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 cultivate a national innovation ecosystem, NSF established the NSF Innovation Corps (I-Corps) in FY 2011. 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 the on 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 I-Corps Team grant gives 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 is 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.

In FY 2014 NSF will support two additional I-Corps competitions – Sites and Nodes – to further build, utilize, and sustain a national innovation ecosystem that augments the development of technologies, products, and processes that benefit the Nation. I-Corps Sites are funded at academic institutions, having already existing innovation or entrepreneurial units, to enable them to nurture and support multiple, local teams to transition their ideas, devices, processes or other intellectual activities into the marketplace. The I-Corps Nodes will establish regional nodes to provide training to I-Corps Teams; develop tools and resources that will impact and expand the benefits of the entire I-Corps program within a two to three year timeframe, and identify and pursue longer-term (five+ years) research and development projects.

I-Corps has its genesis in many of the long standing innovation ecosystem programs. Most closely related to I-Corps is the Partnership for Innovations' (PFI) 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), and other institutions. Their complementary focus will spur the development of discoveries into innovative technologies through collaboration.

All of these activities are designed to strengthen the U.S. innovation ecosystem.

Total Funding for I-Corps

(Dollars in Millions)

FY 2012 Actual	FY 2012 Enacted/ Annualized FY 2013 CR	FY 2014 Request
$6.77	**$7.50**	**$24.85**

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 Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR), and will utilize additional support from 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.

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.

Leadership structure and governance: I-Corps is led by a core group of cognizant NSF program officers comprised of representatives from all directorates. The lead program officer is from ENG and is currently detailed to the Office of International and Integrative Activities. In addition to working closely with all subject matter experts within the directorates and offices, the lead program officer and the I-Corps team regularly meet with other federal agency representatives who have expressed interest in implementing similar programs within their own agency.

Scope within NSF: Principal Investigators (PIs) from every directorate, previously or currently supported for their research and education activities by NSF, are now benefiting from this educational and financial support through I-Corps.

External stakeholders: The primary focus of I-Corps is to help the 'traditional' academic research community better connect with experts in innovation and entrepreneurship, who can in turn help those in the academic community evaluate the commercial viability of their ideas. The program has been well received by future small business interests, the venture capital community, and large established enterprises interested in the intellectual property generated by NSF-supported researchers.

Investment Framework

I-Corps Funding by Directorate

(Dollars in Millions)

Directorate/Office	FY 2012 Actual	FY 2012 Enacted/ Annualized FY 2013 CR	FY 2014 Request
Biological Sciences	$0.10	$0.50	$2.00
Computer and Information Science and Engineering	2.55	2.75	9.00
Education and Human Resources	0.36	-	0.30
Engineering	2.72	2.50	8.00
Geosciences	0.19	0.25	1.75
Mathematical and Physical Sciences	0.65	1.00	3.30
Social, Behavioral, and Economic Sciences	0.20	0.50	0.50
Total, NSF	**$6.77**	**$7.50**	**$24.85**

Totals may not add due to rounding.

FY 2011-FY 2013

The Innovation Corps program is a key element in a series of NSF-supported programs concentrating on the innovation ecosystem. As explained above, 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. 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 supported 124 Team awards, at $50,000 each, for up to six months. The projects were submitted to NSF in response to NSF solicitation 11-560 and were reviewed under NSF's standard Grants for Rapid Response Research (RAPID) mechanism.

The FY 2013 plan begins with the basic I-Corps structure developed in 2011-2012, the elements of which will not change substantively in 2013.

Today, a hypothesis-driven approach to evaluating technical and market viability is offered to all I-Corps teams. The I-Corps program delivers this immersive curriculum through regional I-Corps nodes, wherein the hypothesis driven innovation educational offerings for PIs and their teams are developed and provided by the universities involved in these nodes. This approach appears to be very successful and experience to date indicates it provides significant "value added" to the PI and their teams. In FY 2011, there was one I-Corps Node and in FY 2012, there were two. In FY 2013, NSF is offering 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 and to compete for more I-Corps Nodes.

Recognizing several universities have existing institutional infrastructure and mechanisms to support entrepreneurship within their campuses, NSF plans to launch I-Corps Sites. These sites will provide infrastructure, advice, resources, networking opportunities, training, and modest funding to enable formation of teams that can apply to the I-Corps program.

FY 2014 Request

- NSF will support up to 175 Innovation Team awards to fund NSF-funded researchers who will receive additional support - in the form of mentoring and funding - to accelerate innovation that can attract subsequent third-party funding. Each I-Corps grant provides the project team with resources to determine the readiness to commercialize technology developed by previously-funded or currently-funded NSF projects.

- NSF will support approximately 15 new Innovation Corps Sites in FY 2014. NSF provides up to $100,000 per year for three years to established academic institutions that already have existing innovation or entrepreneurial units to nurture and support multiple teams.

- NSF will support up to three new Innovation Corps Nodes in FY 2014. NSF provides $350,000 to $1.25 million per year for up to three years, depending upon the number of institutions involved, to establish regional nodes to provide training, tools, and resources for longer term (5+ years) projects that meet I-Corps program goals.

FY 2015 and beyond

NSF plans to achieve full-scale integration and dissemination of this program throughout the country, in the FY 2016 – FY 2017 timeframe utilizing a regional hub model. Full-scale implementation will likely include approximately 270 I-Corps Teams annually, a steady state of approximately 40 active I-Corps Sites and 10 regional I-Corps Nodes. 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 out years, several I-Corps recipients will apply to the SBIR program. NSF has already seen, in just the short time since launching this program in July of 2011, a significant number (24) of SBIR proposals from among the I-Corps cohorts resulting in 14 SBIR awards.

Evaluation Framework

I-Corps directly contributes to 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 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 as evidenced by completion of the I-Corps immersion course, where teams make 'Go/No-Go' decisions about moving forward with commercialization.

Additional primary outcomes and milestones for the I-Corps program center on 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 of patents or trademarks to third parties, 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.

In time, the I-Corps program will have a positive impact on all these measures. Given 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 several years to gather data to see real and substantive outcomes on these measures, and for this reason, approaches to tracking short-term progress also needs to be implemented.

Therefore, initial evaluations will focus on input measures primarily, such as level of interest and number of proposals, and the ability to expand the mentor network. Outcome indicators such as start-ups, SBIR submissions, and third party investment will become critical as the program matures. The projected timeline is:

- FY 2012: The Foundation established a baseline of "Pre I-Corps" activities.
- FY 2013: The Foundation will initiate evaluations and initiate the I-Corps Nodes and I-Corps Sites programs.
- FY 2014: NSF will continue with regular evaluations of the previously described metrics and develop a chronological database that allows for more detailed historical analysis of program impact. The approach will be similar to that taken with the ERC and I/UCRC programs since 1985.