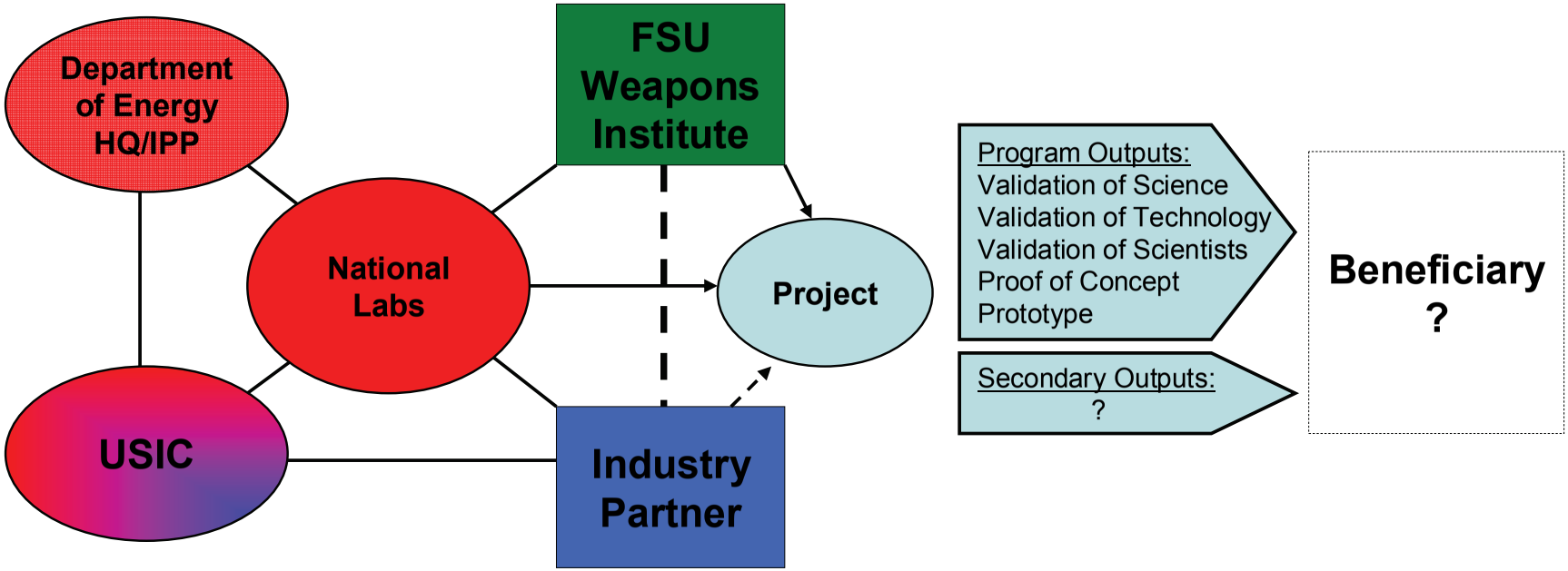
COMPANIES

4WAVE, Inc.
ADMA Products Inc.
AgraQuest, Inc.
Akamai Physics, Inc.
Applied Plasma Technologies
Arthrocare
Atlantic Richfield Company
BioGenesis, Inc.
Biological Targets, Inc.
Boeing
Cambridge Environmental
CH2M Hill
Dow Chemical Company
DuPont
Ecotrade
Empire Magnetics Inc.
Fenix
Fuel Cell Energy
GE Security
General Motors R&D Center
Global Nuclear Fuels
Halliburton Energy Services, Inc.
Ion Focus Technology, Inc.
Materials and Systems Research, Inc.
Maverix, Inc.
Numotech
Oases Federal Systems
Pinnacle
Radiation Monitoring Devices
SciClone
Spectra Quest, Inc.
Teknichal Services
TRACE Photonics, Inc.
Valley Forge Composite Technologies
VOLIUS, Inc.
WOSTEC, Inc.

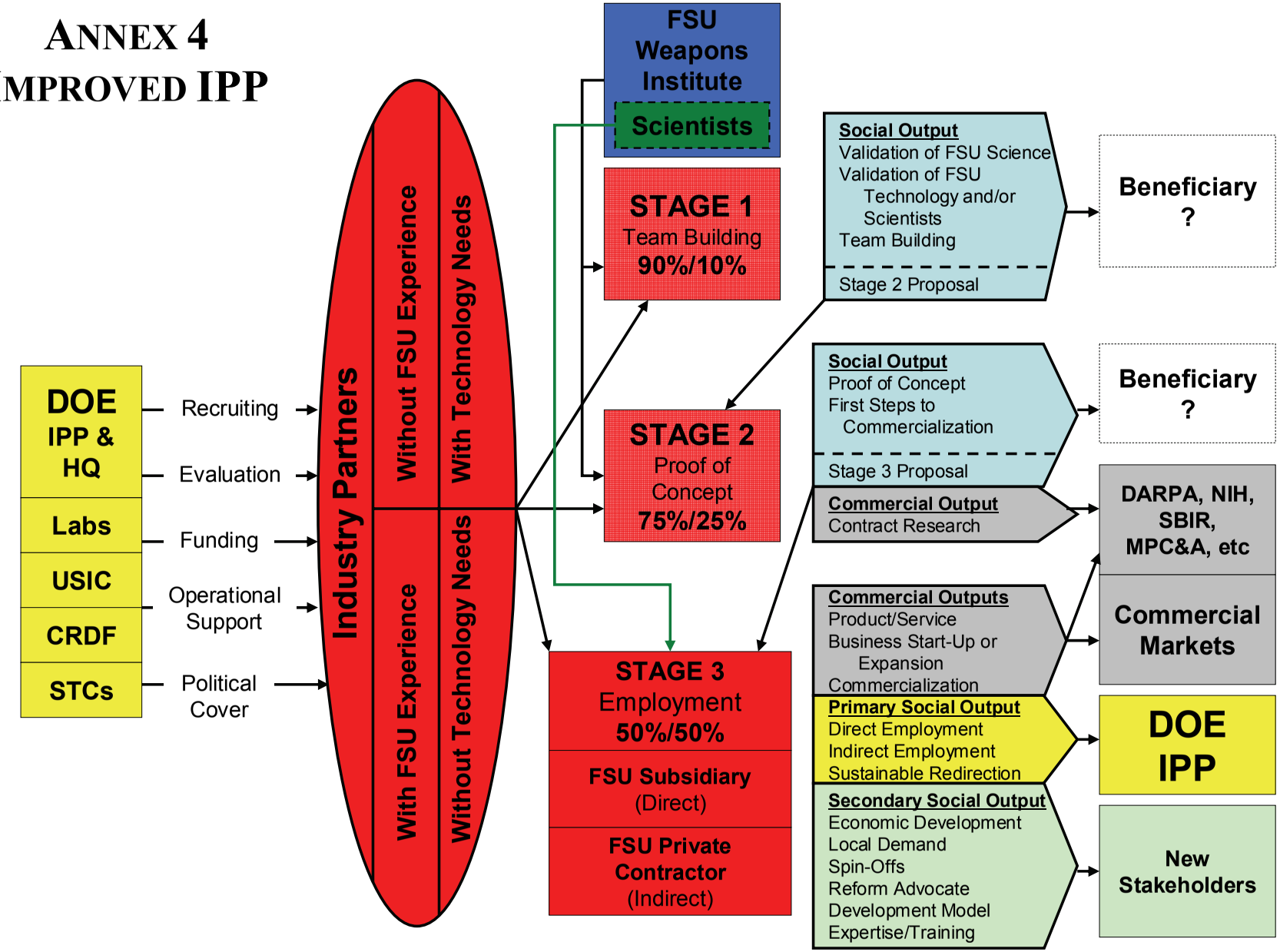
LAB CONTACTS

Argonne National Laboratory
Kansas City Plant
Lawrence Berkeley National Laboratory
Oak Ridge National Laboratory
Pacific Northwest National Laboratory

ANNEX 3
CURRENT IPP



ANNEX 4
IMPROVED IPP



ANNEX 5
ABOUT THE AUTHOR

Frederick "Rick" Kellett's experience over the past decade as the Regional Director of a management consulting operation focused on local entrepreneurs in Central Asia and more recently as the Executive Vice President of Byelocorp Scientific, Inc. (BSI) makes him uniquely suited to direct this initiative. BSI is one of the few western companies to have successfully utilized former Soviet weapons research and manufacturing capabilities to create commercially viable civilian enterprises. One effort brought together a team of Belarusian and American scientists and engineers to develop a revolutionary optics finishing technology, which is now being used by every major optics manufacturer in the world. The other restructured a Kazakhstani weapons factory to produce large industrial process equipment for the region's growing oil business. Importantly, the latter also became the key supplier of equipment and packaging for spent nuclear fuel during the shutdown of the BN-350 reactor under a DoE nonproliferation initiative. Rick joined the Center in late 2005 as a Senior Business Fellow with the Cooperative Nonproliferation Program.

ABOUT THE COOPERATIVE NONPROLIFERATION PROGRAM

The *Cooperative Nonproliferation Program* at The Henry L. Stimson Center is a multifaceted program designed to accelerate existing threat reduction efforts, and design new projects aimed at more rapidly and sustainably securing dangerous weapons, materials, and expertise around the globe. The program also leverages resources to address other issues of global concern, such as international public health and global economic development. For detailed information about our projects, please visit: http://www.stimson.org/cnp.

The Henry L. Stimson Center is a community of scholars devoted to enhancing international peace and security through rigorous, nonpartisan analysis and results-oriented outreach on many of the most enduring and challenging problems of national and international security.