

# **OneNSF INVESTMENTS**

## **NSF INNOVATION CORPS (I-Corps)**

### **OVERVIEW**

The National Science Foundation (NSF) seeks to develop and nurture a national innovation ecosystem that builds upon fundamental research to guide the output of scientific research toward the development of technologies, products, and processes that benefit society.

In order to help jumpstart a national innovation ecosystem, NSF has established the NSF Innovation Corps (I-Corps). The NSF I-Corps' purpose is to support NSF-funded researchers who, with teams, are interested in transitioning their research out of the lab. I-Corps awards are based on the maturity of the effort (i.e. is the research ready to leave the lab), strength of the team, and anticipated market value. The teams selected for I-Corps awards will receive additional support – in the form of mentoring and funding – to accelerate innovation that can attract subsequent third-party funding.

The purpose of the I-Corps grant is to give the project team access to resources to help determine the readiness to commercialize technology developed by previously-funded or currently-funded NSF projects. The outcome of the I-Corps projects will be threefold: 1) a clear go/no go decision regarding viability of products and services, 2) should the decision be to move the effort forward, a transition plan to do so, and 3) a technology demonstration for potential partners.

I-Corps has its genesis in many of the long standing innovation ecosystem programs. Most closely related to I-Corps is the Accelerating Innovation Research (AIR) program in the Directorate for Engineering (ENG), started in FY 2011. The AIR program:

- encourages the translation of the numerous, technologically-promising, fundamental discoveries made by NSF researchers, while drawing upon and building the entrepreneurial spirit of the researchers and students; and
- fosters connections between existing NSF innovation research alliances.

Those existing NSF innovation research alliances include consortia such as Engineering Research Centers (ERC), Industry University Cooperative Research Centers (I/UCRC), Partnerships for Innovation (PFI), Science and Technology Centers (STC), Nanoscale Science and Engineering Centers (NSEC), Materials Research Science and Engineering Centers (MRSEC) grantees and other institutions. Their complementary focus will spur the development of discoveries into innovative technologies through collaboration.

Both I-Corps and AIR are designed to strengthen the U.S. innovation ecosystem.

### **Goals**

The goals of the I-Corps program are:

- to build on NSF's investment in fundamental research;
- to offer academic researchers and students an opportunity to learn firsthand about technological innovation and entrepreneurship, and thereby fulfill the promise of their discoveries; and
- to prepare students for real-world experience through curricular enhancements, and provide them with opportunities to learn about and participate in the process of transforming scientific and engineering discoveries to meet societal needs.

## **Approach**

NSF's core mission is to fund basic research in all fields of science and engineering. I-Corps supports this mission by helping to transform scientific output into technological innovation. I-Corps will leverage existing funding for programs like PFI, AIR, ERCs, STCs and SBIR/STTR, and will utilize additional support from NSF's private-sector and regional partners, including universities, industries, venture capitalists, and nonprofits. The partnership with universities will also contribute to the development of novel pedagogical tools. This support will be used to support entrepreneurship and innovation costs not normally supported by NSF.

The I-Corps program will also help create a new network that will strategically connect NSF-funded scientists and innovators to the national innovation ecosystem, including direct connections with mentors and potential future investors.

## *Scope*

The Deshpande Foundation and the Kauffman Foundation have joined with NSF as founding members of the I-Corps public-private partnership. The Deshpande Foundation has been a strong supporter of innovation as a catalyst for positive change. Their support of I-Corps is their first partnership with NSF. The Kauffman Foundation has a history devoted to the support of entrepreneurship and entrepreneurship education, and their participation in I-Corps continues a rich relationship with NSF. For example, Kauffman provided invaluable advice and structure to our Innovation Fellows Post-Doctoral program, carried out in partnership with the American Society for Engineering Education (ASEE), in 2009 - 2010. Donations to the I-Corps program, which will leverage NSF appropriated funds, are currently estimated to be \$1.20 million over the first two years.

## *Organizational Structure*

NSF participation includes every directorate and NSF's Offices of Cyberinfrastructure and Polar Programs. The structure of I-Corps mirrors the NSF Director's vision of OneNSF, working together seamlessly in well-integrated and efficient ways across organizational and disciplinary boundaries. The internal review structure for the program involves a core of cognizant program officers in partnership with topic-specific program officers in each of the seven directorates and the Offices of Cyberinfrastructure and Polar Programs.

The I-Corps award mechanism includes funding, mentorship, and focused instruction in a hypothesis-driven approach to evaluating potential commercial viability. The I-Corps execution model will involve, at least initially, only a single solicitation. As NSF learns more about the community response to this program, NSF may modify the structure. Modifications might include award size, award duration, education, and mentorship requirements, just to suggest a few possibilities. For example, I-Corps awards could be increased to \$75,000 from the current \$50,000 to provide the team additional resources.

## **INVESTMENT FRAMEWORK**

### **FY 2011-FY 2012**

The Innovation Corps program is a key element in a series of NSF-supported programs concentrating on the innovation ecosystem. As explained in the Overview, I-Corps has its genesis in a number of long-standing programs within the NSF that support the innovation ecosystem. In FY 2011 and FY 2012, investments in the inaugural year for I-Corps complemented these long-standing investments in programs, such as ERC, I/UCRC, PFI, STC, NSEC, and MRSEC. Of course, all of these programs are built on the backbone of support for core research, primarily to individual investigators, found in every directorate at NSF.

The I-Corps program is comprised of three elements, namely:

- Financial support to the team for the development of a prototype or a proof of concept;
- A specific structure for the I-Corps team, comprised of a principal investigator, an entrepreneurial lead, and an innovation/entrepreneurial mentor; and
- A strong educational component focusing on a hypothesis driven approach to developing a methodology for evaluating both the technical merits and the marketability of the concept being proposed.

In FY 2012, the I-Corps program will initially support up to 150 projects annually, at \$50,000 each, for up to six months. The projects are submitted to NSF in response to NSF solicitation 11-560 and are reviewed under NSF's standard Grants for Rapid Response Research (RAPID) mechanism.

### **FY 2013 Request**

The FY 2013 Request begins with the basic I-Corps structure developed in 2011-2012, the elements of which will not change substantively in 2013. In FY 2013, NSF anticipates supporting up to 375 awards at \$50,000 each or 250 awards at \$75,000 each. However, based on lessons we will learn in the execution of I-Corps in 2012, we may make some adjustments to the program. Potential adjustments include:

- The size and duration of the award;
- The extent to which all I-Corps team members are required to participate in all aspects of the educational elements of the program; and
- The specific providers of the educational content of the program.

Today, a hypothesis driven approach to evaluating technical and market viability is offered to all principal investigators. This approach has proven to be very successful and experience to date indicates it provides significant "value added" to the principal investigator (PI). While this curriculum is currently offered to the PIs by one university, the expectation is that other universities will be able to leverage this curriculum and integrate it into similarly productive curricula. We anticipate, in FY 2013, to offer opportunities to other universities to develop the curriculum, using the lessons learned in the execution of the I-Corps program in FY 2011 and FY 2012. We also anticipate the establishment of regional I-Corps nodes, wherein the hypothesis driven innovation educational offerings for PIs and their teams would be developed and provided by the universities involved in these nodes.

### **FY 2014 – FY 2016**

In the next three to five years following FY 2013, full-scale integration and dissemination of this program throughout the country, utilizing a regional hub model, is anticipated. The Foundation has purposely

restricted opportunities for providing the educational content of I-Corps to one institution for the first full year of the program (FY 2012), so that we can collect data from the FY 2011 and FY 2012 awardees and learn the advantages and disadvantages of that particular approach. The intention, from the outset, has been to solicit participation of universities throughout the country in offering these dynamic and powerful curricula for innovation. NSF also anticipates that, in the outyears, a substantial cohort of SBIR proposers and winners will develop from successful I-Corps recipients. NSF has already seen, in just the short time since launching this program in July of 2011, a significant number of SBIR proposals from among the I-Corps cohort.

**I-Corps Funding**

(Dollars in Millions)

| Directorate/Office | FY 2011<br>Actual | FY 2012<br>Estimate | FY 2013<br>Request |
|--------------------|-------------------|---------------------|--------------------|
| BIO                | \$0.05            | \$0.50              | \$2.00             |
| CISE               | 0.20              | 2.50                | 6.00               |
| ENG                | 0.45              | 2.50                | 6.00               |
| GEO                | -                 | 0.25                | 1.00               |
| MPS                | 0.20              | 1.00                | 1.30               |
| SBE                | 0.05              | 0.50                | 0.50               |
| OCI                | -                 | 0.25                | 1.00               |
| OPP                | -                 | -                   | 0.75               |
| EHR                | 0.10              | -                   | 0.30               |
| <b>Total, NSF</b>  | <b>\$1.06</b>     | <b>\$7.50</b>       | <b>\$18.85</b>     |

Totals may not add due to rounding.

**EVALUATION FRAMEWORK**

I-Corps is the focus of one of NSF’s three Priority Goals for FY 2012 and FY 2013. Progress towards Priority Goals is assessed quarterly by agency senior management and reported on the website *Performance.gov*. The relevant priority goal is to increase the number of entrepreneurs emerging from university laboratories. Specifically, the Priority Goal states that by September 30, 2013, 80 percent of teams participating in the Innovation Corps program will have tested the commercial viability of their product or service.

Additional primary outcomes and milestones for the I-Corps program center on those tangible measures that relate directly to the societal application realized from NSF’s investments in basic research. For example, successful completion of the I-Corps grant would be expected to contribute to one or more of the following:

- New start-up businesses, 25-30 percent of I-Corps recipients;
- Licensing, 5 percent of recipients;
- SBIR proposals, 10-15 percent of recipients;
- A business plan suitable for review by third-party investors, 10-15 percent of recipients;
- Students prepared to be entrepreneurially competitive, 80 percent of recipients; and
- New curriculum development or improvement in current curricula focusing on entrepreneurship and innovation.

While the expectation is that the I-Corps program will have a positive impact on all these measures, establishing a realistic *timeline* over which these measures will change is more challenging. Because of the high visibility and high community interest in I-Corps, there is naturally going to be close examination almost immediately of the impact of this program on metrics such as these. It may take more than a one-year cycle to see real and substantive changes in these measures. For this reason, quantifiable *measures of progress* that indicate NSF is indeed likely to see improvements in the above metrics as a result of I-Corps investments need to be used.

With the exception of the performance target established in the priority goal, at this early stage in the development and evolution of I-Corps, it is difficult to assign specific numerical targets around the metrics listed above. However, there is the expectation that numerical growth in all these areas will take place as a result of NSF's I-Corps investments. Initial evaluations will focus on process measures primarily, such as level of interest and number of proposals, and the ability to expand the mentor network. More substantive indicators such as start-ups, SBIR submissions, and third party investment will become critical as the program matures. Being very analytical, but also realistic, about the measures of success and when it will be appropriate to use each particular metric, a projected timeline is:

FY 2011: 21 awards at \$50,000 each – Primary evaluation, conducted by NSF staff, done on operations and process only; make procedural adjustments as necessary.

FY 2012: Up to 150 awards at \$50,000 each – The Foundation will establish baseline activities “Pre I-Corps” and begin data collection of the metrics described above.

FY 2013: Up to 375 at \$50,000 each or 250 awards at \$75,000 each – The Foundation will initiate evaluations utilizing the baseline metrics developed in FY 2012.

FY 2014-FY 2016: NSF will continue with regular evaluations of the previously described metrics, developing a chronological database that allows for more detailed historical analysis of program success. The approach will be similar to that taken with the very successful Engineering Research Centers and Industry/University Cooperative Research Centers programs since 1985.

