



2022 PTIE Conference Abstract

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

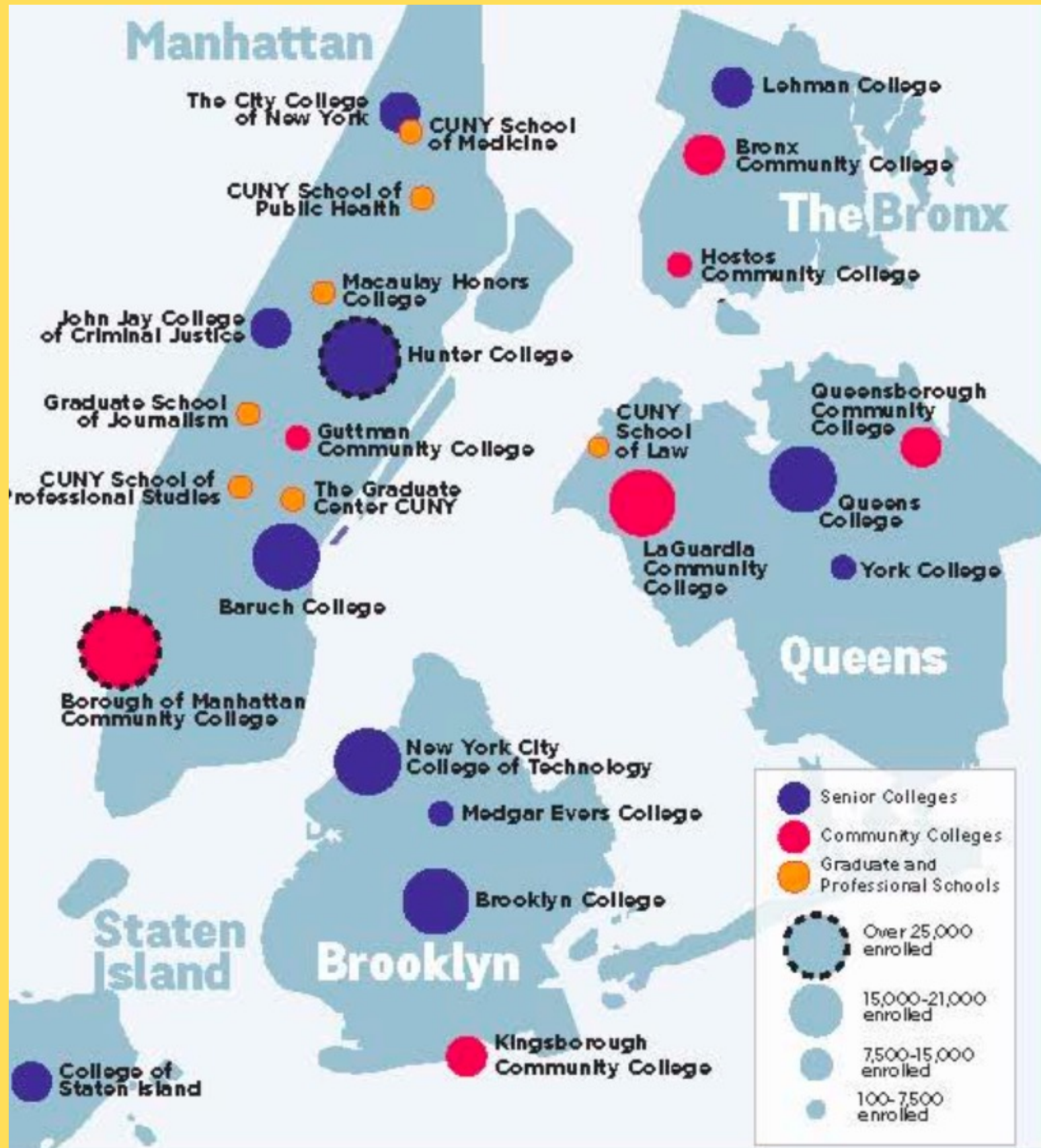
Address: New York, New York, 10019, United States of America

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.

July 26, 2022



PROMOTION AND TENURE – INNOVATION AND ENTREPRENEURSHIP CONFERENCE

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



Employment Factor

The **Industry sector** become the largest sector of employment for **PhD Holders in 2013**

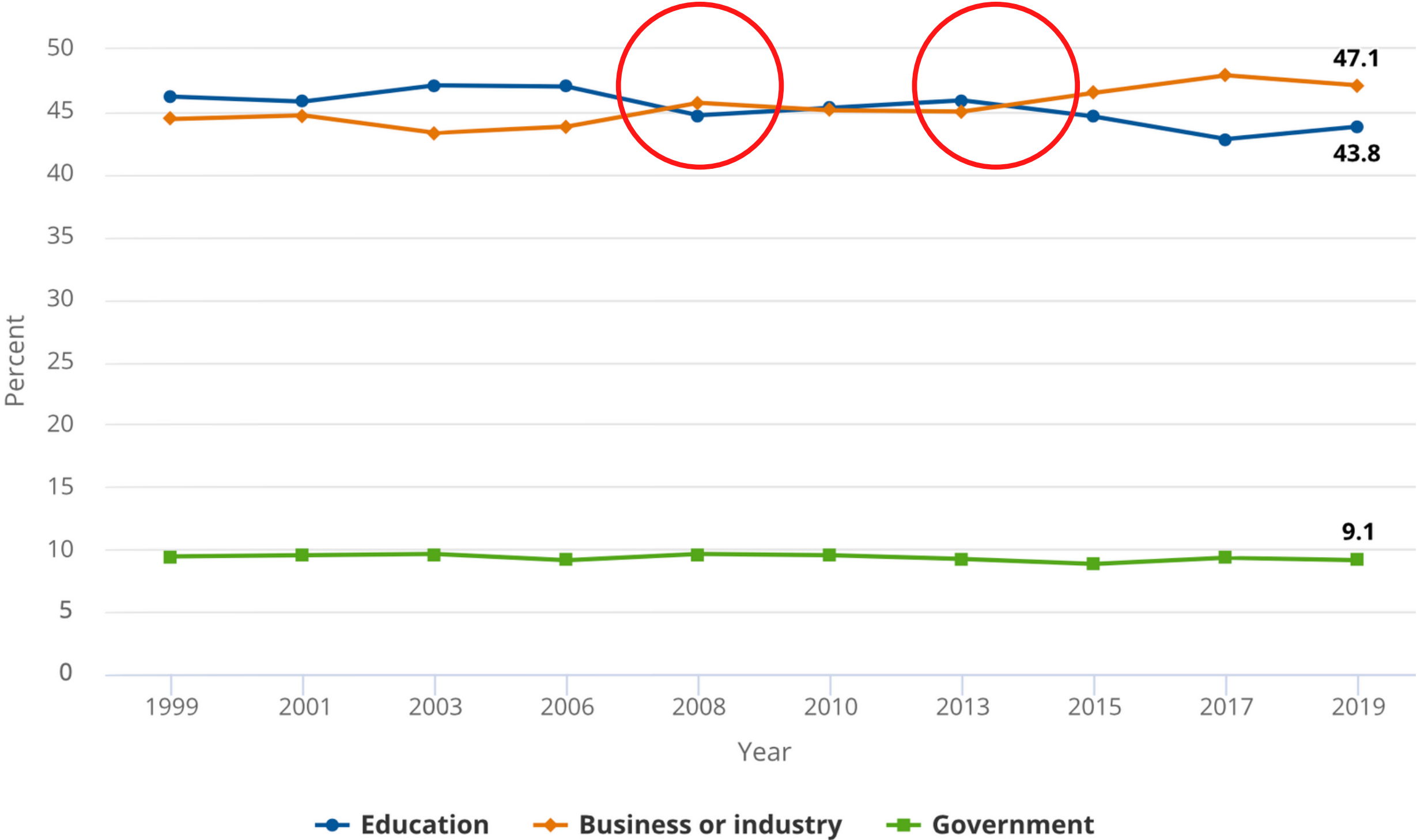


Figure 1. Employment Factor.

Adapted from "Employed U.S.-trained SEH doctorate holders residing in the United States, by broad employment sector: 1999–2019" by J.Opsomer, A.Chen, W.Chang, and D.Foley, 2021, U.S. Employment Higher in the Private Sector than in the Education Sector for U.S.-Trained Doctoral Scientists and Engineers: Findings from the 2019 Survey of Doctorate Recipients. Retrieved from <https://nces.nsf.gov/pubs/nsf21319>



Survival Factor

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

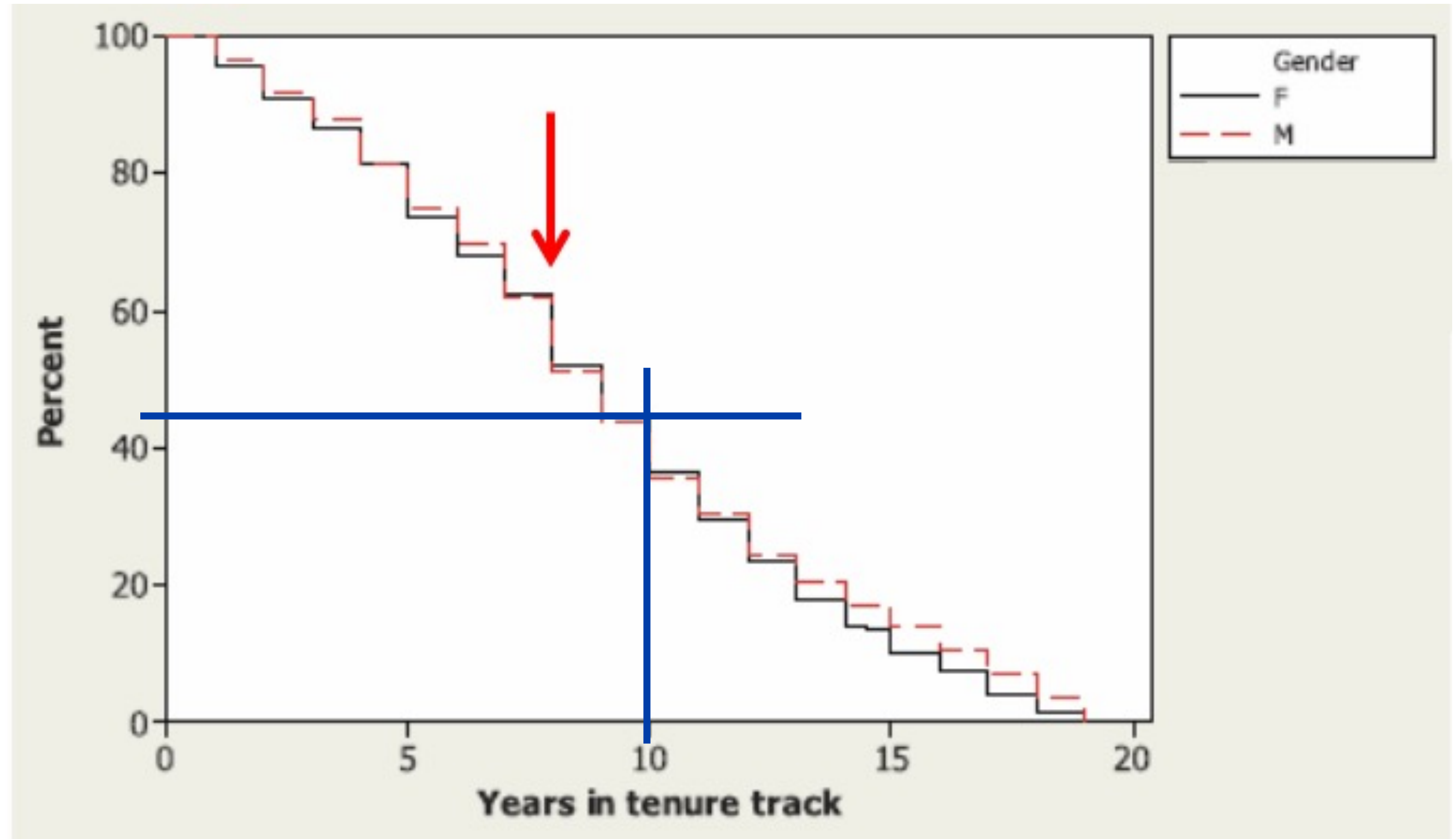


Figure 2. Survival Analysis of Faculty Retention in Science and Engineering.

Adapted from "Nonparametric survival curve for faculty who entered between 1990 and 2002 by gender. IQR, interquartile range" by D.Kaminskiy, 2012, Survival Analysis of Faculty Retention in Science and Engineering by Gender. Retrieved from <https://www.science.org/doi/abs/10.1126/science.1214844>

Economic Factor

The Cost of Departure

There are many hidden costs associated with a faculty member's departure.

**\$390K-
490K**

The average assistant professor start-up package at private Research I universities.*

**\$700K-
1.4M**

Average senior faculty start-up package for STEM fields.*

\$24M

Total spent by the University of Wisconsin at Madison on faculty retention in 2016.**

Figure 3. Start-up cost.

Adapted from "The Cost of Departure" by K.Mathews and T.Benson, 2018, Findings from the First Ever Multi-Institutional Survey of Faculty Retention & Exit. Retrieved from <https://coache.gse.harvard.edu/blog/findings-first-ever-multi-institutional-survey-faculty-retention-exit-infographic>



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.**"

What can U.S. Universities do about faculty retention in Science and Engineering?

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



Economic Impact Report

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

NEW YORK
NSF I-CORPS HUB



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

CUNY NSF I-Corps PIs years at Academia by Discipline and Gender

Discipline	Median Years to Exit Academia		Median Years in Academia to Date	
	K.Basu Study Case n = 2966		CUNY I-Corps PIs n = 38	
	Men	Women	Men	Women
Electrical Engineering	12.92	10.68	17.4 (5)	0
Physics	11.14	9.41	11.4 (4)	2.8 (1)
Mechanical Engineering	16.19	10.41	11 (2)	5.7 (1)
Chemistry	12.49	10.53	12.8 (4)	8.7 (2)
Mathematic	7.33	4.45	-	-
Computer Science	9.32	10.25	11.4 (7)	5.1 (3)
Civil Eng	8.68	10.74	-	-
Biology	11.96	16.36	9 (1)	8 (1)
Chemical Engineering	11.64	9.78	27 (1)	0
Biomedical Engineering	-	-	6.5 (1)	9.5 (1)
Criminal Justice	-	-	0	28 (1)
Earth & Environmental Sciences	-	-	11 (1)	11.5 (1)
Psychology	-	-	0	18 (1)

Table 1. Comparison STEM Faculty Time To Exit by Disciplines and Gender between City University of New York and K.Basu Study Case

Adapted from "Median Time to Exit, by Discipline and Gender" by K.Basu, 2012, Survival Factor. Retrieved from <https://www.insidehighered.com/news/2012/02/17/half-all-tenure-track-faculty-stem-fields-leave-11-years>

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

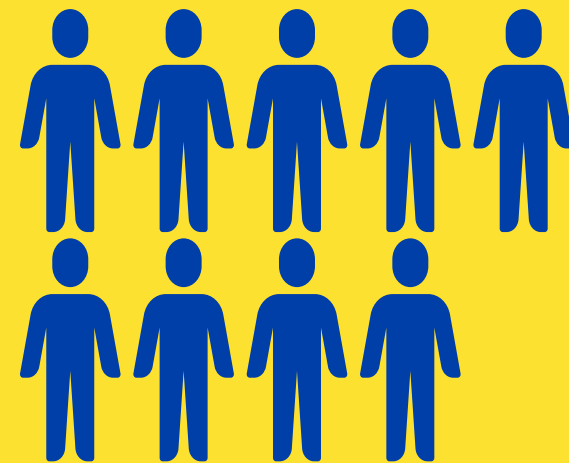
CUNY PIs have companies that have been funded



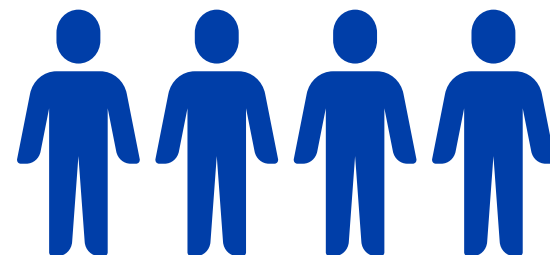
1 won NIH contract

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.

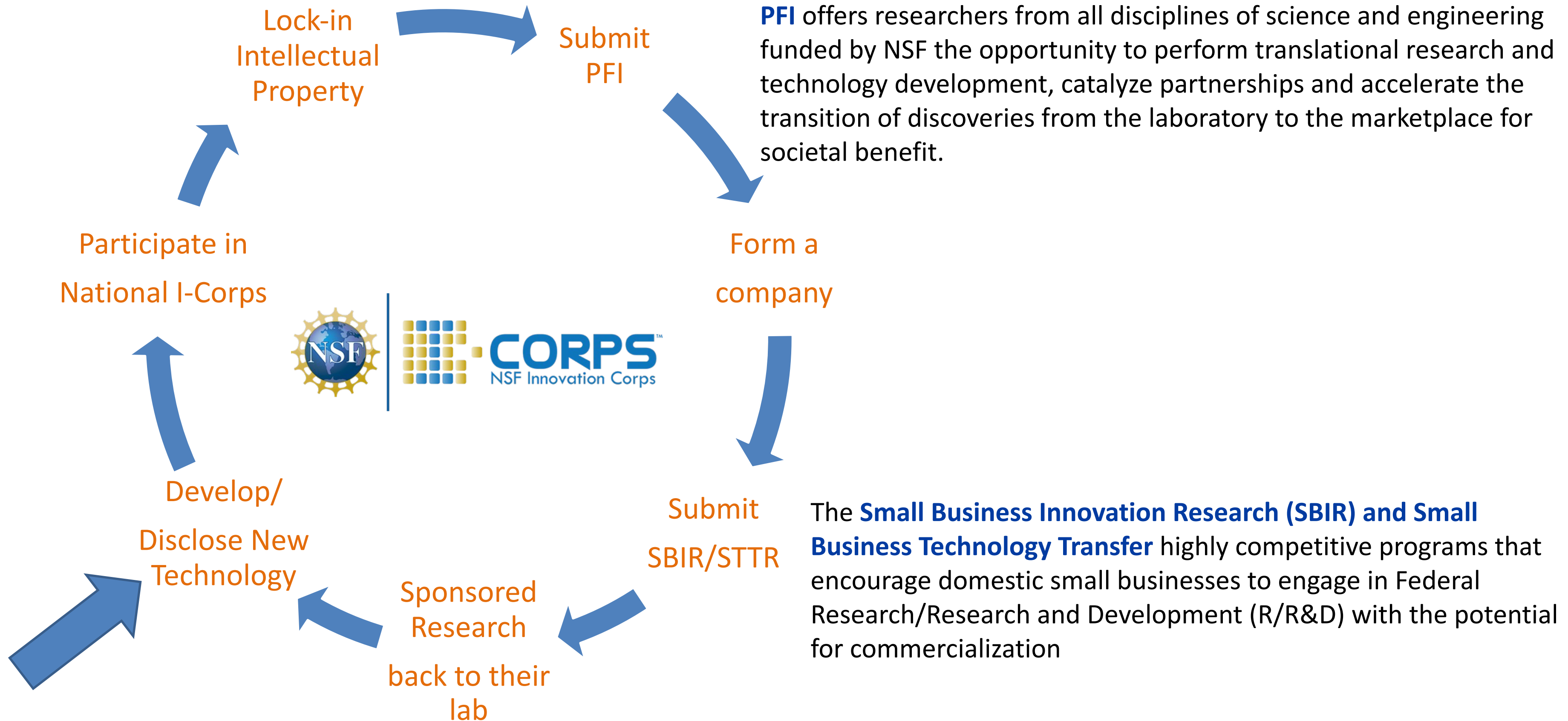


9 companies won SBIR



4 won PFI

Outcomes for P&T

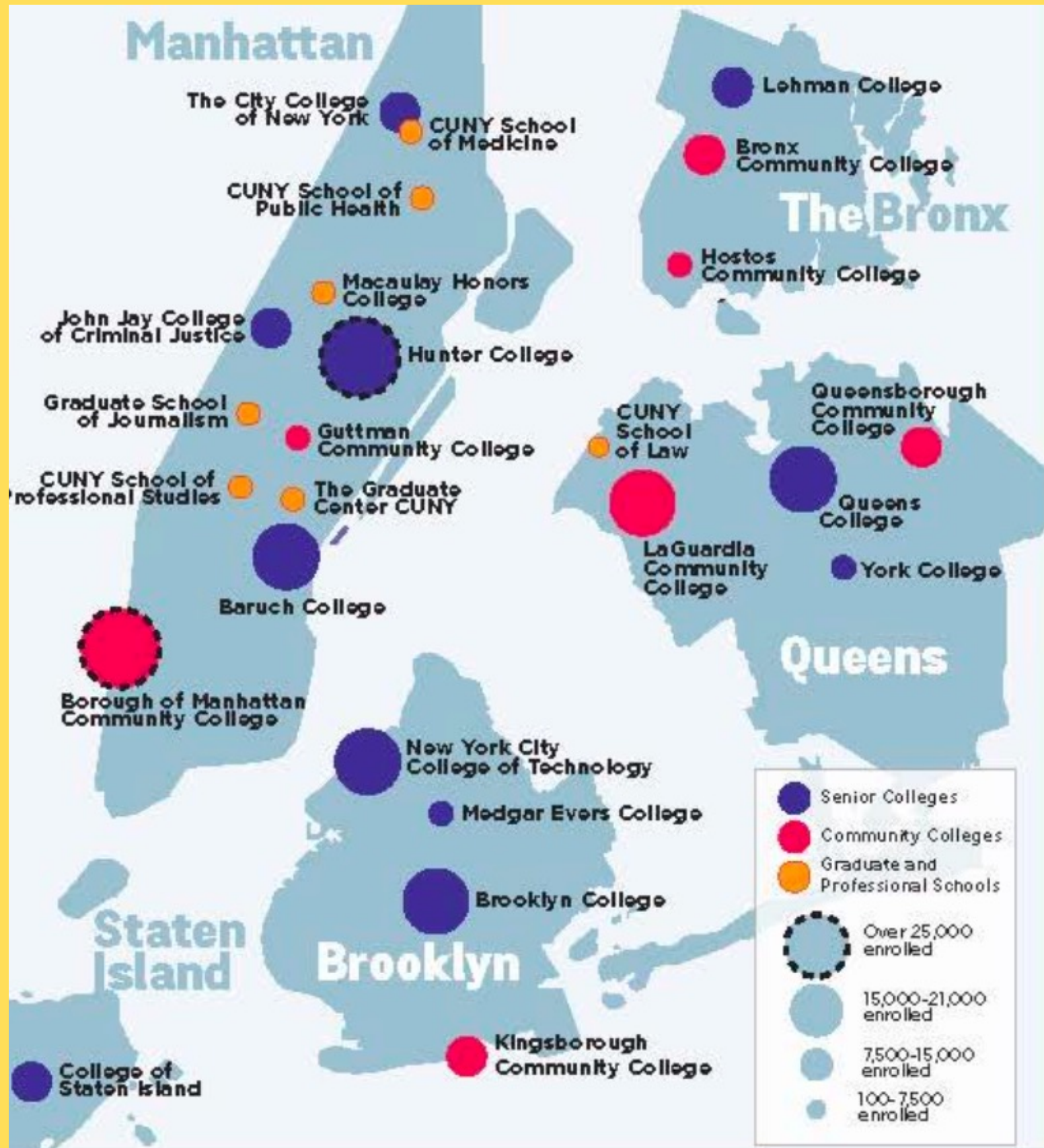


Outcomes for P&T



More Opportunities to build P&T Resume:

- New Funding into your lab
- New Grad students
- New Technology
- New Patents
- New Publications
- New Presentations



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City University of New York

Thank You for listening

Q&A

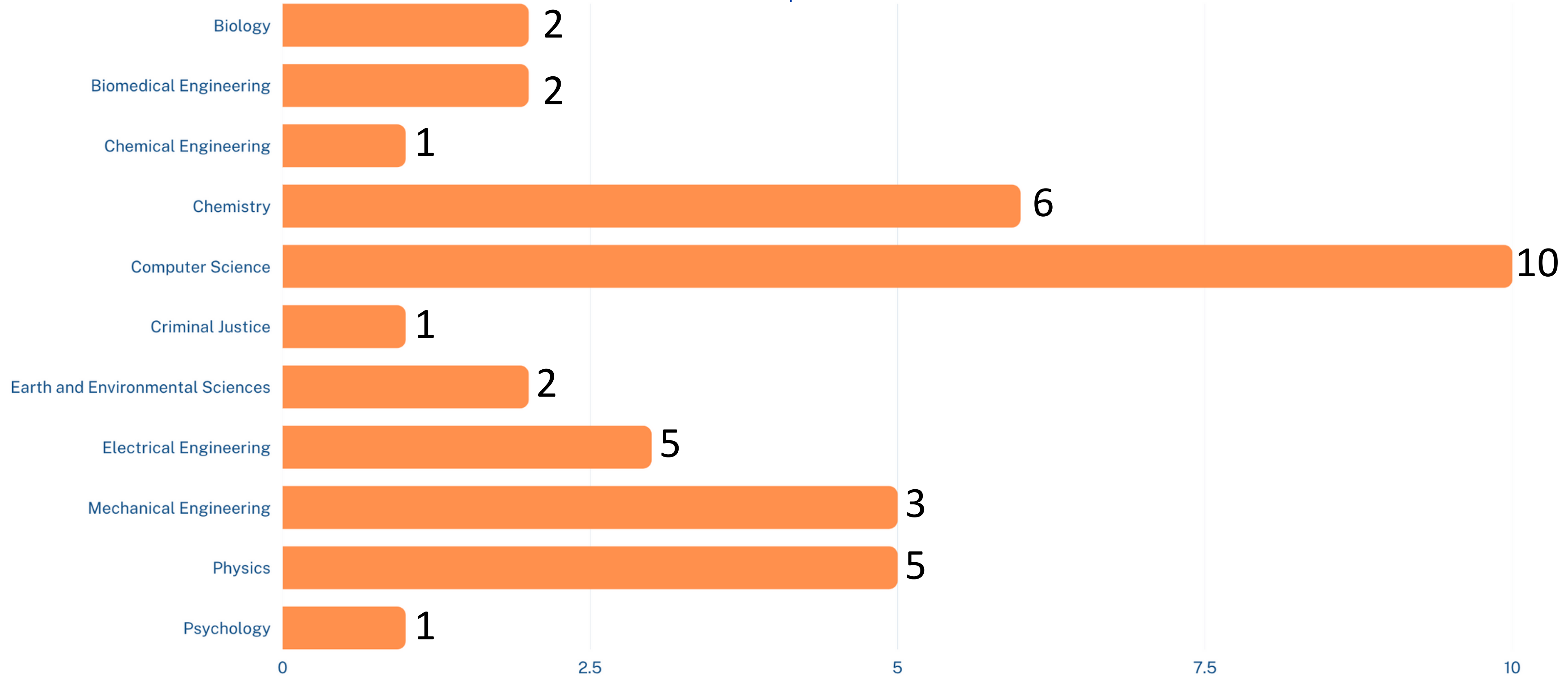
APPENDIX



Demographics: CUNY Principle Investigator's Disciplines*



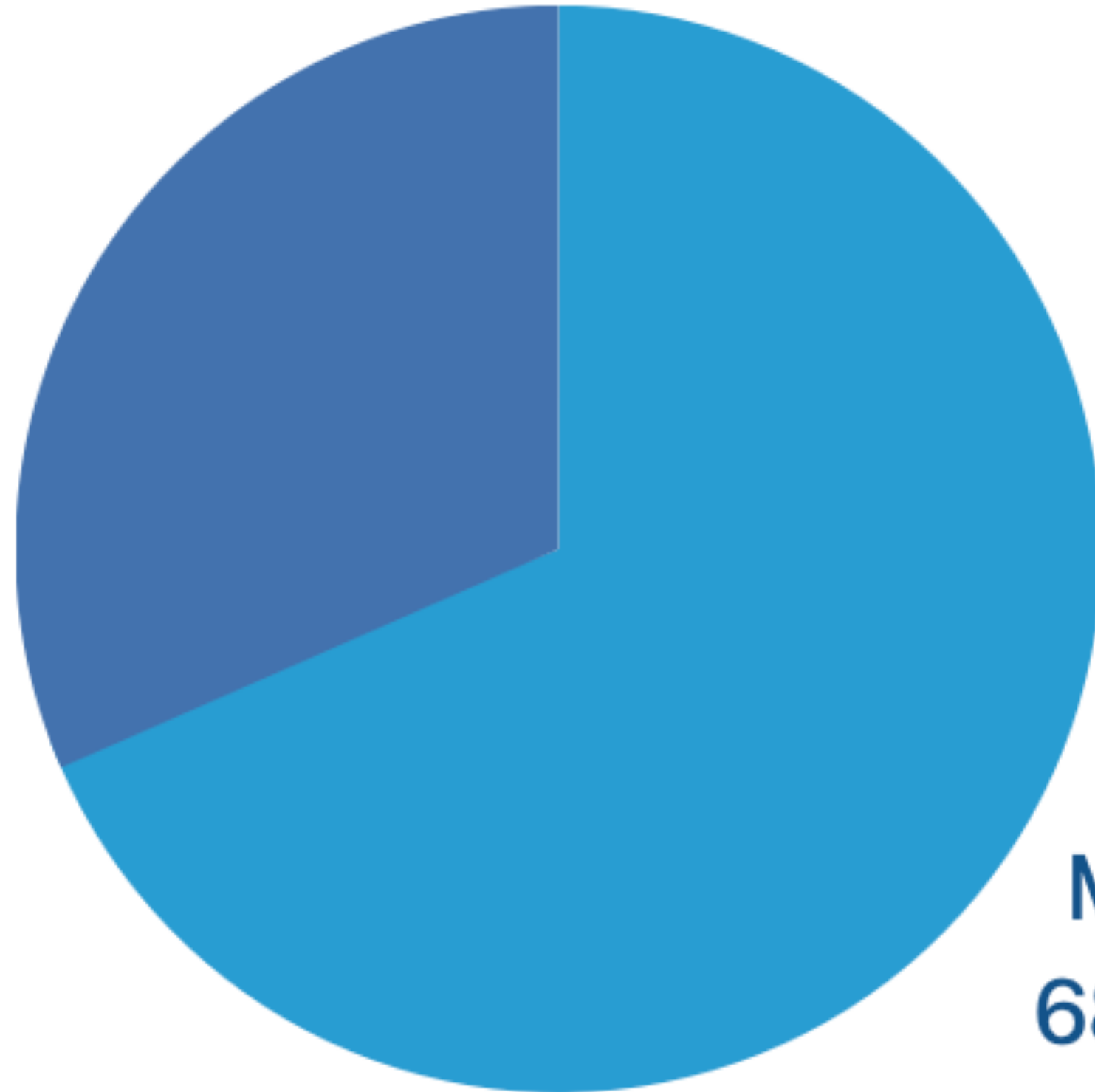
*38 Sample Size



Demographics: CUNY Principle Investigator's Genders*

*38 Sample Size

Female
31.6%



Male
68.4%



TCO Statistics

Patent Info	2013	2014	2015	2016	2017
Invention Disclosures	50	49	52	63	54
Provisionals Filed	49	41	45	60	54
US/PCT Applications	25	36	28	43	42
Issued Patents	11	21	22	19	41