Impact of I-Corps: A 10-Year Retrospective

Genesis of I-Corps
Errol Arkilic
Founder CEO of M34 Capital (Former NSF)

NIH Perspective
Christie A. Canaria
Program Director NCI SBIR & I-Corps at NIH

University Perspective
Babu DasGupta
University of Wisconsin-Milwaukee (Former NSF)

1

NSF Innovation Corps (I-Corps)

- **Founding Principles**
- **Expansion**
- **Impact**

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Why is spinning a technology out of a lab so difficult?

- The Unknown
- The Confusion
- Third Party Risk
- The Misunderstanding

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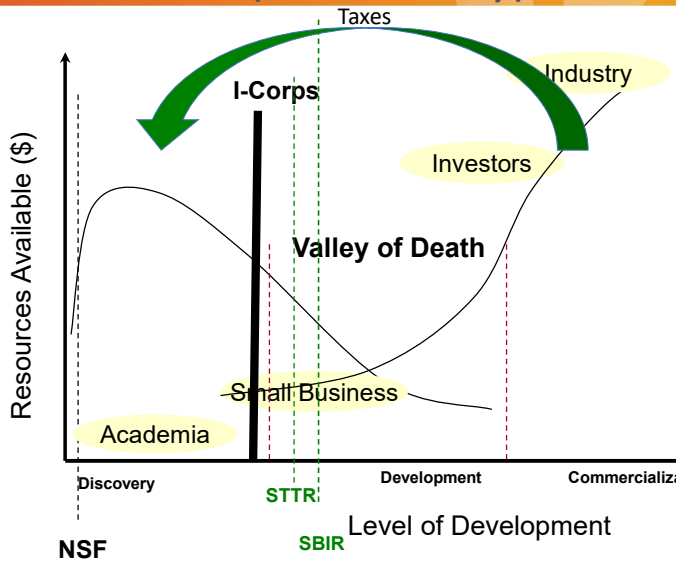
Technology Innovation Spectrum (The Theory)



From Angus Kingon

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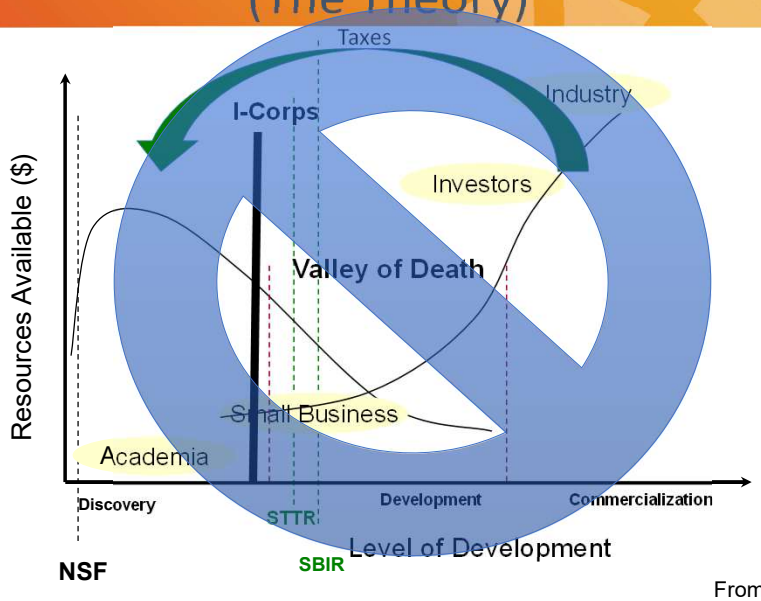
Technology Innovation Spectrum (The Theory)



From Angus Kingon

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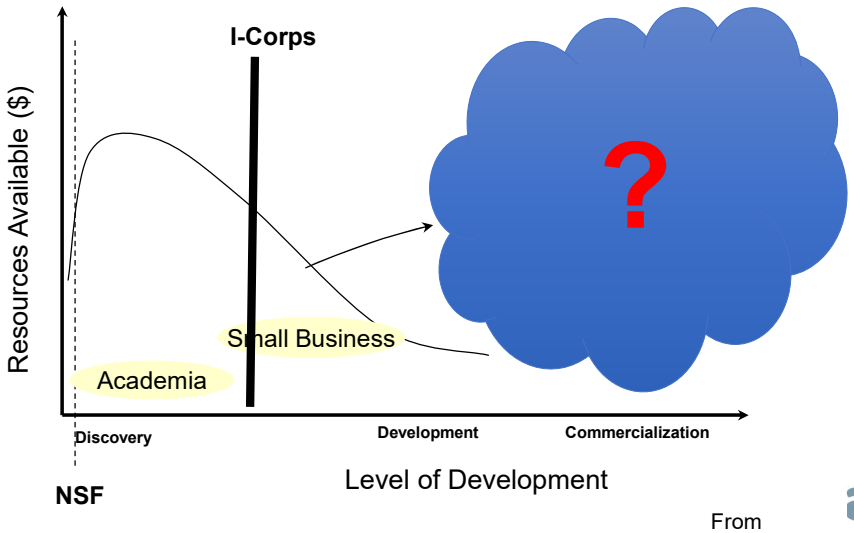
Technology Innovation Spectrum (The Reality)



From Angus Kingon

6

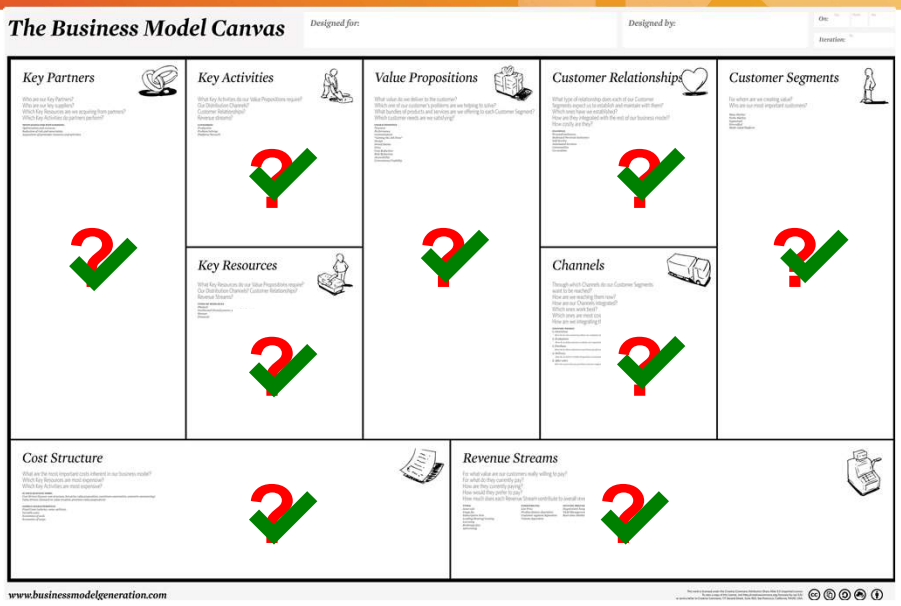
How do we explore the unknown

In general we look for a new law by following the following process:
First, we guess it
Then, we compute the consequences
Then, we compare the computation results to nature
We compare it directly to observation
If it disagrees with experiment, it's wrong
That simple statement is the key to science
It doesn't make a difference how beautiful your guess is
Or how smart you are, or who made the guess
If it disagrees with experiment, its wrong
That's all there is to it

-Richard Feynman

7

Business Model Canvas



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First Response

Yeah, But!

9

Programs Modeled after NSF I-Corps

- **Partnerships with Federal Agencies:**
  - **DOE (ARPA-E, EERE)**
  - **DHS, (Science and Technology Directorate)**
  - **DOD (Basic Research Office)**
  - **NIH (SBIR/STTR, Clinical and Translational Science Awards Program)**
  - **NSA (Mission Capabilities Group)**
  - **SBA (Office of Entrepreneurial Development)**
  - **USDA (National Institute of Food and Agriculture)**
  - **NASA**
- **The Chancellor of Ohio Board of Regents (Ohio State University)**
- **Science Foundation Ireland (SFI)**
- ***Others***
  - ***NIDILRR (HHS)***
  - ***CONACYT (Mexico)***
  - ***South Korea (Ministry of Science and ICT, Korea Innovation Center)***

10

I-Corps for Life Sciences: A pilot

- Pilot program for Life Sciences run at USCF Spring 2013
- Four Tracks:
  - Medical Devices
  - Therapeutics
  - Diagnostics
  - eHealth

11

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MISSION AND VISION

MISSION

The I-Corps at NIH mission is to empower entrepreneurs in developing and validating a strategic business model through diverse customer discovery in order to meet unmet clinical needs. I-Corps enables and accelerates the transformation of invention to impact.

VISION

I-Corps at NIH envisions an innovation ecosystem where entrepreneurs approach healthcare problems through data-driven decision making.

We achieve our mission by

- Nurturing the innovation network (e.g., Highlighting successes of program alumni, developing the teaching talent pool, engaging the pipeline pre I-Corps)
- Demonstrating inclusiveness of diversity in thought and perspective in all aspects of programming

I-CORPS at NIH

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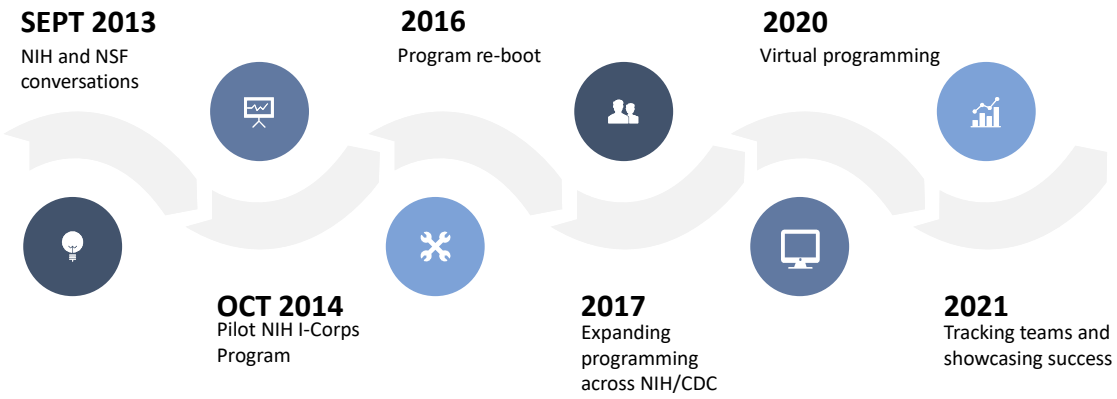
A PRACTICE IN PIVOTING



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PILOT TAKEAWAYS

2014 Pilot

- 100 interviews
- 10 week program
- 4 institutes NIH/CDC
- 3 tracks: therapeutics, medical devices, diagnostics
- 6 instructors: mix of life science expertise and NIN instructors

Takeaways from the Pilot

- This could work!
- 10 weeks is too long
- Integration of instructors with domain expertise is critical
- Small businesses in the Phase I stage have lots of opportunity to learn

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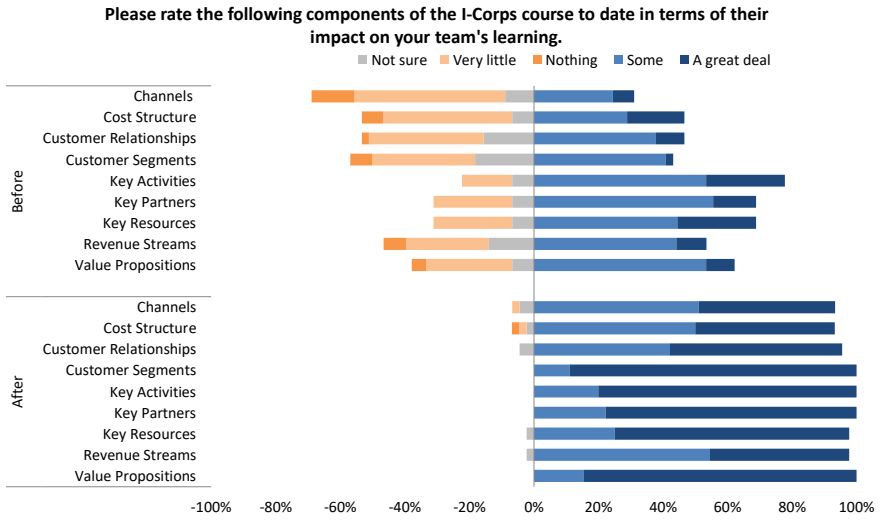
BUSINESS MODEL CANVAS KNOWLEDGE



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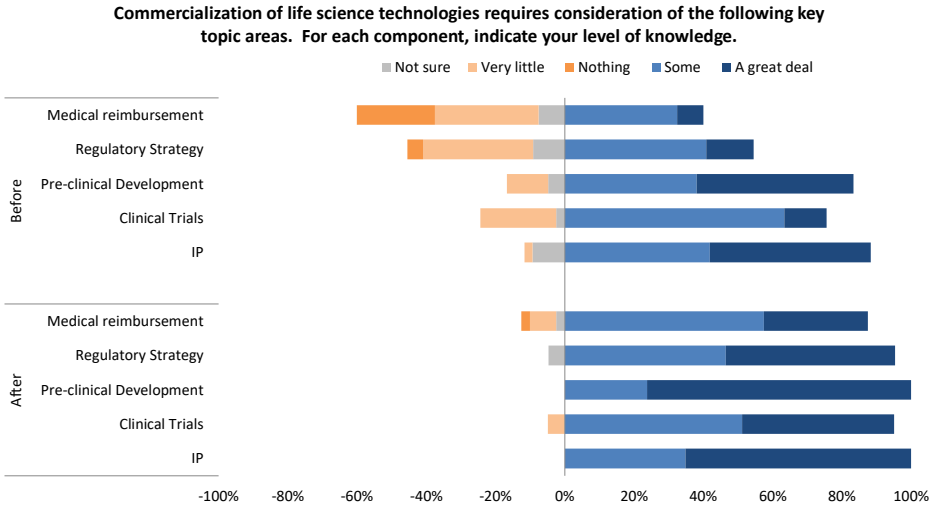
LIFE SCIENCE COMMERCIALIZATION KNOWLEDGE



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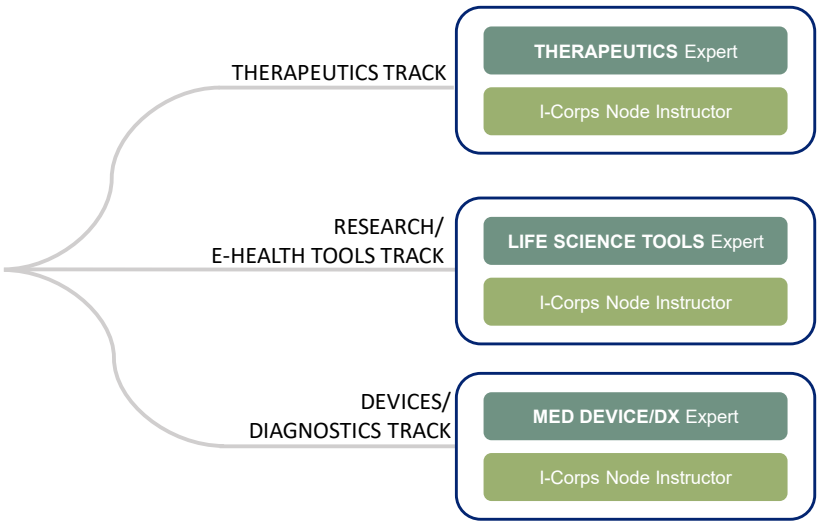
TODAY'S PROGRAM STRUCTURE

TEAM & CURRICULUM

- Teams are distributed among track "rooms"
- Curriculum tailored to life sciences
- 8-week course
  - 3-Day Kick-off Event
  - 6 Weekly web classes
  - 2-Day Lessons Learned



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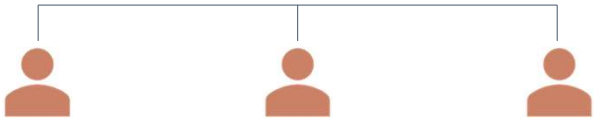
I-CORPS AT NIH TEAM STRUCTURE

The I-Corps at NIH Team



C-level Officer
A high-level company executive with decision-making authority

Technical Lead
The assigned PI on the Phase I award
Or senior researcher

Industry Expert
An individual with prior business development background in the target industry

BENEFITS FOR INDUSTRY EXPERTS

- Learn first-hand the Lean methodologies
- Expose yourself to exciting and commercially promising innovations at an early stage
- Expand professional network
- Earn prestige by being associated with one of our country's leading innovation programs
- Make an impact to help foster the next generation of biomedical start-ups that will, in turn, benefit the society

I-CORPS at NIH

8

I-CORPS AT NIH VS. NSF I-CORPS

	I-CORPS at NIH	NSF I-CORPS
Mission	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.	NSF I-Corps prepares 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.
Eligibility	SBIR- and STTR-funded (Phase I) small business active awardees	Academic (NSF-funded and other) researchers
Cadence	2 cohorts per year	14 cohorts per year
Course structure	8 weeks; 100 interviews Tracked cohorts by technology	7 weeks; 100 interviews Shuffled cohorts, technology agnostic
Instructors	**3 domain experts and 3 core faculty**	3 core faculty and 3 adjunct faculty

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9

ENGAGING SMALL BUSINESS TEAMS

Lessons Learned by NIH to Promote Team Success in I-Corps

- Setting expectations
  - Time
  - Effort
  - Fast-pace and structure
- Highlighting a shared mission
- Articulating support for pivots in support of…
  - Demonstrating value to the companies
  - And value to the patients/beneficiaries

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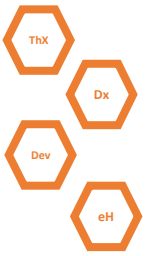
10

ACKNOWLEDGING TEAMS

New startup,
New idea

Fundraising mode

Established small business
breaking into new market



Therapeutics

Diagnostics

Devices

eHealth/Digital Health

"NIH knows teams are at different stages."
"Use I-Corps as a time for growth, exploration, and education."

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11

ALUMNUS HIGHLIGHT - ASCLEPIX

ASCLEPiX THERAPEUTICS

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

- 2014 I-Corps at NIH participant
- Addressed their National Cancer Institute (NCI)-funded peptide therapeutic.

- 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.
- 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.

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12

ALUMNUS HIGHLIGHT - MEDABLE

Medable

$136 million total funding raised to date
$91 million recently secured Series C funding

- 2018 I-Corps at NIH participant
- Addressed their National Cancer Institute (NCI)-funded digital clinical trial software system

- 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.

- 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.

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13

ALUMNUS HIGHLIGHT – VIVO BIOSCIENCES

VIVO BIOSCIENCES

Was acquired by LifeNet Health

- 2014 I-Corps at NIH participant
- Addressed their National Cancer Institute (NCI)-funded 3D material for growing cells and tissues for research

- 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.

- C-Level/PI 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.

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14

IMPACT OF I-CORPS AT NIH

SINCE PROGRAM INCEPTION

Number of teams	201
Number of teams with one or more female members	117
Number of teams with one or more members from under-represented groups	132
Number of unique individuals trained	596
Number of individuals trained that are women	163
Number of individuals trained that are from under-represented groups	198
Subsequent Funding	**$403M**

https://www.nsf.gov/news/special_reports/i-corps/pdf/NSFI-Corps2021BiennialReport.pdf

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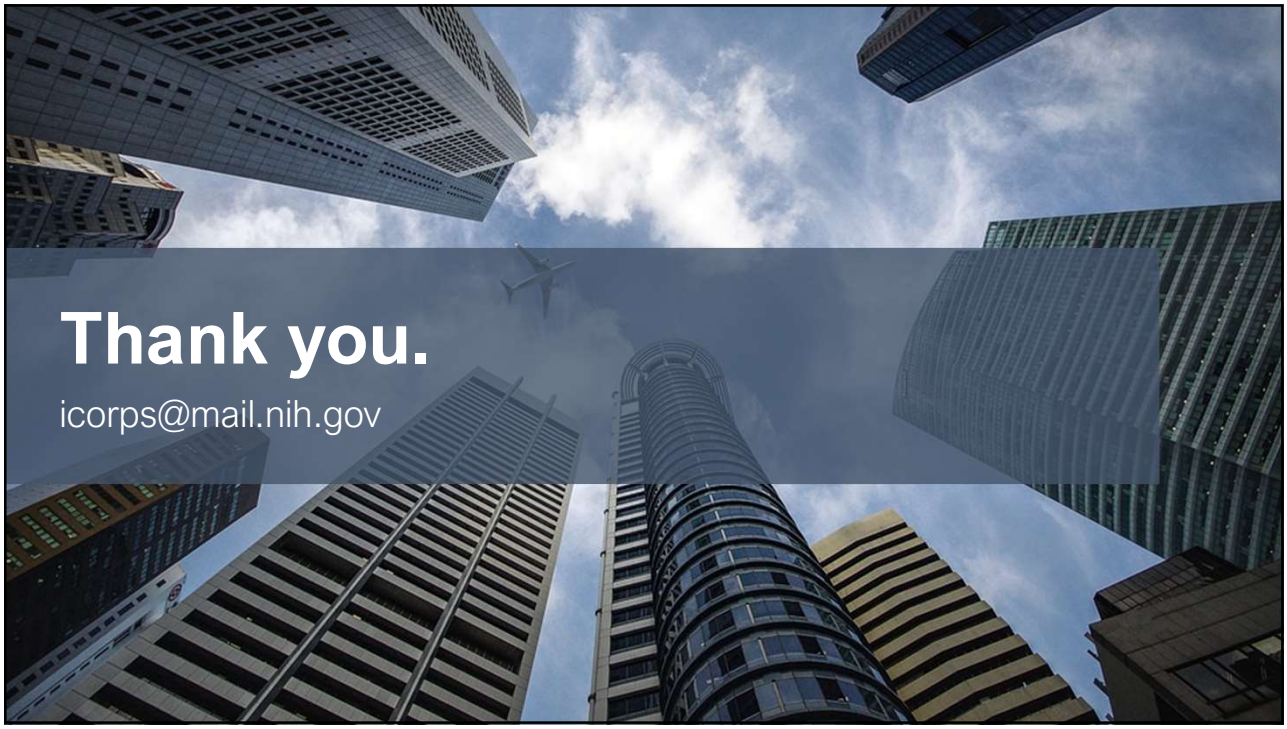
15



16

IMPACT OF NSF INNOVATION CORPS (I-CORPS)

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August 5, 2021

The views expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation or other agencies

1

Impact of NSF Innovation Corps (I-Corps)

- *Number of Teams trained: 1,908
- *Entrepreneurial leads trained: 2,241
- Cohort participation: ~100
- *Startups created: 1,036
- *Subsequent funding raised: $761M
- *(9) NODES and (99) Sites in 2020
- *"Node" to "HUB" model (Principal + Partners + Affiliates): NSF 20-529
- *Mergers and acquisitions: 9

*https://www.nsf.gov/news/special_reports/i-corps/pdf/NSFI-Corps2021BiennialReport.pdf

2

Programs Modeled after NSF I-Corps

- Partnerships with Federal Agencies:
  - DOE (ARPA-E, EERE)
  - DHS, (Science and Technology Directorate)
  - DOD (Basic Research Office)
  - NIH (SBIR/STTR, Clinical and Translational Science Awards Program)
  - NSA (Mission Capabilities Group)
  - SBA (Office of Entrepreneurial Development)
  - USDA (National Institute of Food and Agriculture)
  - NASA
- I-Corps @ Ohio (initiative of the Ohio Department of Higher Education)
- Science Foundation Ireland (SFI)
- *Others*
  - *CONACYT (Mexico)*
  - *South Korea (Ministry of Science and ICT, Korea Innovation Center)*
  - *I-NCUBATE (IIT MADRAS)*

3

Impact of NSF I-Corps

- NSF Industry University Cooperative Research Center (I/UCRC): *I/UCRC bootcamp on Customer Discovery*
- NSF Partnership for Innovation
- NSF SBIR *"Beat-the-Odds Boot Camp"* (Phase I awardees)
- I-Corps for SBIR/STTR awardees (FY 2019/2020)
- Other Observations:
  - "Customer Discovery" for NSF GOALI
  - idea2IMPACT (translating assistive health technologies and other products)

4

Impact of Entrepreneurship Training

- Decreased risk-averse culture
- Increased clarity on “search” vs “execution” and “invention” vs “innovation”
- Change in research outlook (“fundamental” vs “use-inspired” research)
- Increased uncertainty tolerance
- Start-up creations & follow-on funding
- Increased collaboration with industry (ready partners for translation of discoveries)
- Entrepreneurial curricula developed
- Improved job interview skills

5

Success Factors for Academic Spinoffs

- Founding person & the team (mentors? trusted advisors? agility?)
- Adapting to change in culture (scientist/researcher vs entrepreneur)
- Access to University resources (TTO, IP policy, programs on campus …)
- Access to external resources (grants, venture capital/angels, industry partners)
- Acquiring the first customers (early adopters)
- Successful business model
- Decreased institutional and regional barriers
- Alumni network
- Entrepreneurial self-efficacy

6

NSF I-Corps Sites and Nodes: Positive traits

- Enhanced campus awareness and interest in entrepreneurial activities
- Steady diffusion of "Cold Customer Discovery" into the campus research community
- New industry connections
- Program not just for startups (is for any researcher right after disclosure/even as the researcher is conceptualizing what might be disclosed)
- Immersive, perspective (life?) changing experience for most participants
- Move to remote training (especially to underserved regions)
- Increased awareness of federal funding opportunities (SBIR, others)

7

NSF I-Corps Sites and Nodes: Challenges

- Recruiting teams
- Lack of commitment and support from university administration
- Lack of recognition of faculty engagement in I&E for promotion and tenure
- Lack of follow-on programs to help early stage ventures
- Compensating mentors for their time
- Lack of regional pools of mentors willing to work with teams in underserved areas
- Making exploration of the economic and social impact of research an expected and natural part of the PhD process
- Rules around eligibility for the National program shifting from time to time

8