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 purpose of I-Corps is to identify NSF-funded researchers who should receive additional support – in the form of mentoring and funding – to accelerate innovation that can attract subsequent third-party funding.

Total Funding for I-Corps

(Dollars in Millions)		
FY 2013	FY 2014	FY 2015
Actual	Estimate	Request
$13.09	**$22.38**	**$24.85**

Goal

The goals of the I-Corps program are the following:
- Build on NSF's investment in fundamental research;
- Offer academic researchers and students an opportunity to learn first-hand about technological innovation and entrepreneurship, and thereby potentially realize the promise of their discoveries; and
- 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.

This activity supports NSF's strategic goal to Stimulate Innovation and Address Societal Needs through Research and Education. Specifically, I-Corps contributes directly to the strategic objective, *Strengthen the links between fundamental research and societal needs through investments and partnerships,* through the entrepreneurial education of students and faculty.

Approach

The purpose of NSF I-Corps 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., whether the research is 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 2015, NSF will continue to 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 that have 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. I-Corps Nodes 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. In FY 2015, NSF will continue to support I-Corps Teams, and expand the Foundation's support of I-Corps Nodes and I-Corps Sites.

I-Corps is managed within NSF by a core group of cognizant program officers comprised of representatives from all directorates. The lead program officer is from the Directorate for Engineering (ENG), and co-lead program officers are from the Directorate for Computer and Information Science and Engineering (CISE) and the Directorate for Education and Human Resources (EHR). In addition to working closely with all subject matter experts within the directorates and offices, the lead program officer, co-lead program officers, and the I-Corps management team regularly meet with other federal agency representatives who have expressed interest in implementing similar programs within their own agency. NSF will explore opportunities to collaborate with states and regions on expansion of the I-Corps methodology across the Nation. The I-Corps program will also work closely with the Evaluation and Assessment Capability within the Office of International and Integrative Activities (OIIA) on impact assessment.

Investment Framework

I-Corps Funding by Directorate
(Dollars in Millions)

Directorate/Office	FY 2013 Actual	FY 2014 Estimate	FY 2015 Request
Biological Sciences	$1.15	$1.90	$1.00
Computer and Information Science and Engineering	4.60	8.00	10.00
Engineering	4.57	8.00	10.62
Geosciences	1.18	1.35	1.38
Mathematical and Physical Sciences	0.90	2.50	1.00
Social, Behavioral and Economic Sciences	0.35	0.35	0.50
Education and Human Resources	0.33	0.28	0.35
Total	**$13.09**	**$22.38**	**$24.85**

Totals may not add due to rounding.

FY 2013 – FY 2014
The Innovation Corps program is a key element in a series of NSF-supported programs concentrating on the innovation ecosystem. I-Corps has its genesis in a number of long-standing programs within NSF that support the innovation ecosystem, such as Engineering Research Centers (ERC), Industry/University Cooperative Research Centers Program (I/UCRC), Partnerships for Innovation (PFI), Science and Technology Centers (STC), and Materials Research Science and Engineering Centers (MRSEC). In FY 2011 and FY 2012, investments in the inaugural year for I-Corps complemented these long-standing investments. 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 foundation of the program – I-Corps Teams – is comprised of the following three elements:
- A specific structure for the I-Corps Team, comprised of a principal investigator, an entrepreneurial lead, and an innovation/entrepreneurial mentor;
- 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; and
- Financial support to the team for the development of a prototype or a proof-of-concept.

In FY 2013, the I-Corps program supported 131 NSF and four ARPA-E Team awards, at $50,000 each, for up to six months. The FY 2014 plan estimates up to 190 Team awards.

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 principle investigators (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 awarded three more I-Corps Nodes bringing it to a total of five. Building on this experience, NSF will support one to three additional new I-Corps Nodes in FY 2014. In FY 2015, NSF envisions working with states and regions to broaden the successful Innovation Nodes model.

Recognizing several universities have existing institutional infrastructure and mechanisms to support entrepreneurship within their campuses, NSF established the Innovation Corps Sites Program (NSF I-Corps Sites) in order to contribute to a national innovation ecosystem. Sites are funded at academic institutions that already have existing innovation or entrepreneurial units, enabling them to: nurture students and/or faculty who are engaged in projects having the potential to be transitioned into the marketplace. I-Corps Sites provide infrastructure, advice, resources, networking opportunities, training and modest funding to enable groups to transition their work into the marketplace or into becoming I-Corps Team applicants. In FY 2013, four Sites were funded, and NSF plans to fund up to 15 Sites in FY 2014.

FY 2015 Request
- NSF will support up to 189 Innovation Corps 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 $50,000 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 2015. 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 two or more new Innovation Corps Nodes in FY 2015 that incorporate best practices from previously funded nodes. NSF envisions potential partnerships with states that lead to the expansion of the I-Corps model across the nation. NSF currently 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.
- NSF also expects to invest approximately $1.0 million on Evaluation & Assessment activities at the FY 2015 Request level.

FY 2016 – FY 2017
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 8 to 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, many I-Corps recipients will apply to the Small Business Innovation Research (SBIR) program. Since launching the program in July of 2011, NSF has made 46 SBIR awards from among the I-Corps cohorts.

Evaluation Framework
I-Corps directly contributed to one of NSF's three Priority Goals for FY 2012 and FY 2013. Progress towards Priority Goals was assessed quarterly by agency senior management and reported on the website *Performance.gov*. The Priority Goal was to increase the number of entrepreneurs emerging from university laboratories. Specifically, the Priority Goal stated 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 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 I-Corps grants is 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 a need for evaluation on the impact of this program. NSF has developed an I-Corps Logic Model incorporating these outcomes. However, NSF recognizes the difficulty of performing a rigorous impact evaluation, especially in identifying counterfactual control to compare with as a baseline. Further, it may take several years to gather data to see real and substantive outcomes on these measures. In FY 2014, NSF is supporting a feasibility study aimed at developing a quasi-experimental design for use in the impact evaluation expected to begin in FY 2015.

Therefore, initial evaluations were focused on measureable metrics, such as the percentage of teams completing the rigorous I-Corps immersion course with a target to exceed 80 percent. Experience to date suggests that once the teams are carefully selected, over 90 percent are able to put in the due diligence necessary for completion of the course. NSF is collecting outcome measures such as NSF SBIR awards. Other outcome indicators such as self-reported start-ups, 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: NSF initiated data collection on completion of the rigorous I-Corps immersive curriculum by teams and reported it under *Performance.Gov*.
- FY 2014: NSF initiated tracking the number of NSF SBIR awards and is adding this data to its *Performance.Gov* reporting. NSF is supporting a feasibility study aimed at developing a quasi-experimental design for a rigorous in-depth impact evaluation.
- FY 2015: Based on the evaluation feasibility study, NSF will determine the path for a full evaluation of the I-Corps program. NSF will explore collaboration with States for spreading the I-Corps model across the Nation and will continue to work with other interested agencies for incorporating the successful NSF I-Corps program into their operations.