National Science Foundation

Innovation Corps (I-Corps™)

Biennial Report

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American Innovation and Competitiveness Act (AICA) Sec. 601

A Message from the Director

Sethuraman "Panch" Panchanathan
Director of the National Science Foundation

Since 1950, the National Science Foundation (NSF) has carried out its mission to "promote the progress of science; to advance the national health, prosperity, and welfare, and to secure the national defense." Through sustained, long-term investments in fundamental research, we have made leaps forward in every area of science and engineering, pioneering new areas of discovery and innovation, and expanding the possibilities of technology. An important aspect of NSF's work is translation—the process by which scientific knowledge becomes new technology that can enable our communities, strengthen our economy, and enhance our daily lives.

The NSF Innovation Corps (I-Corps) program is a critical tool for fostering the creative spirit and entrepreneurship that drives translation. It is the foundation for an innovation ecosystem that brings together scientists and entrepreneurs, engineers and business leaders, and industry partners with cutting-edge researchers. The result is an exciting mix of novel ideas for how to solve big challenges and new opportunities for commercial success.

Having been part of an I-Corps team, I know firsthand how this program makes it possible to turn laboratory research into new devices and products that can serve the needs of people throughout the nation. For thousands of people in both basic research and commercial development, I-Corps is a way to enhance their success through new partnership, a commitment to entrepreneurship, and a better understanding of how science and engineering can serve the needs of society.

This report highlights the progress of the I-Corps program and its impacts on the research community. NSF is proud that I-Corps has sparked collaborations with other federal departments and agencies. We are excited to build on I-Corps' strengths and successes to realize new economic and societal benefits going forward. Most of all, we are committed to strengthening the connection between the power of discovery and the promise of innovation.

Sethuraman "Panch" Panchanathan

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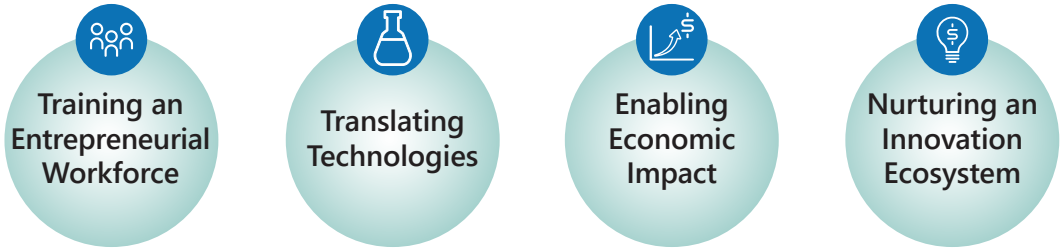
Executive Summary

The U.S. National Science Foundation (NSF) Innovation Corps (I-Corps™) program enables the American research enterprise to accelerate the ability to realize the economic and societal potential of projects born in fundamental science and engineering, and to generate benefits at multiple levels throughout the national innovation ecosystem.

The program consists of fast-paced training in the discovery of industrial needs, with a goal of informing both a technology development plan and an associated venture launch strategy. I-Corps provides a framework to bring together experienced mentors, commercial experts, promising technologies, and research talent to formulate ways to address challenges in the Nation's most advanced industries. I-Corps training and infrastructure together represent an important investment for NSF and the Nation, as directed by the American Innovation and Competitiveness Act (AICA), Public Law 114-329, Section 601.

In response to this important mandate, I-Corps addresses four urgent national needs: **Training an Entrepreneurial Workforce, Translating Technologies, Enabling Economic Impact, and Nurturing an Innovation Ecosystem**.



The program encourages the formation of teams led by seasoned scientists new to entrepreneurship and offers a method to explore possible commercial pathways under the tutelage of skillful advisors and instructors. I-Corps provides training in an evidence-driven framework used widely in the startup community; simultaneously, the teams interact directly with industrial scientists specializing in how to capitalize on advanced technologies. This two-fold approach – advanced education and firsthand engagement – enables teams to rapidly sort through possible commercialization paths to identify the most promising path forward.

The program draws together the globally leading U.S. academic and biomedical communities, as well as the national laboratory infrastructure, to nurture business leadership that thrives in the fast-paced, super-competitive, high-tech economies of the future. This vision is realized in a partnership among three agencies, who collaborate in identifying and addressing the evolving requirements of the program: NSF, the National Institutes of Health (NIH), and the Department of Energy (DOE). While each agency implements I-Corps at a different stage of the journey from demonstration to validation, they share a common vision of empowering scientists to inform and accelerate their contact with the marketplace. This rich collaboration has enabled all participating agencies to provide structured training, support venture launch at scale, and meet the Nation's call for action.

Executive Summary *continued*

Training an Entrepreneurial Workforce

Since its launch in Fiscal Year (FY) 2012, NSF I-Corps has educated 5,700+ participants. The NIH-NSF partnership, known as "I-Corps at NIH", began in FY 2015, and has led to 596 participating individuals. The Department of Energy partnership, known as "Energy I-Corps", launched in FY 2016 and has had 290 participants.

Because startups represent an important pathway for talented individuals to benefit from the technology economy, increasing the participation of women and underrepresented groups in I-Corps is important for moving toward economic equity across the U.S.. The number of women participating in I-Corps continues to grow. In FY 2019 and 2020, 49% of all NSF Teams, 57% of I-Corps at NIH Teams, and 41% of Energy I-Corps Teams had at least one female member. To expand I-Corps access to underrepresented groups, NSF partnered with The National GEM Consortium in 2019 to guide advanced science and engineering undergraduate students into innovation pathways associated with I-Corps.

Translating Technologies

Because each I-Corps Team is assessing the potential benefits of a new technology, the number of teams serves as a rough measure of the volume of technologies validated through the program. Since FY 2012, NSF I-Corps has explored technologies by 1,900+ Teams. I-Corps at NIH has developed 201 Teams since FY 2015, whereas Energy I-Corps has equipped 111 I-Corps national laboratory-based research Teams. These metrics suggest the vast potential that I-Corps offers in identifying potential uses for federally funded technologies.

Enabling Economic Impact

Because startups and small business growth have a disproportionately large, positive impact on the economy, an important measure of impact is the number of new ventures launched and their subsequent success rates in attracting both public funding and private investment to enable their continued growth. Since the inception of I-Corps at NSF, more than half (1,000+) of participating Teams have launched startups, which have cumulatively raised $760+ million in subsequent funding ($426 million in public funding and $335 million in private investment). The NIH teams are Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) bioscience awardees that have collectively raised $400+ million in subsequent funding ($232 million in public funding and $171 million in private investment). DOE-created startups have raised $83 million in post-training funding (distribution of public and private funding is not available at the time of this report).

Nurturing an Innovation Ecosystem

NSF also continues to pilot new ways to nurture an entrepreneurial ecosystem by incorporating I-Corps training into other programs for translational research and commercial applications, such as the Partnerships for Innovation (PFI) program, the Industry-University Cooperative Research Centers (IUCRCs), and the NSF SBIR/STTR programs. Furthermore, since its inception, NSF I-Corps has collaborated with eight U.S. Federal Government agencies, one state government and one foreign country to facilitate access to the training.

Executive Summary *continued*

The Future

As these agencies have evolved their programs to meet the needs of the research enterprise, the program is shifting as well.

NSF is migrating to a new operational model based on expanded consortia, known as "Hubs," to develop and nurture a National Innovation Network (NIN). This new model will help NSF continue to expand the ability to teach researchers customer discovery skills and facilitate technology applications for solutions that benefit the Nation. It is expected that these new Hubs will generate additional national capabilities to respond to the needs of various communities.

New Operational Hub Model

Due to the social distancing guidelines of the COVID-19 pandemic, NSF has pivoted to fully virtual operation, allowing I-Corps Teams, instructors, and NSF program staff to safely participate in cohorts. This model has allowed the program to continue uninterrupted in 2020. Many Teams benefitted from the capability to interview more potential customers across the country, as well as the much-needed flexibility to manage dependent care.

In summary, the I-Corps program at NSF, NIH, and DOE continues to grow. I-Corps has successfully included more women and other underrepresented groups on its teams to expand access. The associated startups grow and raise money successfully. And despite the challenges posed by the COVID-19 pandemic, I-Corps has efficiently and effectively adapted to ensure that Teams receive training, the ecosystem grows sustainably, and technologies migrate from discovery to impact.

Photo Credit: aiisha / Adobe Stock.

I-Corps Program at a Glance | Cumulative Outcomes

	NSF I-CORPS	I-CORPS at NIH	ENERGY I-CORPS
Mission	NSF I-Corps prepares NSF-funded researchers and other researchers to extend their focus beyond the laboratory and accelerates the economic and societal benefits of basic-research projects that are ready to move toward commercialization.	I-Corps at NIH accelerates the translation of biomedical research to the marketplace by providing innovation and entrepreneurship training to NIH-funded SBIR and STTR grantees.	Energy I-Corps accelerates the translation of research to the marketplace by providing innovation and entrepreneurship training to National Laboratory staff scientists and researchers.
Year (FY) Started	2012	2015	2016
Pilot Launched	Fall 2011	Fall 2014	Fall 2015
Teams Trained	1,908	201	120
Entrepreneurial Leads Trained	2,241	198	*Data not available*
Startup Businesses Formed	1,036	201	12
Subsequent Funding Raised	$761 Million	$403 Million	$83 Million

* Numbers reported above and in this report reflect total value since the inception of each program until the end of Fiscal Year 2020

Introduction

The pursuit of discovery leads to the technologies of the future. Fundamental science and engineering research have the promise to deliver exceptional economic and societal outcomes for the nation. By teaching entrepreneurial skills to researchers, opportunities abound. Startups create disproportionate impact on the economy by creating jobs, generating proprietary knowledge, and spurring the development of new industries.

To support a healthy, growing national innovation ecosystem, the National Science Foundation (NSF) introduced and continues to lead the Innovation Corps (I-Corps™) program to train academic researchers in identifying and meeting national needs. Anchored by a strong National Innovation Network linking highly trained and experienced commercialization experts across the country, I-Corps nurtures a diverse workforce capable of both the technical depth required for developing sophisticated solutions, as well as the breadth of understanding to analyze and anticipate potential industrial transformations.

The American Innovation and Competitiveness Act

The American Innovation and Competitiveness Act (AICA) provides a mandate for the I-Corps program. Furthermore, it states that I-Corps should continue to promote a strong innovation system by investing in and supporting female entrepreneurs through mentoring, education, and training as they have been historically underrepresented in entrepreneurial fields. NSF has extended this mandate to include individuals from underrepresented groups[1] to align with its ongoing mission of creating an inclusive entrepreneurial community that reflects the nation as a whole.

Three agencies offer parallel programs: NSF, the National Institutes of Health (NIH), and the Department of Energy (DOE). These three organizations report together on their progress in preparing an entrepreneurial-minded workforce to support the nation.

National Science Foundation WHERE DISCOVERIES BEGIN

NIH National Institutes of Health *Turning Discovery Into Health*

U.S. DEPARTMENT OF ENERGY

This report is prepared in accordance with the AICA, Public Law 114-329 Sec. 601: "The Director shall submit to the appropriate committees of Congress a biennial report on I-Corps program efficacy, including metrics on the effectiveness of the program. Each federal science agency participating in the I-Corps program or that implements a similar program under paragraph (2)(A) shall contribute to the report."

1 "The Foundation shall apply a broader impacts review criterion to identify and demonstrate project support of the following goals: (1) Increasing the economic competitiveness of the United States; (2) Advancing of the health and welfare of the American Public; (3) Supporting the national defense of the United States; (4) Enhancing partnerships between academia and industry in the United States; (5) Developing an American STEM workforce that is globally competitive through improved pre-kindergarten through grade 12 STEM education and teacher development and improved undergraduate STEM education and instruction; (6) Improving public scientific literacy and engagement with science and technology in the United States; and (7) Expanding participation of women and individuals from underrepresented groups in STEM."

Introduction *continued*

NSF I-Corps

NSF I-Corps enables the transformation of invention to impact through an immersive seven-week experiential training course led by experts in technology translation. NSF considers all areas of science and engineering. The curriculum integrates scientific inquiry and customer discovery in an inclusive, data-driven culture driven by rigor, relevance, and evidence. Through I-Corps training, academic researchers can reduce the time to translate a promising idea from the laboratory to the marketplace or relevant societal setting.

NSF seeks to strengthen a national innovation ecosystem that fosters innovation among scientific faculty and students; promotes regional coordination, linkages, and sharing of promising practices; and encourages networks to address pressing societal needs and economic opportunities for the nation.

Specifically, I-Corps has four primary objectives:

- **Prepare scientists and engineers** to extend their focus beyond the research laboratory
- **Translate laboratory discoveries** into solutions with benefits for the economy and society
- **Leverage federal research investments** by advancing commercialization of research outcomes
- **Increase the economic impact** of federally funded research

I-Corps at NIH

I-Corps at NIH empowers entrepreneurs to develop and validate a strategic business model through diverse customer discovery to address unmet clinical needs. The I-Corps at NIH teams participate in an 8-week entrepreneurial immersion course based on NSF I-Corps to generate insights into challenges associated with the commercialization of biomedical and life sciences technologies.

In contrast to the NSF I-Corps program, which traditionally engages university researchers, the I-Corps at NIH program is designed with small businesses in mind: NIH SBIR/STTR Phase I awardees. In SBIR/STTR Phase I, awardees work on early-stage technologies to establish the technical merit, feasibility, and commercial potential; and at this state, projects and teams do benefit from the I-Corps curriculum. The program impacts the future direction of participants' careers, research and teaching, and improves commercial outcomes of NIH-funded small businesses.

By design, the I-Corps at NIH program's team structure incorporates the titles and roles of individuals with decision-making authority within the small business. Participating companies enter the program with three-person teams:

- **C-Level Corporate Officer** (e.g., CEO),
- **Principal Investigator/Technical Lead** [e.g., assigned program director (PD) or principal investor (PI) listed on the Phase I award], and
- **Industry Expert** (e.g., internal or external professional possessing business development background in the target industry).

Introduction *continued*

Energy I-Corps

The Department of Energy (DOE) Energy I-Corps aims to accelerate the deployment of energy technologies by granting DOE laboratory staff[2] access to direct market feedback on their technology offerings. Inspired by the NSF I-Corps model, the Energy I-Corps program empowers teams with the tools, resources, and relationships necessary to discover potential market pathways for their innovations. The DOE ARPA-E program also uses I-Corps to train researchers funded by ARPA-E. Energy I-Corps is administered by the DOE Office of Technology Transitions (OTT).

The DOE's Energy I-Corps program encourages company formation but also defines metrics of success to include outcomes such as external licenses, market insight into research, and improved external engagement. DOE sees great value in changing the problem-solving approach for researchers who return to the bench better equipped to ask and frame research questions through a customer lens based on their customer outreach. This promotes culture change and a new approach to problem solving that reverberates across the lab system for years to come.

2 The definition of sites differs between NSF and DOE. DOE defines their sites as the National Labs while NSF sites are at academic institutions.

Introduction *continued*

NSF I-Corps Training Curriculum

The NSF I-Corps curriculum, which uses an accelerated training adapted from so-called "Lean Startup" methodologies, focuses on the identification of feasible business models to inform both future research and pursuit of commercialization opportunities. Participants enter as close-knit teams that collaborate to "get out of the building" and interview potential customers, partners and other business stakeholders (typically 100 interviews in a seven-week period), with a goal of exploring possible applications potentially addressed with their technological innovations in a sustainable business model.

In the final Lessons Learned presentation, I-Corps Team participants are challenged to articulate a **Commercialization Plan.** Participants craft a cohesive narrative explaining: (1) the "Product-Market Fit," linking the technology to a commercialization opportunity, with options of "Yes/No/Not Yet"; (2) the "Path Forward Decision," regarding the decision to conduct further research, launch a startup, or pursue a different commercialization path than a startup; and (3) their next steps, based on their path forward decision.

The primary outcome of the program is an entrepreneurial mindset that integrates evidence-based decision-making with a spirit of curiosity and insight regarding industrial needs. This combination enables participants to make informed decisions regarding commercial viability and a potential startup opportunity.

Commercialization Plan - Key Steps & Objectives

Product-Market Fit

Linking the technology to a commercialization opportunity: Yes/No/Not Yet?

Path Forward Decision

Decide whether the technology needs further research, ready to launch a startup, or pursue a different commercialization path?

Next Steps

What actions to take based on path-forward decision?

Introduction *continued*

Outcomes

To assess the I-Corps program, NSF, NIH, and DOE established metrics around four themes—Training an Entrepreneurial Workforce, Translating Technologies, Enabling Economic Impact, and Nurturing an Innovation Ecosystem. These themes are implemented as follows:

Training an Entrepreneurial Workforce.

This metric is realized as *individuals trained,* including progress toward broadening participation objectives;

Translating Technologies.

This metric is realized as *teams trained,* as each team is linked to a technology;

Enabling Economic Impact.

This metric is realized as *subsequent economic impact* as determined by three outcomes: Startup businesses formed by I-Corps Teams and subsequent project funding (public and private); and mergers or acquisitions (together known as "exits").

Nurturing an Innovation Ecosystem.

This metric includes both the expansion of the National Innovation Network (NIN), as well as the magnitude of program funding.

These four domains serve as a starting point for evaluation of the I-Corps program. As the program continues to develop, it is anticipated that the assessment methodology and metrics will continue to evolve.

The full set of outcomes for all three agencies, as well as an associated glossary/data dictionary, is reported in Appendix I.

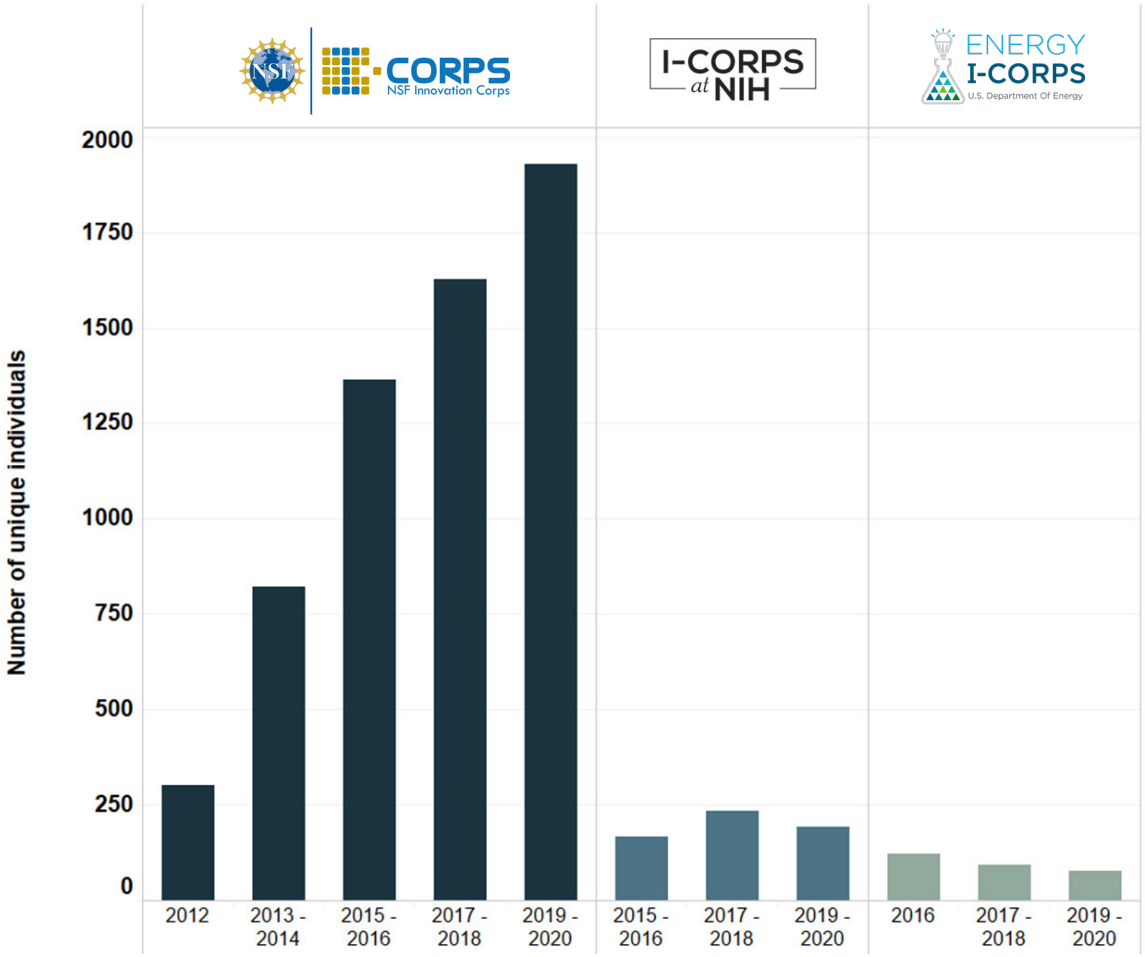
Training an Entrepreneurial Workforce

I-Corps is an experiential training program. It gives researchers the tools to start a relevant venture and opens opportunities in entrepreneurship as a career path. Many I-Corps participants note that they have obtained a new set of tools for research with impact.

I-Corps Participants

Between FY 2019 and 2020, more than 1,900 (unique) individuals participated in NSF I-Corps, nearly 200 individuals participated in I-Corps at NIH, and nearly 80 individuals participated in I-Corps at DOE. Since FY 2012, a total of 6,700 across all three agencies have participated in I-Corps.[3]

Figure 1
Individuals participating in I-Corps
Number of distinct I-Corps participants



3 The time periods refer to the date of participation in I-Corps. Due to the social distancing requirements associated with the COVID-19 pandemic, the I-Corps@NIH and Energy I-Corps programs only conducted one cohort each in FY 2019-2020.

Training an Entrepreneurial Workforce *continued*

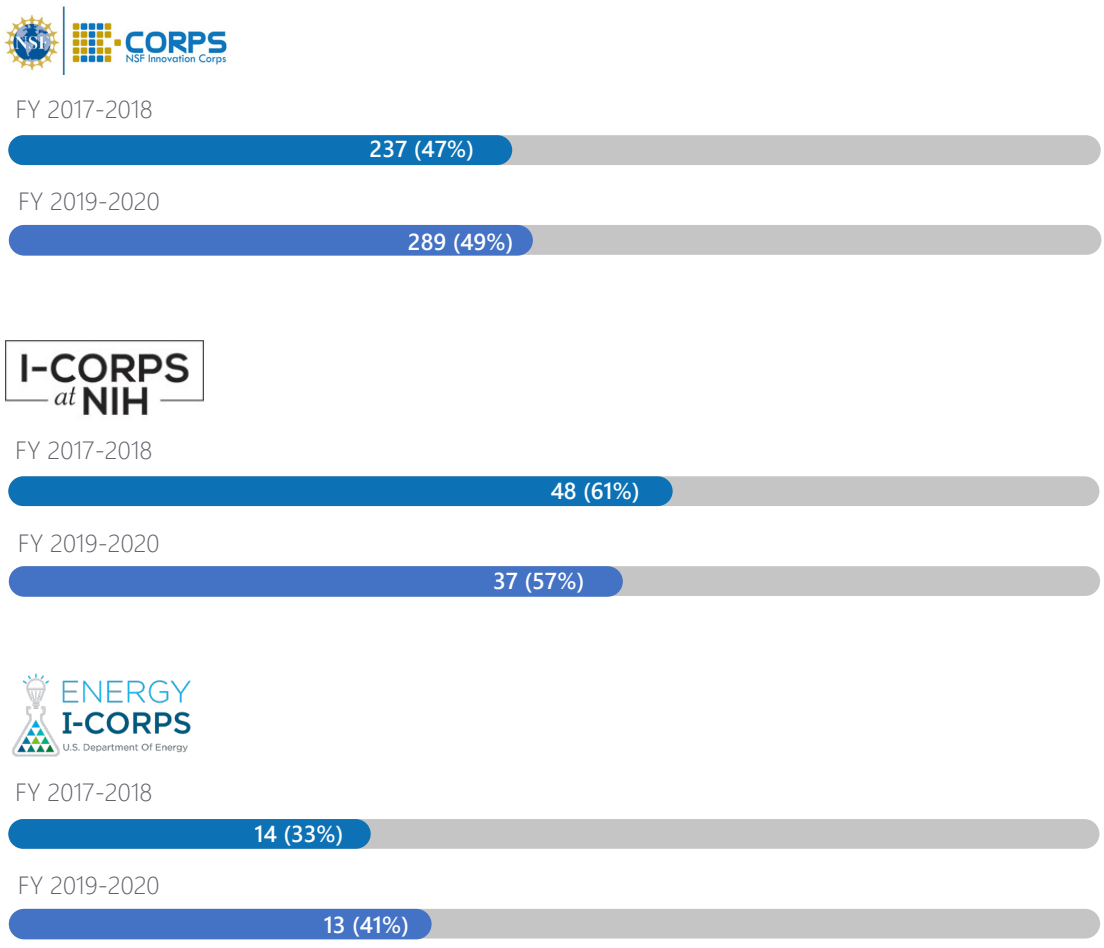
Women in I-Corps

The I-Corps program encourages the participation of women, analyzed at the Team level. **Forty-nine percent (49%) of Teams completing I-Corps training in FY 2019 and FY 2020 had one or more women on the Team (49% of NSF Teams, 57% in I-Corps at NIH, and 41% in Energy I-Corps).** Two of the agencies demonstrated a relative improvement in the participation of women on I-Corps teams since the last reporting period.

Figure 2

Female representation on I-Corps Teams[4]

Percentage of teams with at least one female members



4 Complete data regarding female representation on Teams were not collected prior to 2017.

Training an Entrepreneurial Workforce *continued*

Broadening Participation in I-Corps

NSF remains deeply committed to creating opportunities for all the Nation's communities. In the Fall of 2019, NSF entered into a three-year cooperative agreement with The National GEM Consortium (GEM, formerly Graduate Education for Minorities), a network of leading corporations, government laboratories, and top universities and research institutions.

Chartered in 1976, GEM is the only privately funded, non-profit graduate education organization connecting highly qualified minority graduate students to a national network of more than 150 top-rated universities, government research facilities and leading multinational corporations.

The GEM Inclusion in Innovation Initiative (I4) has four objectives: 1) inspire researchers; 2) integrate the GEM Network into the National Innovation Network; 3) increase the number of participants from underrepresented groups; and 4) impact diversity and inclusion in the national ecosystem.

As of December 2020, 215 GEM graduate student fellows have participated in pilot programming led by a novel partnership of I-Corps instructors and GEM experts. Furthermore, GEM leads an active research effort to explore mechanisms to increase participation of underrepresented groups. It is expected that as promising practices are identified, they will rapidly be scaled.

Translating Technologies

The NSF I-Corps Teams program is an intensive, **seven-week training program** that educates academic researchers on business model development. The training requires that teams **engage in customer discovery,** or the process of exploring business model elements through **at least 100 focused interviews.** In parallel, the course is led by experts teaching a standardized curriculum of business concepts to inform the interview process. The Teams participate in the NSF I-Corps training as a cohort, wherein peer-to-peer interactions and networking are highly encouraged.

The I-Corps training program at all agencies supports a collaborative approach with Teams typically consisting of three roles:

Technical Lead, typically a university faculty member, senior research scientist or postdoctoral scholar with deep and direct technical expertise in the technology of interest for potential translation;

Entrepreneurial Lead, typically a postdoctoral researcher or graduate student committed to understanding the potential applications of the technology; and

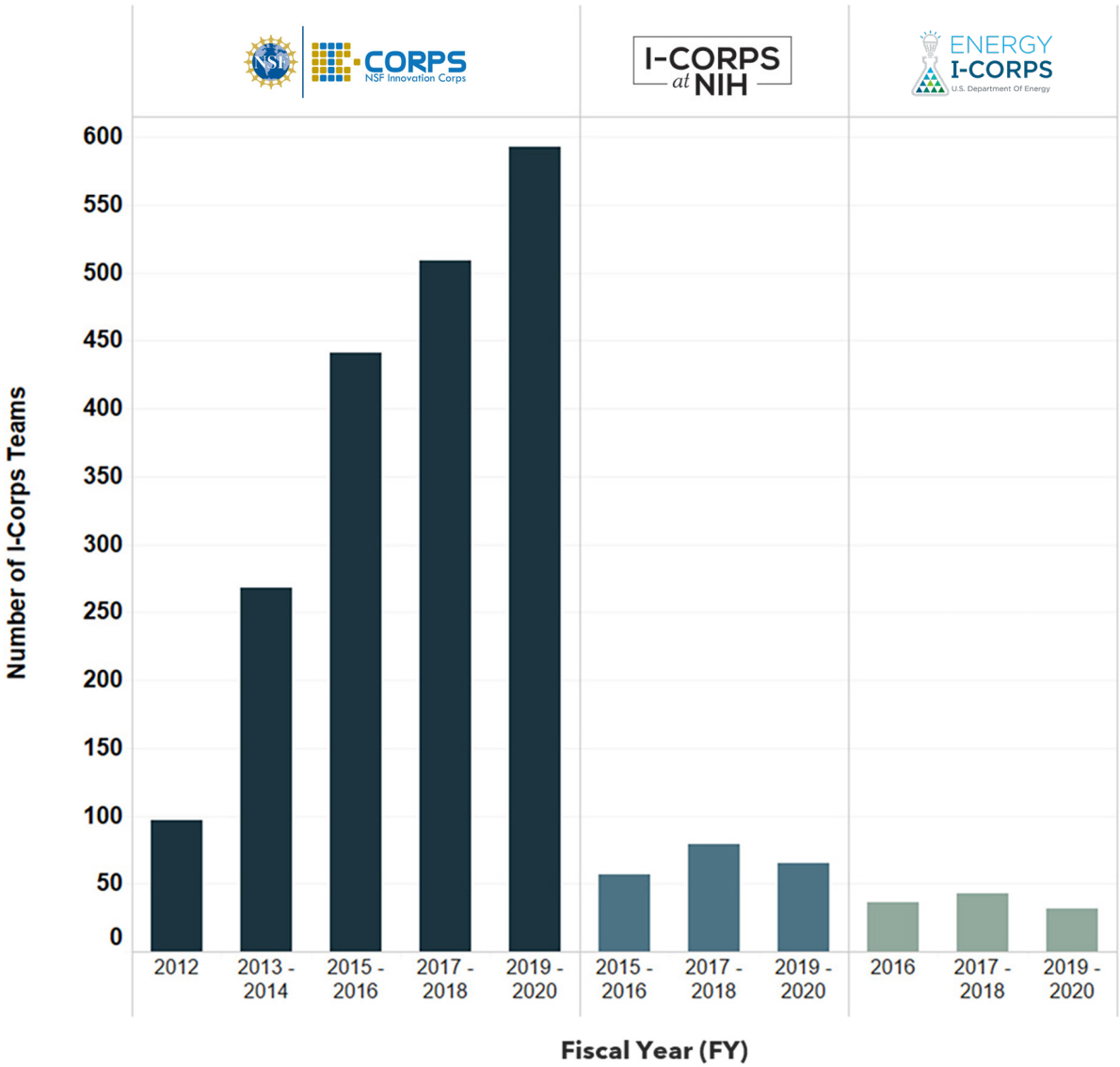
Industry Mentor, typically an experienced entrepreneur with a background in transitioning technology out of scientific laboratories.

The teaching team for an I-Corps cohort consists of three core faculty and three adjunct faculty, all of whom participate in a standardized intensive training to ensure consistency in the course delivery. The core/adjunct model enables NSF to attract top teaching talent from the startup communities around the country so that the teaching faculty reflects the nation as a whole. These instructors are associated with the National Innovation Network, described further below.

Translating Technologies *continued*

Each I-Corps team focuses on a specific technology under development in its laboratory, and therefore the number of teams is a good measure for the number of technologies assessed for translational potential. *(Figure 3)*

Figure 3
I-Corps Teams[5]
Number of Participating I-Corps Teams



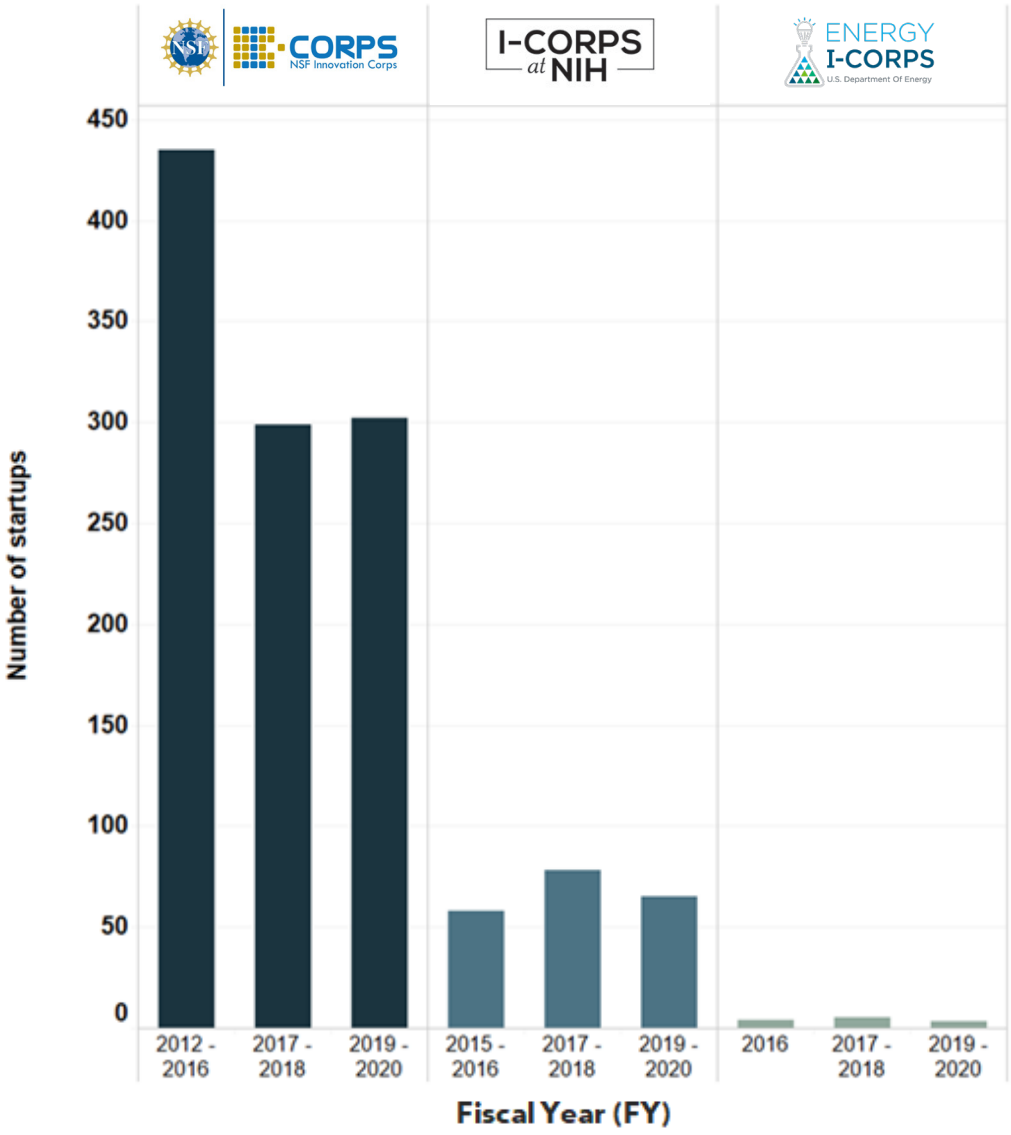
5 Dates reflect completion of the I-Corps program. Due to the social distancing requirements associated with the COVID-19 pandemic, I-Corps at NIH and Energy I-Corps conducted only one cohort each.

Enabling Economic Impact

Startup Formation

A major outcome of the I-Corps program is to generate and support startup companies. Hundreds of new companies are associated with the technologies for which the commercial potential has been validated. In FY 2019–FY 2020, NSF began piloting cohorts dedicated to its SBIR/STTR Phase I awardees. At this time, hundreds of companies have had their technologies validated in I-Corps (Figure 4).

Figure 4
Startups associated with I-Corps technologies
Number of startups formed



Enabling Economic Impact *continued*

Subsequent Funding

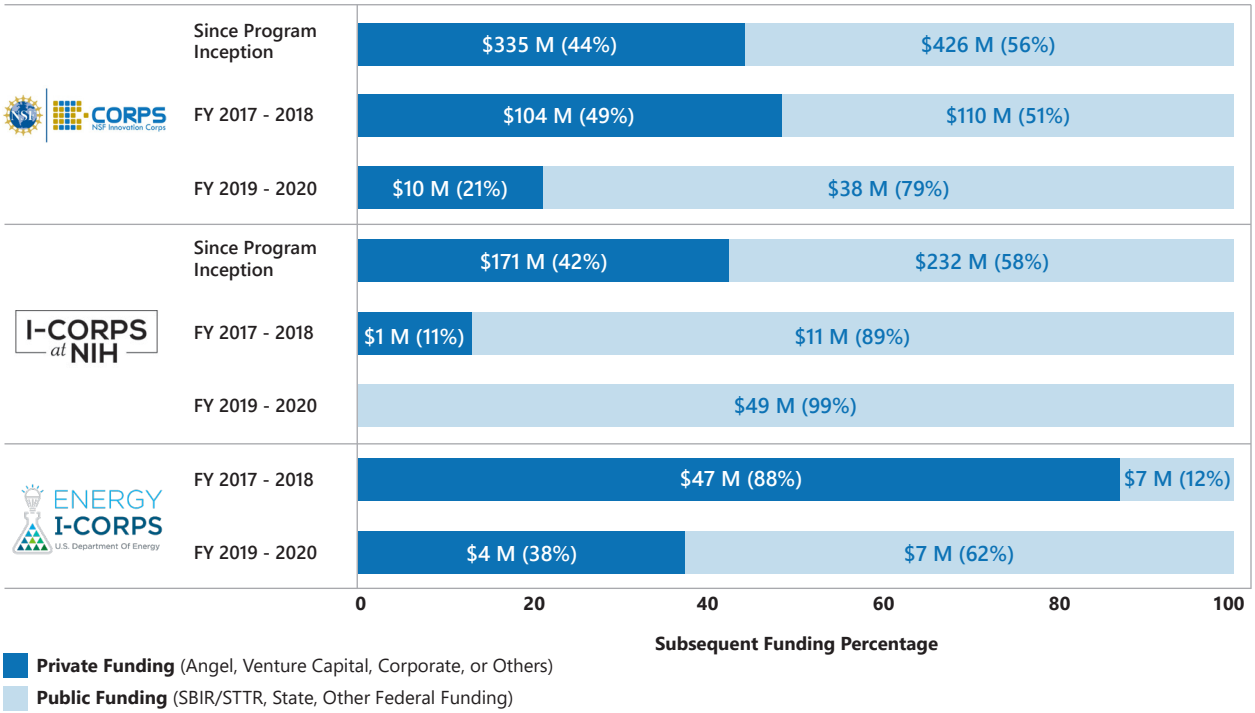
Many of the startups associated with I-Corps need significant levels of capital to launch because of the nature of the technologies. This launch may begin with public funding in the form of SBIR/STTR awards or other federal funding, and then may transition to the private markets. At DOE, the technologies may remain inside the laboratories.

Subsequent funding raised by Teams comprises two forms:

Public funding consists of SBIR/STTR funding, other federal funding (not SBIR/STTR), and state funding.

Private funding consists of venture capital, angel or individual investment, private or corporate funding, and other sources of funding.

Figure 5
Subsequent funding for I-Corps-affiliated startups participating in each reporting period[6]
Distribution by funding form



6 Funding from prior reporting periods is included in later ones; for example, a Team completing a cohort in FY 2017-2018 is included in that period as well as in the "Since Program Inception" period. Total subsequent funding generated by Energy I-Corps teams is $84 M, but data categorizing public or private sources were not available at the time of this report.

Nurturing an Innovation Ecosystem

The NSF I-Corps National Innovation Network is a set of institutions and collaborations that implement the I-Corps program to grow and sustain the national innovation ecosystem.

Nodes

Nodes are typically large, multi-institutional collaborations that support technology entrepreneurship regionally. Nodes form teaching teams to deliver the I-Corps curriculum in national cohorts and create regional training as introductions and recruiting for I-Corps. Furthermore, they recruit and train national I-Corps instructors, identify researchers with promising technologies, and help catalyze I-Corps Team formation. Nodes also develop and manage tailored programs with a variety of federal agency, university and industry partners.

There are nine Nodes in FY 2020.

Sites

To catalyze potential I-Corps teams within their local institutions, entrepreneurial Sites have been established at individual colleges and universities. Sites provide abridged I-Corps training and augment courses with other regional resources. They facilitate networking to help form I-Corps Teams.

There are 99 Sites in FY 2020.

Nurturing an Innovation Ecosystem *continued*

New Model: Hubs

Rather than funding two separate award types, Nodes and Sites, to support the National Innovation Network, NSF will fund Hubs. This new, more integrated award (NSF Solicitation 20-529) incorporates lessons learned from the program's initial success and represents an operational change to the way institutions will receive funding from NSF. The new operational model provides increased and level (rather than previously declining) funding and is more scalable to support the expansion of I-Corps.

Benefits of the Hub Model

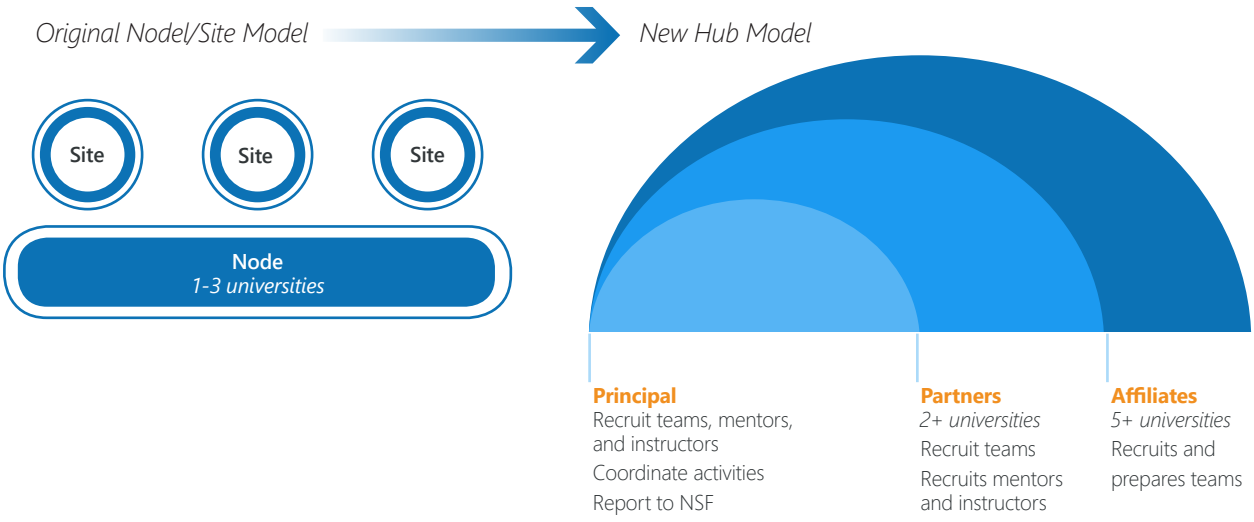
Dynamic Consortia
Hubs are dynamic consortia that begin with a minimum of eight institutions and are required to expand their regional reach and impact by adding at least one new institution per year.

Pool Resources
Hubs pool resources to provide research teams with greater opportunities and access to consistent, high-quality regional and national innovation resources, including NSF I-Corps training cohorts.

Diverse and Inclusive
Hubs are diverse and inclusive in all aspects—including research disciplines, academic institutions, people, tools, programs, capabilities, and geographic locations—to take full advantage of the nation's potential.

Expands National Innovation Network
The Hubs model allows for the expansion of the National Innovation Network and offers visibility into the regional and local impact of the I-Corps program.

Figure 6
Evolution of the Operating Model



Partnerships

Expanding Synergies Within NSF

Partnerships for Innovation (PFI)

Scientists and engineers increase the impact of their NSF-funded research discoveries by developing their technology into a prototype or proof-of-concept through the Partnerships for Innovation (PFI) program (NSF 19-506), supporting technology translation. The intended outcomes of a PFI project are: commercialization of new intellectual property derived from NSF-funded research; creation of new or broader collaborations with industry, including increased corporate-sponsored research; licensing of NSF-funded research to third parties; formation of startups; and entrepreneurship training for future leaders in innovation.

Beginning in FY 2019, PFI awards have included NSF I-Corps training for translational research and technology development focused on commercial applications. To date 21 teams have participated in I-Corps while conducting their prototyping research.

I-Corps for SBIR/STTR

NSF's SBIR and STTR programs (collectively known as "America's Seed Fund powered by NSF") have helped startups develop their technologies and translate them to market for over a quarter-century. In FY 2019 and FY 2020, NSF piloted giving SBIR/STTR awardees the opportunity to participate in I-Corps cohorts, offers the I-Corps curriculum, access to I-Corps instructors and requires 100+ industry interviews. Sixty-one (61) teams participated in cohorts for which the final decision was to identify next steps toward success. It is anticipated that this pilot will continue.

Beat-the-Odds Boot Camp

For many years, the NSF has encouraged all of its new SBIR/STTR Phase I awardees to participate in the Beat-the-Odds "Boot Camp" based on an abridged I-Corps curriculum, offering access to I-Corps instructors and requiring 30+ customer interviews. This program has served as an introduction to customer discovery for awardees who may not have had previous connections to the National Innovation Network. An estimated 300 teams participate each year, including teams from other agencies.

Industry-University Cooperative Research Centers Boot Camp

The Industry-University Cooperative Research Centers (IUCRC) are multi-university consortia with industry representatives participating through a membership model. Because NSF is committed to helping academics understand industrial research and commercial needs, the IUCRC program has implemented a similar Boot Camp for awardees with Planning Grants. This process helps them discover pressing industrial needs to address in their proposed Centers. The Boot Camp helps them acquire critical entrepreneurial skills toward development of new enterprises, such as IUCRCs, in the academic environment. Four cohorts of Planning Grant awardees have participated in the Boot Camp and several have successfully launched new Centers.

Partnerships *continued*

Federal Partners Participating in NSF National Cohorts

NSF provides mechanisms for several federal agencies to enable their own awardees to participate directly in NSF cohorts. The current participating agencies and programs are listed below, and a full record is listed in Appendix 2.

Department of Defense (DoD): I-Corps@DoD

The goals of I-Corps@DoD are to spur the translation of fundamental research with potential defense relevance to the marketplace, to encourage collaboration between academia and industry, and to train students, faculty, and other researchers to understand innovation and entrepreneurship. DoD sends teams to NSF I-Corps cohorts.

Department of Homeland Security (DHS)

The DHS Science and Technology Directorate SBIR program offers select awardees an opportunity to participate in NSF I-Corps. The participant companies evaluate the market opportunity of their DHS-funded innovations to more successfully prepare for and increase the odds of successful commercialization.

National Aeronautics and Space Administration (NASA)

The NASA I-Corps program enables small businesses, including startups, to improve the likelihood of success by introducing their SBIR and STTR awardees to business model development. NASA teams participate in NSF I-Corps cohorts. In addition to sending teams to NSF cohorts, NASA teams also participate in the NSF Beat-the-Odds Boot Camp.

Other Partnerships

State Partner: I-Corps@Ohio

The I-Corps@Ohio program incorporates NSF I-Corps training objectives to accelerate commercialization of technologies from Ohio universities, colleges and research institutions. The program expands the business acumen and networks of faculty and students across the state. Funding for this program comes from the State of Ohio, which worked with NSF to train their instructors. The resulting startup companies will drive sustainable, technology-based economic development in Ohio. (I-Corps@Ohio metrics are not included in this report.)

Foreign Partner: Science Foundation Ireland

Science Foundation Ireland (SFI) partnered with NSF to allow participation of SFI-funded researchers in the NSF I-Corps program. The SFI/NSF I-Corps@SFI Entrepreneurial Training Programme is intended to support SFI-funded researchers to develop entrepreneurial skills that will enable them to realize new opportunities for their research that will lead to economic and societal impact. At the same time, U.S.-based NSF I-Corps Teams learn about European markets from Irish counterparts, and the NSF program explores opportunities for European mentors and additional collaborations.

The SFI/NSF I-Corps partnership builds on a long history of scientific collaboration between the two agencies, including the NSF Engineering Research Center program collaboration, and extends the collaboration from fundamental research to translational and entrepreneurship activities. Since the partnership was signed in 2016, I-Corps@SFI has supported 13 SFI teams in the NSF I-Corps Teams program.

Virtual Operation

Response to the COVID-19 Pandemic

In response to the COVID-19 pandemic beginning in March 2020, the NSF I-Corps program quickly pivoted to offer the course entirely online to ensure the safety of participants, instructors, and NSF staff, with no loss of content or quality. As of December 2020, NSF has led 8 fully virtual cohorts with more than 200 Teams. Teams meet as a cohort for their kick-off meeting, convene weekly with their instructors, and converge as a group at the course's end for a Lessons Learned session.

I-Corps Teams have reported that the virtual program continues to provide great value. Many say that they are able to easily achieve 100+ industry interviews — often noting that inviting industry leaders to meet virtually has been easier than they expected. Furthermore, this mode of operation has enabled NSF to open new opportunities for participants with physical disabilities and dependent care responsibilities, broadening participation in the program.

NSF Highlights

Participant Highlight

Carbice Corporation

Georgia
NSF I-Corps Participant, 2016

$15 million
recently raised in private capital

Carbice Corporation's core work was developed at Georgia Tech by 2017 NSF Waterman Award Winner Dr. Baratunde Cola. At the core of Carbice Carbon is the highest thermal conductivity material in the world—the carbon nanotube.

Fundamentally, heat management is a barrier to innovation. The ever-increasing functionality (and power) of electronics, smaller and more complex packages, and the always connected nature of our world have all combined to place heat removal as one the most significant challenges to deploying new technologies. When electronics run too hot, they fail prematurely, sometimes catastrophically. Carbice Carbon is helping to solve all of these problems with our innovative new technology. Already, we have enabled new products to be launched, saved our customers hundreds of thousands of dollars in build costs and have been designed into several new satellite constellations that are breaking new ground in low-cost space exploration.

I-Corps really helped us to refine our value proposition. We went into the program with a well-defined sense of what our initial products and markets would be, but the time speaking directly to end users during the customer discovery process taught us what features of our products added the most value and differentiation from the rest of the market. That enabled us to double down on perfecting and enhancing those features early in the product design cycle so that all of our products built on that competitive advantage.

Craig Green
Chief Technology Officer and Vice President of Engineering

The Carbice Corporation team.
Photo credit: Carbice Corporation.

Participant Highlight

Marinus Analytics

Pennsylvania
NSF I-Corps Participant, 2014

In the last two years, the Marinus Analytics solution "Traffic Jam" has contributed to the identification of 6,800 victims of sex trafficking. While an undergraduate at Carnegie Mellon University (CMU), Marinus Analytics' President and Founder Emily Kennedy began researching human trafficking. She was connected with CMU's Robotics Institute and, with their help, developed Traffic Jam, a suite of analytics tools that use machine learning and artificial intelligence to "quickly turn big data into actionable intelligence to help save precious investigative time to rescue vulnerable victims." In 2014, Kennedy and her partners spun the research out of the university into the startup Marinus Analytics, which came to receive National Science Foundation SBIR funding in the coming years.

Kennedy attributed her company's success to the support of the NSF:

All of this [success in assisting law enforcement in recovering human trafficking victims] would not have been possible without the support of the National Science Foundation who believed in our mission of AI for social good.

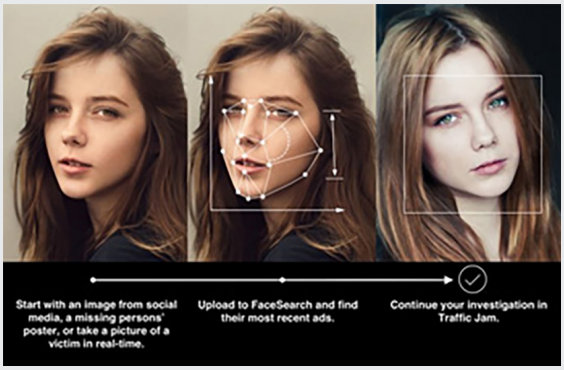


Illustration of the Traffic Jam solution to find victims of human trafficking.
Photo credit: Marinus Analytics.

NSF Highlights *continued*

Participant Highlight

Meati Foods

Colorado
NSF I-Corps Participant, 2016

Meati Foods (formerly known as Emergy) makes environmentally sustainable protein as synthetic "meat" from fungi and recently raised $28M. Meati's products are textured, highly nutritious, and even cost competitive to animal meats. Meati's process is highly efficient and sustainable, using 1% of the land, water, and energy compared to traditional animal meats. At scale, the products achieve cost parity, allowing for wide market adoption.

I-Corps has played an integral part of Meati Foods journey. The co-founders of Meati Foods originally took part in the NSF National I-Corps program in the fall of 2016. At the time, the company was called Emergy and the technology was driven toward making advanced electrochemical materials. The interviews from the first I-Corps (along with three subsequent I-Corps with different organizations) led Emergy to pivot into protein production and eventually a branded product.

Justin Whiteley
PhD, Co-founder and Chief Technology Officer at Meati Foods

Meati Foods alternative steak product.
Photo Credit: Susan Morrell, Meati Foods.

Participant Highlight

Metalmark Innovations, Inc.

Massachusetts
NSF I-Corps Participant, 2018

Metalmark is a Harvard startup that leverages patented 3D nano-architectured materials to create air purification systems for treating submicron-scale indoor airborne pollution, targeting airborne pathogens (such as viruses like COVID-19) that spread infectious diseases, volatile organic compounds (VOCs) such as formaldehyde, and ultra-fine particles (UFPs) that cause chronic illnesses, cancer, heart attacks, and strokes, and neurological disorders like dementia and Alzheimer's Disease.

The transmission of COVID-19 is primarily via airborne droplets. Effectively inactivating these airborne viral droplets is critical for reducing the risks of infection and protecting against future pandemics. Currently, a technology gap exists for such solutions that are safe, efficient, and cost-effective. Our solution is well-suited for filling that gap, as well as provide additional benefits such as decomposing VOCs and UFPs..., The NSF has been pivotal to our growth since the beginning, from initial validation of the technology to the current phase of product-oriented development and scaleup.

Sissi Liu
CEO and Co-Founder of Metalmark Innovations

Metalmark Innovations team (left to right): Sissi Liu, Tanya Shirman, Elijah Shirman. Photo Credit: Harvard Innovation Labs.

NSF Highlights *continued*

Participant Highlight

PhotoCide Protection, Inc.

North Carolina
NSF I-Corps Participant, 2018

Founded in 2018 with technology developed at North Carolina State University, PhotoCide Protection, Inc. is developing a family of environmentally-friendly products that can disinfect high-touch surfaces for about 7 days, protecting people from a wide range of pathogens, including drug-resistant strains and SARS-CoV-2. Inspired by one of the co-founders' personal experiences with hospital-acquired infections, PhotoCide Protection's products use biocidal 'singlet' oxygen (from oxygen in the air) to cause damage to bacteria, fungi viruses, and multi-drug resistant bacterial strains.

While we have long believed in the technology and scientific principles behind the SafeLight family of products, three significant moments stand out in terms of believing that the idea might work from a commercial standpoint: first, at the conclusion of the NSF I-Corps program, where based on our findings from over 135 voice of customer interviews we made a 'Go' decision on moving forward with our startup and its pre-commercialization steps; second, just recently after the NSF STTR Boot Camp, where we identified additional customer segments and better mapped out the SafeLight product adoption strategy; and third, recent data on our SafeSpray product (obtained as part of the STTR grant) show that it is capable of inactivating human coronavirus 229E (as a model for SARS-CoV-2) for over a month under ambient environmental conditions, thus extending the length of our antimicrobial claims to well over what we have heard that hospitals are looking for (i.e., one week).

Robert Sheehan
Business Manager, PhotoCide Protection

PhotoCide Protection's STTR-support technician performing antiviral assays.
Photo credit: PhotoCide Protection.

Participant Highlight

Precision Microwave

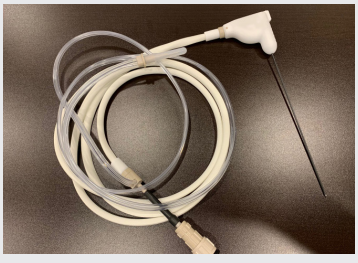
Kansas
NSF I-Corps Participant, 2017

Precision Microwave, Inc. is developing a medical applicator to treat cancerous tumors more precisely. The Kansas-based company hopes that its directional microwave ablation applicator will provide allow physicians to treat tumors more safely without damaging sensitive tissues, potentially enabling microwave abatement treatment for more widespread use in oncology.

We received feedback from one of the doctors we originally talked to during I-Corps that our technology may be a 'game changer' in an application area we had not even previously considered...

...I-Corps was a very intense and challenging experience for me personally. At the time I was also a full-time graduate student, and in retrospect, was not prepared for the pace of the program. It was very uncomfortable for me to be pressured to reach out to prospective users/customer and ask about their needs and paint points. However, I-Corps is definitely one of those experiences that takes years to show how valuable it really was. Looking back now, we learned an enormous amount about our customers, set our company up with a customer-centric focus from the beginning, and made network connections we still rely on to this day. I-Corps provided us with the initially stressful, but necessary, experience and structure that we have relied on and leveraged to achieve most of our business success so far.

Austin Pfannenstiel
President of Precision Microwave, Inc.



Directional microwave ablation (DMWA) applicator.
Photo credit: Precision Microwave, Inc.

NSF Highlights *continued*

Participant Highlight

Sensatek Propulsion Technology, Inc.

Florida
NSF I-Corps Participant, 2017

Sensatek Propulsion Technology develops ceramic materials derived from fused polymers for wireless sensors on the most extreme parts of an engine. This technology, led by a Marine Corps veteran, may be used for aircraft such as F-18s or Air Force One. These passive resonant frequency antennas create a wireless sensor that does not need cables or batteries to be "the eyes" on the costliest parts of gas turbine engines. The wireless sensors are sprayed directly on blades to provide temperature data that feeds into remaining useful life models to further predict outages. The sensors can withstand temperatures up to 800°C and speeds up to 126,000 revolutions per minute (rpm) to increase the efficiency of engines and determine how long the parts will last, allowing manufacturers to schedule maintenance, and saving money.

After conducting over 165 customer discovery interviews, we discovered that not only was there a significant value proposition in eliminating $3 million outages per gas turbine per year, but there was also a market opportunity around delivering this innovation to over 35,371 gas turbines installed around the world, poising a $1.8 billion total available market opportunity for power generation gas turbines alone.

Reamonn Soto
Founder of Sensatek Propulsion Technology, Inc.

Reamonn Soto, CEO of Sensatek Propulsion Technology, Inc. Photo credit: Sensatek Propulsion Technology, Inc.

Participant Highlight

Sironix Renewables

Washington
NSF I-Corps Participant, 2016

Sironix Renewables makes eco-friendly, better-performing ingredients for cleaning products so formulators of detergents can make a safer and more effective consumer product. Co-founder Paul Dauenhauer, Lanny Schmidt Honorary Professor at University of Minnesota, won a 2020 MacArthur Fellowship.

The NSF has been with us throughout the entire process. All the way from the NSF I-Corps program early on, where we conducted hundreds of customer interviews all the way across the board, not only in cleaning products, but also working with farmers and agriculture and all sorts of other different applications that we were looking at the time. Then through the [SBIR] Phase I and Phase II process, we were really able to focus down on the technology, but also really hit the ground running, developing something that we knew would be impactful.

I think what really inspires me is the opportunity to work on something in science, which I've worked in science all my life [...], but also to see the business impact and the potential societal impact that a technology can have. I think that really kind of completes the picture and checks all the boxes for me in terms of being able to develop a really cool technology, but also being able to see how that technology can improve human lives and improve our environment and make our world better.

Christoph Krumm
CEO and co-founder of Sironix Renewables

Paul Dauenhauer, co-founder of Sironix Renewables. Photo credit: John D. and Catherine T. MacArthur Foundation.

NIH Highlights

Participant Highlight

AsclpeiX Therapeutics

Maryland
I-Corps@NIH Participant, 2014

$35 million
raised in support of product development since graduating from the I-Corps at NIH Program

When they were accepted to participate in the pilot cohort of I-Corps at NIH in 2014, Jordan Green, Founder, AsclepiX and Niranjan Pandey, Vice President of R&D, AsclepiX, joined forces with an industry expert to form an I-Corps team to address their National Cancer Institute (NCI)-funded peptide therapeutic.

During I-Corps at NIH, the team asked many questions and pivoted multiple times to optimize their strategies. One of the key things the AsclepiX team learned was that de-risking and simplifying the manufacturing and scale-up process would be critical in their commercialization journey. This motivated the team to explore a simpler form of treatment through a sustained-release form.

Another key finding was the validation of a clinical need for other vascular diseases—which led to a major pivot in their focus. Following the I-Corps at NIH experience, AsclepiX shifted their focus to address macular edema, which results from damaged blood vessels that leads to abnormal accumulation in the eye and can lead to blindness. Incorporating what they learned through I-Corps at NIH, AsclepiX is now developing AXT107, their lead peptide therapeutic to treat macular edema with a single, time-released dose.

Peptide structure for AsclepiX AXT107. Photo Credit: AsclepiX company website.

Participant Highlight

Medable

California
I-Corps@NIH Participant, 2018

$136 million
total funding raised to date

$91 million
recently secured Series C funding

In 2018, Medable began their National Cancer Institute SBIR journey by introducing a flexible digital platform offering tools and modules that could streamline clinical trials using direct-to-patient technologies.

Medable's TOGETHERCare™ is a smart software system that can be configured to uncover and rapidly notify both patients and caregivers about health changes when they can be easily addressed. The goal is to engage patients and reduce their symptoms which helps them receive more effective treatments and remain in clinical trials.

The TOGETHERCare project and information gathered has also informed a new product, the TeleVisit™ mobile app, that has been garnering significant interest in response to the COVID-19. The TeleVisit mobile app enables clinical trial research to progress in a social distancing setting and is used by leading biopharma sponsors and clinical research organizations worldwide. Medable has also extended TeleVisit capabilities to consenting and performing clinical outcome assessments remotely. Today, Medable offers a portfolio of TeleVisit, TeleConsent, and TeleCOA™ solutions.

Screenshots of Medable portals. Photo credit: Medable.

NIH Highlights *continued*

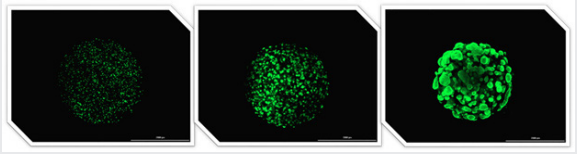
Participant Highlight

Vivo Biosciences

Alabama
I-Corps at NIH participant, 2014

Raj Singh was a research assistant professor at the University of Alabama at Birmingham when he decided to take his idea on a commercialization path. He licensed his invention and founded Vivo Biosciences to develop a three-dimensional material for growing cells and tissues for research use. The five-employee company successfully paved their way to commercialization with the support of multiple SBIR and STTR awards. As a National Cancer Institute SBIR grantee, Vivo was able to participate in the pilot cohort of I-Corps at NIH, which opened new doors for Vivo's journey.

During the program, Vivo's I-Corps team focused on identifying key partners and activities necessary to translate their technology from lab to market. This focused effort gave the company a chance to expand its network and ultimately resulted in LifeNet Health's acquisition of Vivo Biosciences in 2016 and its continued development of HuBiogel. Singh is now the Chief Scientist at LifeNet Health, a 1,000-employee company, where he focuses his efforts in expanding the technology to applications in various fields including oncology, personal diagnostics, and regenerative medicine.



Microtumors produced by embedding human colon tumor cells (HT-29) in HuBiogel. Photo credit: LifeNet Health.

DOE Highlights

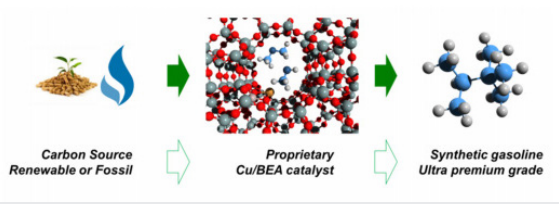
Participant Highlight

CuB Fuels

Colorado
Energy I-Corps participant, 2017

Mid-sized automotive fuel refiners can have difficulty meeting regulatory mandates in a cost-effective fashion. CuB Fuels enables automotive manufacturers and oil refineries to improve fuel economy and meet regulatory mandates through a proprietary catalyst technology that produces a high-octane synthetic gasoline blendstock from domestic resources. The CuB Fuels product allows refiners to produce more premium-grade fuel to address growing demand, blend-up lower grades to salable products, increase efficiency of reformer operation, and reduce the volume of crude oil purchased.

The CuB team is continuing to grow its strategic relationships to advance the translation of this technology.



CuB Fuels has developed a catalyst that can make a high-octane synthetic gasoline from domestic resources. Illustration credit: CuB Fuels.

Participant Highlight

Gamma Reality

California
Energy I-Corps Participant, 2017

$2.6 million
has been awarded by the Defense Threat Reduction Agency (DTRA) to continue developing the technology

Specialized equipment is required to identify and locate radiological/nuclear material and map contamination. Many available commercial systems are static, employ manual location-triangulation methods that are error prone, require a human to hold and operate the system, and lack contextual sensors (such as visual cameras or LiDAR) which provide environmental information about an area of interest. As a result, users of these systems typically need to take multiple measurements of an area for tens of minutes at a time and track the location of the system manually, risking longer exposure to radioactive material, and are limited to ground measurements.

The Localization and Mapping Platform (LAMP) is a lightweight, compact, contextual sensor package that integrates off-the-shelf components (such as visual cameras and GPS) and Scene Data Fusion software to visualize radioactive and nuclear sources in 3D and in real-time. The Scene Data Fusion software on LAMP fuses radiation data with 3D models of an area to show the location of radiological/nuclear material and map radioactive contamination. LAMP is designed to be modular, allowing it to integrate seamlessly with a wide range of radiation detectors, including laboratory prototypes and commercial systems, and can also be deployed in a handheld configuration or on manned or unmanned ground and aerial vehicles.

Photo Credit: Gamma Reality Solution.

DOE Highlights *continued*

Participant Highlight

SwitchGlaze

Colorado
Energy I-Corps Participant, 2016

Buildings account for ~75% of electricity use in the United States. Current trends in commercial building design are toward all-glass facades, which place aesthetics and interaction with the external environment ahead of energy efficiency. Dynamic glass changes in response to a stimulus and shows promise as an exciting solution to this issue by mitigating solar heat gain during times of high solar glare while allowing high visual clarity and light transmittance during other times. However, the return on investment for current dynamic glass technology is too high for widespread adoption.

SwitchGlaze couples the energy savings of dynamic glass with solar energy generation in a window solar panel that responds to sunlight by dynamically switching color. The technology is poised for immediate impact in skylight retrofits by saving consumers construction costs and enabling integrated designs, where SwitchGlaze powers a CPU that controls rain sensors, motors to open/close the window, and internal LED lighting. Low-cost production and energy generation in SwitchGlaze technology dramatically reduce the return on investment of dynamic glazing to one to three years, enabling practical deployment in commercial buildings and automotive industries.

The team has been awarded over $2 million from DOE to continue advancing the technology and has new commercial partners for fabrication and scale-up of its prototype products.

NREL SwitchGlaze team members Lance Wheeler and Robert Tenent have developed a switchable photovoltaic window that both reduces building energy use and produces DC current. Photo credit: Dennis Schroeder, NREL.

Appendices

This section contains two appendices. The first appendix reports outcomes for each I-Corps program—NSF I-Corps, I-Corps at NIH, and Energy I-Corps. The second appendix reports a list of Memoranda of Understanding (MOUs) of the NSF I-Corps program.

Appendix I. Tables of Outcomes

Appendix II. Current Memoranda of Understanding (MOUs) for the NSF I-Corps program

		Reporting Metrics	End of FY 2018	End of FY 2020
Program Structure	National Innovation Network (NIN)	Number of active I-Corps Nodes*	9	9
		Number of universities in active I-Corps Nodes	28	28
		Number of active I-Corps Sites	99	92
		Number of universities in active I-Corps Sites	99	92
	Cohorts	Number of completed cohorts**	63	90
	Annual Program Funding	NSF Funding Level‡		
		FY 2017	**$29,848,028**	--
		FY 2018	**$32,817,459**	--
		FY 2019	--	**$32,824,943**
		FY 2020	--	**$37,953,776**
		Other federal agencies funding support	**$0**	**$0**
		State funding support	**$0**	**$0**
		Private funding support	**$0**	**$0**

***** The 9 active I-Corps Nodes - Bay Area Regional I-Corps Node, DC/MD/VA Regional I-Corps Node, I-Corps South Node, Innovation Node -Los Angeles, Midwest I-Corps Node, New England Regional Innovation Node, New York City Regional Innovation Node, Southwest Innovation Corps, UNY I-Corps Node.

****** There were 4 cohorts in FY 2012; 6 in FY 2013; 6 in FY 2014; 8 in FY 2015; 14 in FY 2016; 12 in FY 2017; 13 in FY 2018, 13 in FY 2019, and 14 in FY 2020.

‡ Funding reflects actual obligations

		Reporting Metrics	Since Program Inception	FY 2017 - 2018	FY 2019 - 2020
Teams Trained	Characteristics of Teams	Number of Teams trained‡	**1908**	**509**	**593**
		Number of Teams having one or more female members♦	**827** [43 %]	**237** [47 %]	**289** [49 %]
		Number of Teams having one or more members from under-represented groups ■	**1012** [53 %]	**289** [57 %]	**366** [62 %]
	Source of Teams [non-exclusive categories]	Number of Teams with prior NSF Research Lineage	1250	241	297
		Number of Teams that came through:			
		Universities	1569	382	407
		I-Corps Nodes	410	168	189
		I-Corps Sites	324	99	187
		Other federal agencies	62	33	17
		Department of Defense (DoD)	25	17	8
		Department of Energy (DoE)	9	1	0
		Department of Homeland Security (DHS)	11	4	3
		Department of Agricultuure (USDA)	7	7	0
		National Aeronautics and Space Administration (NASA)	10	4	6
		Federal Laboratories	0	0	0
		Incubators/Accelerators	0	0	0
		SBIR/STTR Program*	85	9	70
		National Aeronautics and Space Administration (NASA)	10	4	6
		Department of Homeland Security (DHS)	11	4	3
		National Science Foundation (NSF)	64	1	61
		NSF Partnership for Innovation (PFI) Program **	21	0	21
		Partners through Memorandum of Understanding (MOU)***	75	41	22
		U.S. State Partnerships†	0	0	0
		International Partnerships***	13	8	5
		Others	0	0	0

***** DHS teams were sent from their SBIR program (4 teams were sent in FY 2016, 4 teams between FY 2017 and 2018, and 3 teams between FY 2019 and 2020); NASA teams were sent from their STTR program (4 teams were sent between FY 2017 and 2018, and 6 teams between FY 2019 and 2020); NSF teams--previously not reported--were sent from their SBIR/STTR program (1 team in FY 2013, 1 team in FY 2016, 1 team in FY 2017, and 60 teams between FY 2019 and FY 2020).

** To respond to the mandate set by the American Innovation and Competitiveness Act, Section 601(c)(3), the NSF Partnerships for Innovation (PFI) Program provides funding to support prototype or proof-of-concept development work by participants, including I-Corps participants, on early stage innovation/technology that are not yet eligible to participate in a Small Business Innovation Research Program or a Small Business Technology Transfer Program. Under the new solicitation, NSF 19-506 (began at FY 2019), PFI award recipients who have not previously participated in the NSF I-Corps Teams Program must allocate $50,000 of their budget to participate in the I-Corps Teams program to acquire a better understanding on the commercial aspects of translating an innovation toward a market application, such as: market need, target industry sector, product-market fit, value proposition, the target customer, sales and distribution channels, supply-chain, preliminary intellectual property strategy (NSF 19-506: https://www.nsf.gov/pubs/2019/nsf19506/nsf19506.htm).

*** NSF has executed a total of 9 MOUs with 8 federal agencies. The MOUs are: ARPA-E (Part of DOE), Office of Energy Efficiency and Renewable Energy (EREE; Part of DOE), DoD, DHS, National Institute of Food and Agriculture (part of USDA), NASA, National Center for Advancing Translational Sciences (Part of NIH), National Security Agency (NSA), and Small Business Administration (SBA). The goal for each MOU varies; for example the EERE MOU was designed to use I-Corps to train scientists and engineers in the national energy labs to be able to recognize commercial potential of technologies being developed within the national labs. The goal of the ARPA-E MOU was to train researchers that are funded by ARPA-E. The goal of SBA was to train some of their Small Business Development Center people to understand I-Corps. It is important to note only 5 agencies listed in the table above sent teams to participate in the NSF I-Corps program. In addition, NSF also signed a MOU with the Science Foundation of Ireland (SFI), and SFI sent 8 teams to participate in the NSF I-Corps program during the FY2017 - 2018 reporting period, and 5 teams during the FY 2019 - 2020 reporting period.

† While no Teams were sent to participate in the NSF I-Corps program, NSF did engage in a partnership with the state of Ohio, in that NSF helped Ohio to set up its own I-Corps program, trained their instructors, and provided programmatic guidances. The MOU between the two parties was renewed in FY 2019.

‡ There were 97 teams participated in the NSF I-Corps program in FY 2012, 135 in FY 2013, 133 in FY 2014, 176 in FY 2015, 265 in FY 2016, 232 in FY 2017, 277 in FY 2018, 267 in FY 2019, and 326 in FY 2020.

♦ Overall, between FY 2012 and FY 2020, 43 % of the teams have members that self-identified as female. Share of teams that didn't offer any gender information or reported partial information (i.e. some members reported their gender but not others) are 18 %. For teams that participated between FY 2017 and FY 2018, the percentages are: 47 % and 8 % respectively, and for FY 2019 and 2020: 49 % and 17 % respectively.

■ This report defines under-represented groups in science and engineering as individuals who identify as: 1) women, 2) race as Black or African American, American Indian, Alaska Native, and/or Native Hawaiian or Other Pacific Islander, 3) Hispanic origin of yes, and/or 4)disability status of yes, or persons reporting at least one race in these groups. Between FY 2012 and FY 2020, 53 % of the teams have members that self-reported to be in one or more of these under-represented groups, and share of teams with completely missing or partially missing information (in either gender, race, ethnicity, and/or disability) is 28 %. For teams that partipated between FY 2017 and FY 2018, these percentages are: 57 % and 13 % respectively, and for FY 2019 and FY 2020, 62 % and 17 % respectively.

		Reporting Metrics	Since Program Inception	FY 2017 -2018	FY 2019 -2020
Individuals Trained	Statistics	Number of (unique) individuals trained*	**5800**	**1628**	**1928**
		Number of individuals trained that are women **	1097 [19 %]	338 [21 %]	411 [21 %]
		Number of individuals trained that are from under-represented groups***	1432 [25 %]	437 [27 %]	568 [30 %]
		Number of Entrepreneurial Leads trained†	**2241**	**632**	**744**
		Number of Entrepreneurial Leads that are women ▲	510 [23 %]	164 [26 %]	204 [27 %]
		Number of Entrepreneurial Leads that are from under-represented groups ♦	668 [30 %]	207 [33 %]	283 [38 %]
	Status of the Entrepreneurial Lead at the time of training‡	Graduate Student	898 [53 %]	205 [52 %]	251 [49 %]
		Post-doctoral Researcher	267 [16 %]	62 [16 %]	56 [11 %]
		Undergraduate Student	57 [3 %]	16 [4 %]	22 [4 %]
		Startup Management	171 [10 %]	27 [7 %]	116 [22 %]
		Others	307 [18 %]	81 [21 %]	70 [14 %]

***** Count of distinct program participants, based on name, affiliation, and biographical sketch submitted at the time of proposals

** Overall, for individuals that participated in the NSF I-Corps program between FY 2012 and FY 2020, 19 % of them self-identified as female, 69 % as male, and 12 % offered no response. For individuals that participated between FY 2017 and FY 2018, 21 % of them self-identified as female, 75 % as male, and 4 % offered no response. FY 2019 and FY 2020, 21 % of them self-identified as female, 67 % as male, and 11 % offered no response.

******* This report defines under-represented groups in science and engineering as individuals who identify as: 1) women, 2) race as Black or African American, American Indian, Alaska Native, and/or Native Hawaiian or Other Pacific Islander, 3) Hispanic origin of yes, and/or 4)disability status of yes, or persons reporting at least one race in these groups. Overall, for individuals that participated in the NSF I-Corps program between FY 2012 and FY 2020, 25 % of them self-reported to be in one or more of these under-represented categories, while 27 % of participants provided no response in either gender, race, ethnicity, and/or disability. For individuals that participated between FY 2017 and FY 2018, 27 % of them self-reported to be in one or more of these underrepresented categories, while 9 % respondents provided no response in either gender, race, ethnicity, and/or disability; for individuals that participated betwen FY 2019 and FY 2020, the percentages are: 30 % and 15 % respectively.

† There are some Teams that have more than one entrepreneurial lead.

▲ Overall, for Entrepreneurial Leads (ELs) that participated in the NSF I-Corps program between FY 2012 and FY 2020, 23 % of them self-identified as female, 66 % as male, and 11 % offered no response. For individuals that participatd between FY 2017 and FY 2018, 26 % of them self-identified as female, 71 % male, and 3 % offered no response. FY 2019 and FY 2020, 27 % of them self-identified as female, 63 % male, and 10 % offered no response.

♦ Overall, for Entrepreneurial Leads (ELs) that participated in the NSF I-Corps program between FY 2012 and FY 2020, 30 % of them self-reported to be in one or more of the under-represented categories, while 25 % of participants provided no response in either gender, race, ethnicity, and/or disability. For individuals that participated between FY 2017 and FY 2018, these percentages are: 33 % and 7 % respectively, and for individuals that participated betwen FY 2019 and FY 2020, 38 % and 13 % respectively.

‡ Only Teams with NSF awards were counted (n = 1700, since program inception; n= 391 between FY 2017 and 2018; n = 515 between FY 2019 and 2020).

		Reporting Metrics	Since Program Inception	FY 2017 -2018	FY 2019 -2020
Economic Impact	**Teams**	Number of Teams	**1908**	**509**	**593**
		Number of Teams linked to startups	1022 [54 %]	292 [57 %]	301 [51%]
	Startups	Number of startups formed*	1036	299	302
	Subsequent Funding**	Total (cumulative) funding linked to startups†	**$760,523,044**	**$213,344,466**	**$47,446,787**
	Merger & Acquisition	Number of startups that were merged or acquired‡	9	1	0
	Source of Subsequent Funding Obtained by Startups***	Public Funding	**$425,934,549**	**$109,764,901**	**$37,641,758**
		SBIR/STTR	$289,312,261	$76,499,954	$19,994,004
		Other federal funding [non-SBIR/STTR]	$119,580,890	$23,061,946	$17,202,754
		State funding	$17,041,398	$10,203,001	$445,000
		Private Funding	**$334,588,495**	**$103,579,565**	**$9,805,029**
		Venture capital	$280,076,626	$92,678,521	$6,376,499
		Angel or individual investor	$22,224,124	$7,003,300	$2,035,030
		Private industry, corporate funding, or others	$32,287,745	$3,897,744	$1,393,500

* There were several Teams that linked to more than one start-up business.

** Subsequent Funding excludes financial support to the I-Corps program, and only considers funding raised during or after I-Corps participation

*** Based on funding obtained through all sources

† Funding data was collected by VentureWell using a combination of Pitchbook (third party market and venture capitalist data provider) data, government data, SEC filings, and self-reporting data. In addition, NSF verified all federal funding with data from USASpending.gov and the Federal Procurement Data System. Funding reported are cumulative; to illustrate, for reporting period FY 2017 and 2018, the total (cumulative) subsequent funding: $213,344,466 represents all fundings raised by I-Corps teams that participated in the NSF I-Corps program during FY 2017 - 2018, since participation through the end of FY 2020.

‡ Out of the 9 startups that were merged or got acquired, 4 of them became an operating subsidiary after the M&A.

I-CORPS at NIH

		Reporting Metrics	End of FY 2018	End of FY 2020
Program Structure	**National Innovation Network (NIN)***	Number of active I-Corps Nodes	Not Applicable	Not Applicable
		Number of universities in active I-Corps Nodes		
		Number of active I-Corps Sites		
		Number of universities in active I-Corps Sites		
	Cohorts	Number of completed cohorts**	7	10
	Annual Program Funding	NIH Funding Level***		
		FY 2017	**$2,400,000**	--
		FY 2018	**$2,400,000**	--
		FY 2019	--	**$2,640,000**
		FY 2020	--	**$2,640,000**
		Other federal agencies funding support	$0	$0
		State funding support	$0	$0
		Private funding support	$0	$0

* I-Corps at NIH has no nodes or sites in the NIN.

** This number includes the pilot cohort. Due to COVID-19, only 1 cohort was completed in FY2020; cohort 2 was delayed and will be counted in FY2021.

*** Funding set aside for extramural awards to teams was the same for FY17 and FY18.

I-CORPS at NIH

		Reporting Metrics	Since Program Inception	FY 2017 - 2018	FY 2019 - 2020
Teams Trained	Characteristics of Teams	Number of Teams trained	**201**	**79**	**65**
		Number of Teams having one or more female members	117 [58 %]	48 [61 %]	37 [57 %]
		Number of Teams having one or more members from under-represented groups	132 [66 %]	53 [67 %]	42 [65 %]
	Source of Teams [non-exclusive categories]	Number of Teams with prior NIH Research Lineage	196	79	65
		Number of Teams that came through:			
		Universities	50	1	16
		I-Corps Nodes	5	2	3
		I-Corps Sites	8	2	5
		Other federal agencies	9	6	0
		National Science Foundation	9	6	0
		Federal Laboratories	0	0	0
		Incubators/Accelerators	1	0	0
		SBIR/STTR Program*	196	78	65
		Partners through Memorandum of Understanding (MOU)**	9	6	0
		U.S. State Partnerships	0	0	0
		International Partnerships	0	0	0
		Others	0	0	0

** With NSF and National Cancer Institue, the MOU was in spirit, not in writing

I-CORPS at NIH

		Reporting Metrics	Since Program Inception	FY 2017 -2018	FY 2019 -2020
Individuals Trained	**Statistics**	Number of (unique) individuals trained	**596**	**235**	**194**
		Number of individuals trained that are women	163 [27 %]	68 [29 %]	51 [26 %]
		Number of individuals trained that are from under-represented groups	198 [33 %]	77 [33 %]	65 [34 %]
		Number of Entrepreneurial Leads trained	**198**	**79**	**64**
		Number of Entrepreneurial Leads that are women	55 [28 %]	24 [30 %]	19 [30 %]
		Number of Entrepreneurial Leads that are from under-represented groups	68 [34 %]	29 [37 %]	23 [36 %]
	Status of the Entrepreneurial Lead at the time of training‡	Graduate Student	0	0	0
		Post-doctoral Researcher	0	0	0
		Undergraduate Student	0	0	0
		Startup Management	198 [100 %]	79 [100 %]	64 [100 %]
		Others	0	0	0

‡ All Entrepreneurial Leads are C-level executives (which are considered as employees of the company) in the I-Corps at NIH program.

I-CORPS at NIH

		Reporting Metrics	Since Program Inception	FY 2017 -2018	FY 2019 -2020
Economic Impact	**Teams**	Number of Teams	**201**	**79**	**65**
		Number of Teams linked to startups*	199 [99 %]	78 [99 %]	65 [100 %]
	Startups	Number of startups formed	201**	78	65
	Subsequent Funding	Total (cumulative) funding linked to startups	**$403,056,893**	**$12,842,375**	**$48,691,193**
	Merger & Acquisition	Number of startups that were merged or acquired	2	0	0
	Source of Subsequent Funding Obtained by Startups* **	Public Funding	**$231,976,893**	**$11,422,375**	**$48,611,193**
		SBIR/STTR	$177,750,379	$10,969,711	$15,630,080
		Other federal funding [non-SBIR/STTR]	$54,226,514	$277,664	$32,981,113
		State funding	$0	$175,000	$0
		Private Funding	**$171,080,000**	**$1,420,000**	**$80,000**
		Venture capital	$107,490,000	$50,000	$80,000
		Angel or individual investor	$6,390,000	$0	$0
		Private industry, corporate funding, or others	$57,200,000	$1,370,000	$0

* Reflects the number of small-business SBIR/STTR participants in I-Corps at NIH

** Reflects the number of distinct small-business participants in I-Corps at NIH plus new start-ups generated. Some businesses participated twice with different teams.

*** SBIR/STTR and non-SBIR/STTR Funding numbers sourced from usaspending.gov and sbir.gov. Private and State Funding numbers sourced from PitchBook Data, Inc.; data has not been reviewed by PitchBook analysts.

		Reporting Metrics	End of FY 2018	End of FY 2020
Program Structure	National Innovation Network (NIN)*	Number of active I-Corps Nodes	1	1
		Number of universities in active I-Corps Nodes	Not Applicable	Not Applicable
		Number of active I-Corps Sites	12	13
		Number of universities in active I-Corps Sites	Not Applicable	Not Applicable
	Cohorts	Number of completed cohorts**	7	10
	Annual Program Funding	DOE Funding Level		
		FY 2017†	**$2,725,000**	--
		FY 2018‡	**$1,950,000**	--
		FY 2019	--	**$3,400,000**◆
		FY 2020	--	**$2,450,000**▲
		Other federal agencies funding support	$0	$0
		State funding support	$0	$0
		Private funding support△	**$75,000**	**$75,000**

* The (definitions of) nodes and sites of the Energy I-Corps program are different from those of the NSF I-Corps program. Please see the *Program Structure* section of the Energy I-Corps Annual Report for more details (https://www.energy.gov/sites/prod/files/2020/12/f81/Energy%20I-Corps%20Annual%20Report%202020.pdf)

** The pilot (first cohort) was launched in October 2015. There would have been 11 cohorts by the end of FY 2020, but Spring 2020 cohort was cancelled due to COVID-19.

† The overall budget for FY 2017 was an estimated $2,725,000; $700,000 for the program management "node" funding, and estimated $2,025,000 for the 27 lab teams that participated [average of $75,000 per team].

‡ The overall budget for FY 2018 was an estimated $1,950,000; $750,000 for the program management "node" funding, and estimated $1,200,000 for participated teams.

◆ The overall budget for FY 2019 was an estimated $3,400,000; $1,750,000 from OTT and $1,650,000 from other DOE program offices

▲ The overall budget for FY 2020 was an estimated $2,450,000, which is lower than planned because of COVID-19 postponement/cancellation

△ 1 privately-funded team from FY 2017

		Reporting Metrics	Since Program Inception	FY 2017 - 2018	FY 2019 - 2020
Teams Trained	Characteristics of Teams	Number of Teams trained	**111**	**43**	**32**
		Number of Teams having one or more female members	Not Available	**14** [33 %]	**13** [41 %]
		Number of Teams having one or more members from under-represented groups	Not Available	Not Available	Not Available
	Source of Teams [non-exclusive categories]	Number of Teams with prior DOE Research Lineage*	111	43	32
		Number of Teams that came through:			
		Universities	0	0	0
		I-Corps Nodes	0	0	0
		I-Corps Sites	0	0	0
		Other federal agencies	0	0	0
		Federal Laboratories	111	43	32
		Incubators/Accelerators	0	0	0
		SBIR/STTR Program*	0	0	0
		Partners through Memorandum of Understanding (MOU)	0	0	0
		U.S. State Partnerships	0	0	0
		International Partnerships	0	0	0
		Others	0	0	0

* All teams have received previous direct DoE funding, but not specifically through grants.

		Reporting Metrics	Since Program Inception	FY 2017 -2018	FY 2019 -2020
Individuals Trained	Statistics	Number of (unique) individuals trained*	**290**	**92**	**77**
		Number of individuals trained that are women **	56 [19 %]	16 [17 %]	17 [22 %]
		Number of individuals trained that are from under-represented groups		Not Available	
		Number of Entrepreneurial Leads trained	**120**	**46**	**34**
		Number of Entrepreneurial Leads that are women	Not Available	8 [17 %]	9 [26 %]
		Number of Entrepreneurial Leads that are from under-represented groups		Not Available	
	Status of the Entrepreneurial Lead at the time of training	Graduate Student	Not Available	0	0
		Post-doctoral Researcher		24 [26 %]	20 [26 %]
		Undergraduate Student		0	0
		Startup Management		0	0
		Others***		68 [74 %]	57 [74 %]

* Distinct count of program participants

** Individuals who self-identified as female

*** Others consists of lab staff scientists and researchers

		Reporting Metrics	Since Program Inception	FY 2017 -2018	FY 2019 -2020
Economic Impact	**Teams**	Number of Teams	**111**	**43**	**32**
		Number of Teams linked to startups	12 [11 %]	5 [12 %]	3 [9 %]
	Startups	Number of startups formed	12	5	3
	Subsequent Funding*	Total (cumulative) funding linked to startups	**$83,481,585**	**$53,704,361**	**$10,710,000**
	Merger & Acquisition	Number of startups that were merged or acquired	0	0	0
	Source of Subsequent Funding Obtained by Startups**	Public Funding	**Not Available**	**$6,702,324**	**$6,676,000**
		SBIR/STTR		$183,000	Not Available
		Other federal funding [non-SBIR/STTR]		$6,519,324	
		State funding		$0	
		Private Funding	**Not Available**	**$47,002,037**	**$4,034,000**
		Venture capital		$0	Not Available
		Angel or individual investor		$0	
		Private industry, corporate funding, or others		$47,002,037	

* Subsequent Funding excludes financial support to the I-Corps program, and only considers funding raised during or after I-Corps participation

** Based on funding obtained through self-reported sources

Data Dictionary

Table	Metrics	Description
Program Structure	Number of active I-Corps nodes	Number of active I-Corps nodes at the end of FY 2020
	Number of universities in active I-Corps nodes	Number of universities in active I-Corps nodes at the end of FY 2020
	Number of active I-Corps sites	Number of active I-Corps sites at the end of FY 2020
	Number of universities in active I-Corps sites	Number of universities in active I-Corps sites at the end of FY 2020
	Number of completed cohorts	Number of cohorts completed at the end of FY 2020
	Agency Funding Level for FY 2017	Budget for the I-Corps program for FY 2017
	Agency Funding Level for FY 2018	Budget for the I-Corps program for FY 2018
	Agency Funding Level for FY 2019	Budget for the I-Corps program for FY 2019
	Agency Funding Level for FY 2020	Budget for the I-Corps program for FY 2020
	Other federal agencies funding support	External Funding from Other Federal Agencies for the Agency's I-Corps program between FY 2017 and FY 2018, and between FY 2019 and FY 2020
	State funding support	External Funding from U.S. States for the Agency's I-Corps Program between FY 2017 and FY 2018, and between FY 2019 and FY 2020
	Private funding support	External Funding from Private Sources (Foundation, Industry) for the Agency's I-Corps Program between FY 2017 and FY 2018, and between FY 2019 and FY 2020

Data Dictionary

Table	Metrics	Description
Teams Trained	Number of Teams Trained	Total number of teams that have completed the Agency's I-Corps program, since program inception, between FY 2017 and FY 2018, as well as between FY 2019 and FY 2020
	Number of Teams having one or more female members	Total number of teams who have one or more individuals who identify as gender female that have completed the Agency's I-Corps program, since program inception, between FY 2017 and FY 2018, as well as between FY 2019 and FY 2020
	Number of Teams having one or more team members from underrepresented groups	Number of teams who have one or more individuals from under-represented groups that have completed the Agency's I-Corps program since program inception, between FY 2017 and FY 2018, as well as between FY 2019 and FY 2020. This report defines under-represented groups as individuals who identify as: 1) women, 2) race as Black or African American, American Indian or Alaska Native, and/or Native Hawaiian or Other Pacific Islander, 3) Hispanic origin of yes, and/or 4) disability status of yes.
	Number of Teams with prior Agency Lineage	Number of teams that have previously received financial support from the agency sponsoring them to I-Corps
	Number of Teams that came through Universities	Number of teams entering the Agency's I-Corps program from Universities
	Number of Teams that came through I-Corps Nodes	Number of teams entering the Agency's I-Corps program from I-Corps Nodes
	Number of Teams that came through I-Corps Sites	Number of teams entering the Agency's I-Corps program from I-Corps Sites
	Number of Teams that came through Other Federal Agencies	Number of teams entering the Agency's I-Corps program that have previously received research support from other federal agencies and were sent to participate in the I-Corps program from those agencies
	Number of Teams that came through Federal Laboratories	Number of teams entering the Agency's I-Corps program from Federal Laboratories
	Number of Teams that came through Incubators/Accelerators	Number of teams entering the Agency's I-Corps program through Incubators/Accelerators
	Number of Teams that came through SBIR/STTR Program	Number of teams entering the I-Corps program through the SBIR/STTR program
	Number of Teams that came through Partners through MOU	Number of teams entering the Agency's I-Corps program through a Memorandum of Understanding (MOU)
	Number of Teams that came through U.S. State Partnerships	Number of teams entering the Agency's I-Corps program through U.S. State Partnership
	Number of Teams that came through International Partnerships	Number of teams entering the Agency's I-Corps program through International Partnership
	Number of Teams that came through Others	Number of teams entering the Agency's I-Corps program through other pathways not listed above

Data Dictionary

Table	Metrics	Description
Individuals Trained	Number of individuals trained	Total number of individuals that have completed the I-Corps program, since program inception, between FY 2017 and FY 2018, as well as between FY 2019 and FY 2020
	Number of individuals trained that are women	Number of individuals that have completed the I-Corps program (since program inception, between FY 2017 and FY 2018, as well as between FY 2019 and FY 2020) who identify as gender female
	Number of individuals trained that are from under-represented groups	Number of individuals from under-represented groups that have completed the I-Corps program (since program inception, between FY 2017 and FY 2018, as well as between FY 2019 and FY 2020). This report defines under-represented groups as individuals who identify as: 1) women, 2) race as Black or African American, American Indian or Alaska Native, and/or Native Hawaiian or Other Pacific Islander, 3) Hispanic origin of yes, and/or 4) disability status of yes.
	Number of Entrepreneurial Leads trained	Total number of Entrepreneurial Leads trained
	Number of Entrepreneurial Leads trained that are women	Number of Entrepreneurial Leads trained who identify as gender female that have completed the I-Corps program
	Number of Entrepreneurial Leads trained that are from under-represented groups	Number of Entrepreneurial Leads from under-represented groups that have completed the I-Corps program (since program inception, between FY 2017 and FY 2018, as well as between FY 2019 and FY 2020). This report defines under-represented groups as individuals who identify as: 1) women, 2) race as Black or African American, American Indian or Alaska Native, and/or Native Hawaiian or Other Pacific Islander, 3) Hispanic origin of yes, and/or 4) disability status of yes.
	Graduate Student	Number of Entrepreneurial Lead who was a Graduate Student at the time of I-Corps Training
	Post-doctoral Researcher	Number of Entrepreneurial Lead who was a Post-doctoral Researcher at the time of I-Corps Training
	Undergraduate Student	Number of Entrepreneurial Lead who was an Undergraduate Student at the time of I-Corps Training
	Startup Management	Number of Entrepreneurial Lead who self-identified as a Founder, Co-Founder, CEO, COO, CTO, or any other leadership/management position at a startup
	Others	Number of Entrepreneurial Lead who was neither a Graduate Student, nor a Post-doctoral Researcher, nor an Undergraduate Student, nor in Startup Management position at the time of I-Corps Training

Data Dictionary

Table	Metrics	Description
Economic Impact	Number of Teams linked to a startups	Total number of teams (distinct count) that formed startups
	Number of startups formed	Total number of startups formed (distinct count)
	Total (cumulative) funding obtained by startups	Total Amount, in USD, of public and private funding raised by teams during or after their participation of the I-Corps program (since program inception, between FY 2017 and FY 2018, as well as between FY 2019 and FY 2020). Cumulative refers to funding raised since I-Corps participation through the end of FY 2020
	Number of startups that were merged or got acquired	Number of startups created by teams that have completed I-Corps program (since program inception, between FY 2017 and FY 2018, as well as between FY 2019 and FY 2020) that have been acquired
	Source of Funding - SBIR/STTR	Total amount, in USD, of SBIR/STTR funding raised by teams that have completedthe I-Corps program (since program inception, between FY 2017 and FY 2018, as well as between FY 2019 and FY 2020)
	Source of Funding - Other Federal Funding [non SBIR/STTR]	Total amount, in USD, of federal funding--excluding SBIR/STTR--raised by teams that have completed the I-Corps program (since program inception, between FY 2017 and FY 2018, as well as between FY 2019 and FY 2020)
	Source of Funding - State Funding	Total amount, in USD, of U.S. State funding (states in the U.S.) raised by teams that have completed the I-Corps program (since program inception, between FY 2017 and FY 2018, as well as between FY 2019 and FY 2020)
	Source of Funding - Venture Capital	Total amount, in USD, of venture capital and seed funding raised by teams that have completed the I-Corps program (since program inception, between FY 2017 and FY 2018, as well as between FY 2019 and FY 2020)
	Source of Funding - Angel or Individual Investor	Total amount, in USD, of angel (and/or individual) funding raised by teams that have completed the I-Corps program (since program inception, between FY 2017 and FY 2018, as well as between FY 2019 and FY 2020)
	Source of Funding - Private Industry, Corporate Funding, or Others	Total amount, in USD, of corporate funding, private industry funding, or other sources raised by teams that have completed the I-Corps program (since program inception, between FY 2017 and FY 2018, as well as between FY 2019 and FY 2020)

Year of Initial Agreement/Renewal/Extension	Agency	Organization	Primary Objectives
2014	Department of Homeland Security (DHS)	Science and Technology Directorate	DHS: Pilot/implement NSF I-Corps curriculum with DHS technologies with commercial impact; NSF: gain experience with expansion of NSF I-Corps to another federal agency thereby broadening participation
2015	Department of Defense (DoD)	Basic Research Office	DOD: Pilot/implement NSF I-Corps curriculum with BRO technologies with commercial impact; NSF: gain experience with expansion of NSF I-Corps to another federal agency thereby broadening participation
2015/2019	The Chancellor of Ohio Board of Regents (COBR)		COBR: Pilot/implement NSF I-Corps curriculum with State of Ohio university technologies with commercial impact; NSF: gain experience with expansion of NSF I-Corps to state-level to broaden participation
2016/2019	National Aeronautics and Space Administration (NASA)		NASA: In the first MOU, pilot/implement NSF I-Corps curriculum for NASA SBIR/STTR awardees with commercial impact; in the second MOU, seeks to encourage NASA SBIR/STTR firms to understand potential customer needs, and thus defining additional, non-NASA markets where their technologies can compete. NSF: Improve present and future coordination of the different federal I-Corps programs, share lessons learned on the criticality of involving legal counsel and procurement staff in populating details and implementing agency-specific I-Corps programs, and create best practices in outreach and/or programming for a comparable NSF SBIR/STTR program
2016/2018	Science Foundation Ireland (SFI)		SFI: NSF I-Corps curriculum evaluation; NSF: explore international collaboration and access to European markets for U.S.-based NSF I-Corps Teams