Title: Analysis of the role of NSF I-Corps training on engineering and science faculty retention rates at CUNY

Authors: Jessica Fields*, Nhi Tran

Institution: City University of New York (CUNY), NY I-Corps Hub

Address: New York, New York, 10019, United States of America

Corresponding Author contact information: jessica.fields@cuny.edu

Abstract:

Since 2012, the City University of New York (CUNY) has had forty-two teams participate in the National Science Foundation (NSF) Innovation Corps (I-Corps; pronounced “eye-core”) program. This presentation will explore the 1. Retention rates of these CUNY PIs within academia after completion of an I-Corps course, 2. Comparison of retention rates to national averages, 3. Variations of retention rates by discipline and sex, and finally, 4. Notable differences between PIs that have completed regional versus national I-Corps training. The NSF I-Corps program facilitates the translation of deep-technology and basic research out of academia and into the marketplace. Teams of three consisting, traditionally, of a Science or Engineering professor (referred to as Principal Investigator(PI) or Technical Lead (TL)), their graduate student (Entrepreneurial Lead (EL)), and an Industry Mentor (IM) were awarded a $50K NSF grant to participate in a seven week bootcamp where the team was trained in the Lean LaunchPad Methodology and expected to complete 100 or more customer discovery interviews to help establish a potential product-market fit. Our analyses suggest that the NSF I-Corps also increases retention of STEM faculty in academia and may enhance their careers.
Analysis of the Role of NSF I-Corps Training on Engineering and Science Faculty Retention Rates at the City University of New York

Nhi Tran and Jessica Fields
The Industry sector become the largest sector of employment for PhD Holders in 2013

Figure 1. Employment Factor.
Almost **50%** of Faculty members in the science and engineering disciplines leave university after **10 yrs.**

**Figure 2. Survival Analysis of Faculty Retention in Science and Engineering.**
What can U.S. Universities do about faculty retention in Science and Engineering?

According to K.Basu research on Faculty Retention in 2012, Survival Factor, Bloomberg Journalist:
"...it can take **up to 10 years** to recoup the investment of a new hire in a STEM field because **start-up costs** -- the money required for a research lab and research program -- **can be as high as $1.5 million.**"
**NSF I-CORPS TEAMS PROGRAM**

7 week program: 10 sessions and 100+ interviews.
Teams are granted **$50k** to do Customer Discovery

**MISSION:** Support researchers interested in entrepreneurial education and mentoring, with the goal of reducing the time it takes to bring technologies from the laboratory to the marketplace.

---

**1. NSF FUNDED RESEARCH/COMPLETED REGIONAL I-CORPS**
- Prior award from NSF in a scientific or engineering field that has been active within five years
- Participated in a Regional I-Corps Program hosted by an I-Corps Site, Node, or Hub

**2. UNIVERSITY BASED RESEARCH**
- Reducing the time it takes to bring technologies from the laboratory to the marketplace.
- **Deep Tech - Intellectual Property**

**3. FORM A TEAM**
- Entrepreneurial Lead (EL)
- Technical Lead (TL) OR Principle Investigator (PIs)
- Industry Mentor (IM)
NSF I-CORPS TEAMS PROGRAM

Number of NSF I-Corps Teams: 2,523
Total Follow-on Funding Raised: $1.5B

Number of Resulting Businesses: 1,377
Number of Teams with Funding Records: 867
Number of Employees: 4,834

Last updated: 06/22/22

From T. Loomis - NSF National Innovation Network (NIN) Meeting, 23 June 2022
City University of New York (CUNY)
Principle Investigators (PIs) attended NSF I-Corps 2012 - 2022

43 I-Corps Teams
38 Principle Investigators
$2.1M I-Corps Grants Awarded
<table>
<thead>
<tr>
<th>Discipline</th>
<th>Median Years to Exit Academia</th>
<th>Median Years in Academia to Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>K.Basu Study Case n = 2966</td>
<td>CUNY I-Corps PIs n = 38</td>
</tr>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>12.92</td>
<td>10.68</td>
</tr>
<tr>
<td>Physics</td>
<td>11.14</td>
<td>9.41</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>16.19</td>
<td>10.41</td>
</tr>
<tr>
<td>Chemistry</td>
<td>12.49</td>
<td>10.53</td>
</tr>
<tr>
<td>Mathematic</td>
<td>7.33</td>
<td>4.45</td>
</tr>
<tr>
<td>Computer Science</td>
<td>9.32</td>
<td>10.25</td>
</tr>
<tr>
<td>Civil Eng</td>
<td>8.68</td>
<td>10.74</td>
</tr>
<tr>
<td>Biology</td>
<td>11.96</td>
<td>16.36</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>11.64</td>
<td>9.78</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Criminal Justice</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Earth &amp; Environmental Sciences</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Psychology</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 1. Comparison STEM Faculty Time To Exit by Disciplines and Gender between City University of New York and K.Basu Study Case
38 CUNY PIs remain in academia

21 out of 38

have been promoted in their careers:
1 became Dean
1 became Presidential Professor
2 became Named Professors
3 became Department Chairs
14 got promoted to Professors
CUNY PIs Outcomes from the Innovation Cycle

10 out of 38
CUNY PIs have companies that have been funded

1 won NIH contract
National Institutes of Health (NIH)
Seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability.

9 companies won SBIR

4 won PFI
PFI offers researchers from all disciplines of science and engineering funded by NSF the opportunity to perform translational research and technology development, catalyze partnerships and accelerate the transition of discoveries from the laboratory to the marketplace for societal benefit.

The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs encourage domestic small businesses to engage in Federal Research/Research and Development (R/R&D) with the potential for commercialization.
Outcomes for P&T

- Lock-in Intellectual Property
- Submit PFI
- Form a company
- Submit SBIR/STTR
- Participate in National I-Corps
- Develop/ disclose New Technology
- Sponsored Research back to their lab

More Opportunities to build P&T Resume:

- New Funding into your lab
- New Grad students
- New Technology
- New Patents
- New Publications
- New Presentations
Thank You for listening

Q&A

Analysis of the Role of NSF I-Corps Training on Engineering and Science Faculty Retention Rates at the City University of New York
Demographics:
CUNY Principle Investigator's Disciplines*

- Biology: 2
- Biomedical Engineering: 2
- Chemical Engineering: 1
- Chemistry: 6
- Computer Science: 10
- Criminal Justice: 1
- Earth and Environmental Sciences: 2
- Electrical Engineering: 5
- Mechanical Engineering: 3
- Physics: 5
- Psychology: 1

*38 Sample Size
Demographics:
CUNY Principle Investigator's Genders*
*38 Sample Size

Female 31.6%
Male 68.4%
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Invention Disclosures</td>
<td>50</td>
<td>49</td>
<td>52</td>
<td>63</td>
<td>54</td>
</tr>
<tr>
<td>Provisionals Filed</td>
<td>49</td>
<td>41</td>
<td>45</td>
<td>60</td>
<td>54</td>
</tr>
<tr>
<td>US/PCT Applications</td>
<td>25</td>
<td>36</td>
<td>28</td>
<td>43</td>
<td>42</td>
</tr>
<tr>
<td>Issued Patents</td>
<td>11</td>
<td>21</td>
<td>22</td>
<td>19</td>
<td>41</td>
</tr>
</tbody>
</table>