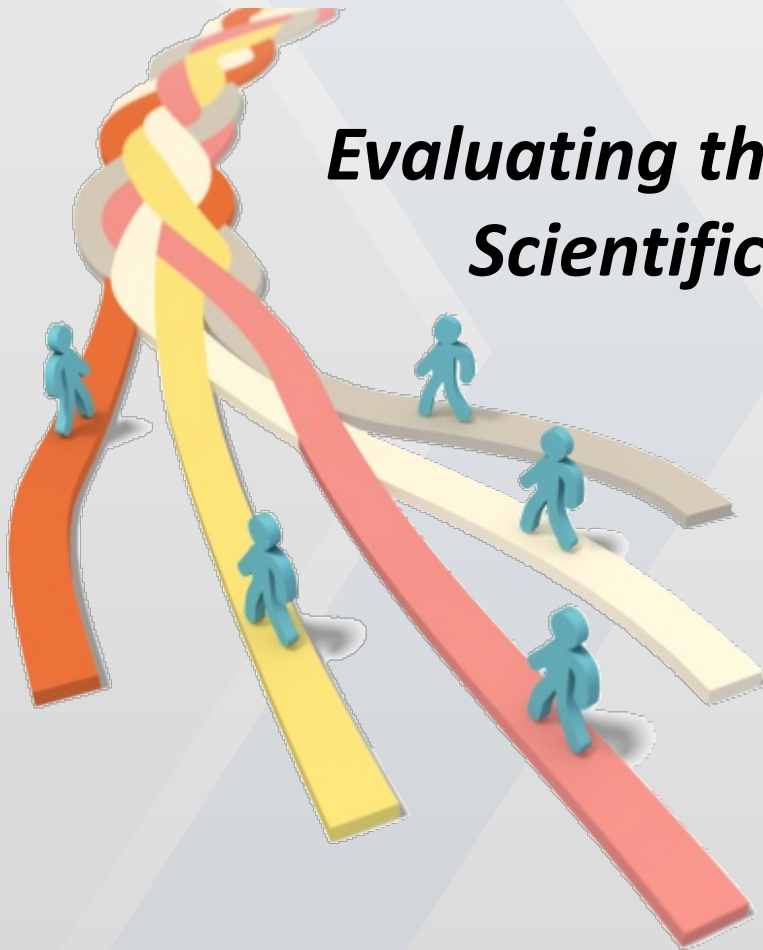


Common Fund “Strengthening the Biomedical Research Workforce” Program

Evaluating the “Broadening Experiences in Scientific Training (BEST)” Awards



Patricia Labosky, PhD
Program Leader
Office of Strategic Coordination
May 18, 2018

NIH is committed to a robust and sustainable biomedical research workforce

In 2011, the NIH Advisory Committee to the Director (ACD) formed the Biomedical Workforce (BMW) Working Group to examine issues related to the future of the biomedical research workforce.

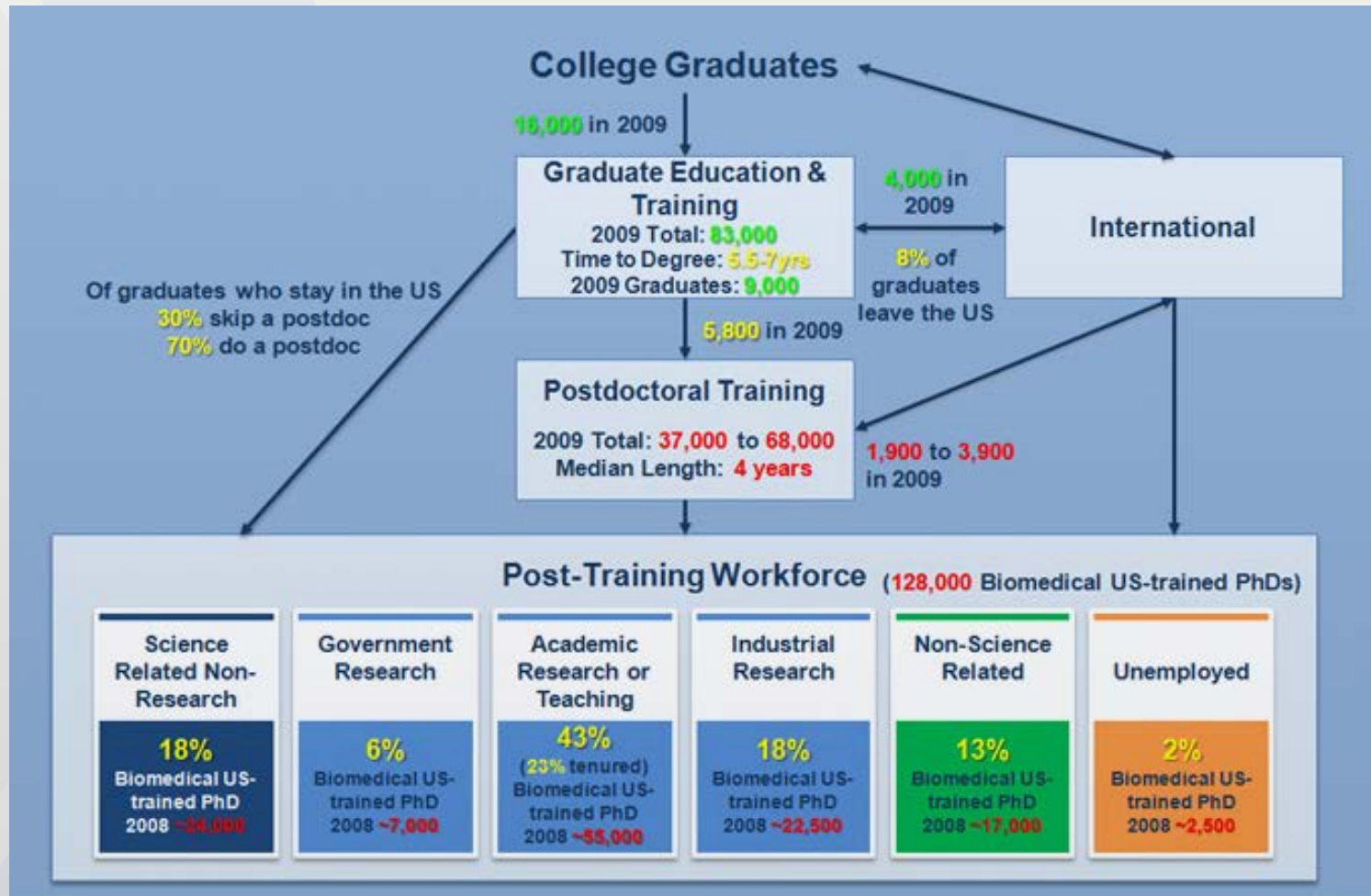
Charge:

Develop a model for a sustainable and diverse U.S. biomedical research workforce that can inform decisions about training of **the optimal number of people for the appropriate types of positions** that will advance science and promote health.

Working Group Chairs:

- Shirley Tilghman, Ph.D., then President, Princeton University, N.J.
- Sally Rockey, Ph.D., then NIH Deputy Director for Extramural Research

Ph.D. Biomedical Research Workforce: Snapshot



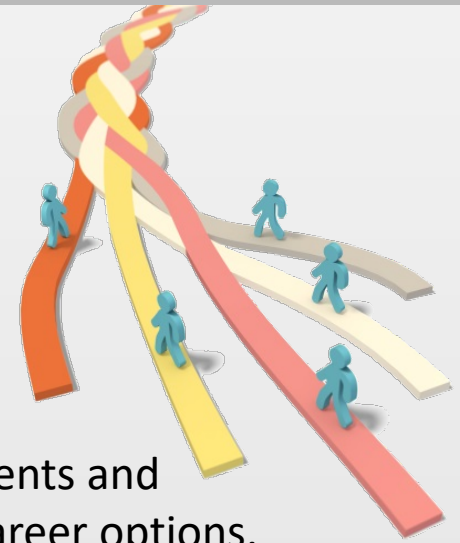
ACD Report: Findings and Conclusions

- Combination of the large upsurge in US-trained PhDs, increased influx of foreign-trained PhDs, and aging of the workforce make **launching a traditional, independent, academic research career increasingly difficult.**
- **Long training time and relatively low early-career salaries** may make the **biomedical research career less attractive.**
- **The current training programs do little to prepare people for anything besides an academic research career.**

One result:

- The NIH Common Fund launched the [Strengthening the Biomedical Research Workforce](#) program to expand the versatility of training opportunities to prepare early career scientists for entry into the dynamic biomedical workforce landscape. This program made the [BEST \(Broadening Experiences in Scientific Training\)](#) awards.

Goals of BEST Awards



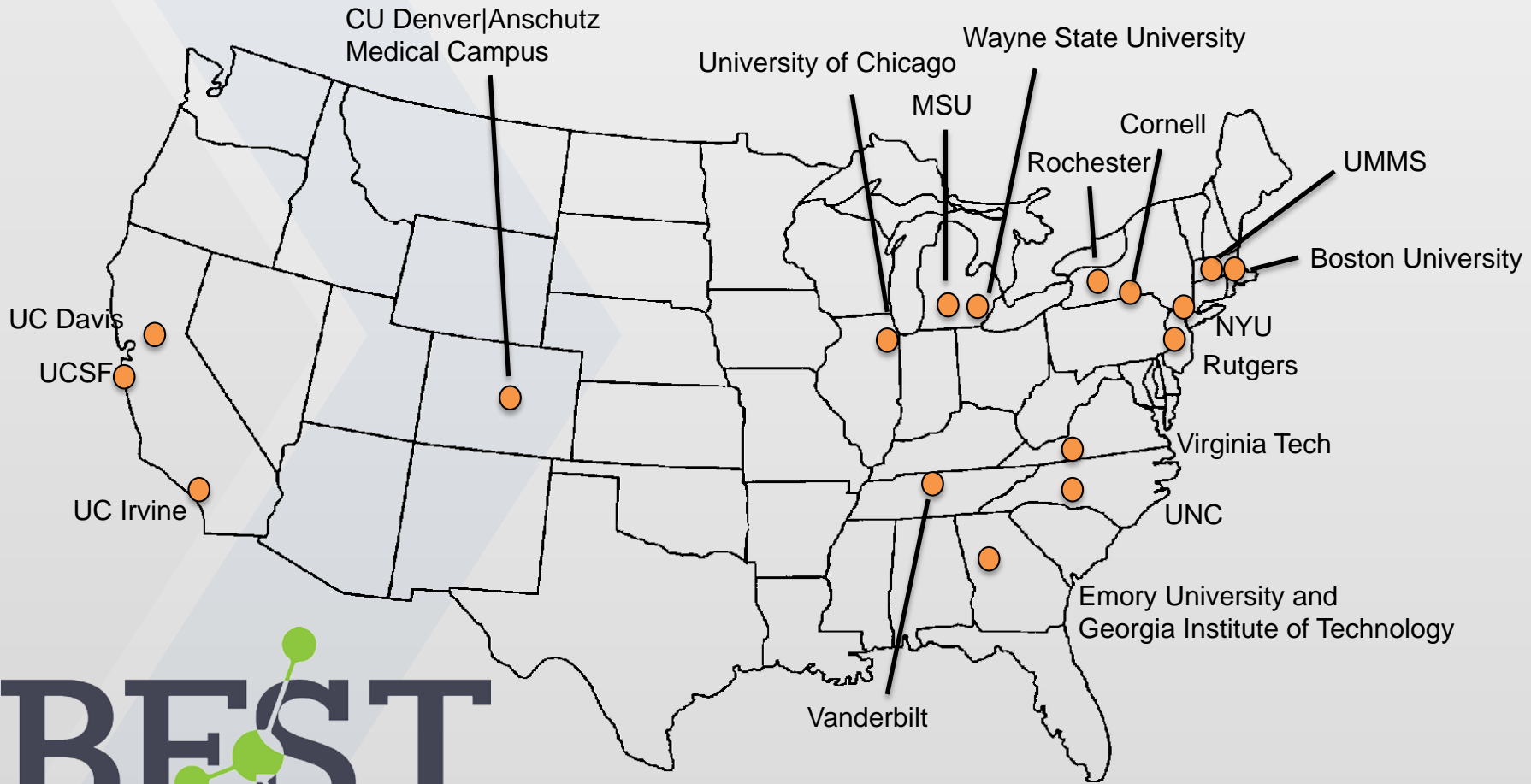
- **Transformative Workforce Development**
- **New Tools, Technologies, Data, Approaches**
 - Trying to affect a “sea change” with this program.
 - Alter the training landscape to give pre-doctoral students and postdoctoral fellows direct exposure to a myriad of career options.
 - Provide trainees with a working knowledge of the opportunities available to them AND the information to facilitate their path towards these options.
 - Determine what approaches make a difference and for whom.
 - Make tested approaches widely available.
 - Evaluation: longitudinal national cross-site evaluation
- **Enabling Infrastructure**

Building infrastructure, novel courses, internships, training opportunities, workplace exposures, etc.



These are 5 year non-renewable awards, awardees are working together as a consortium.

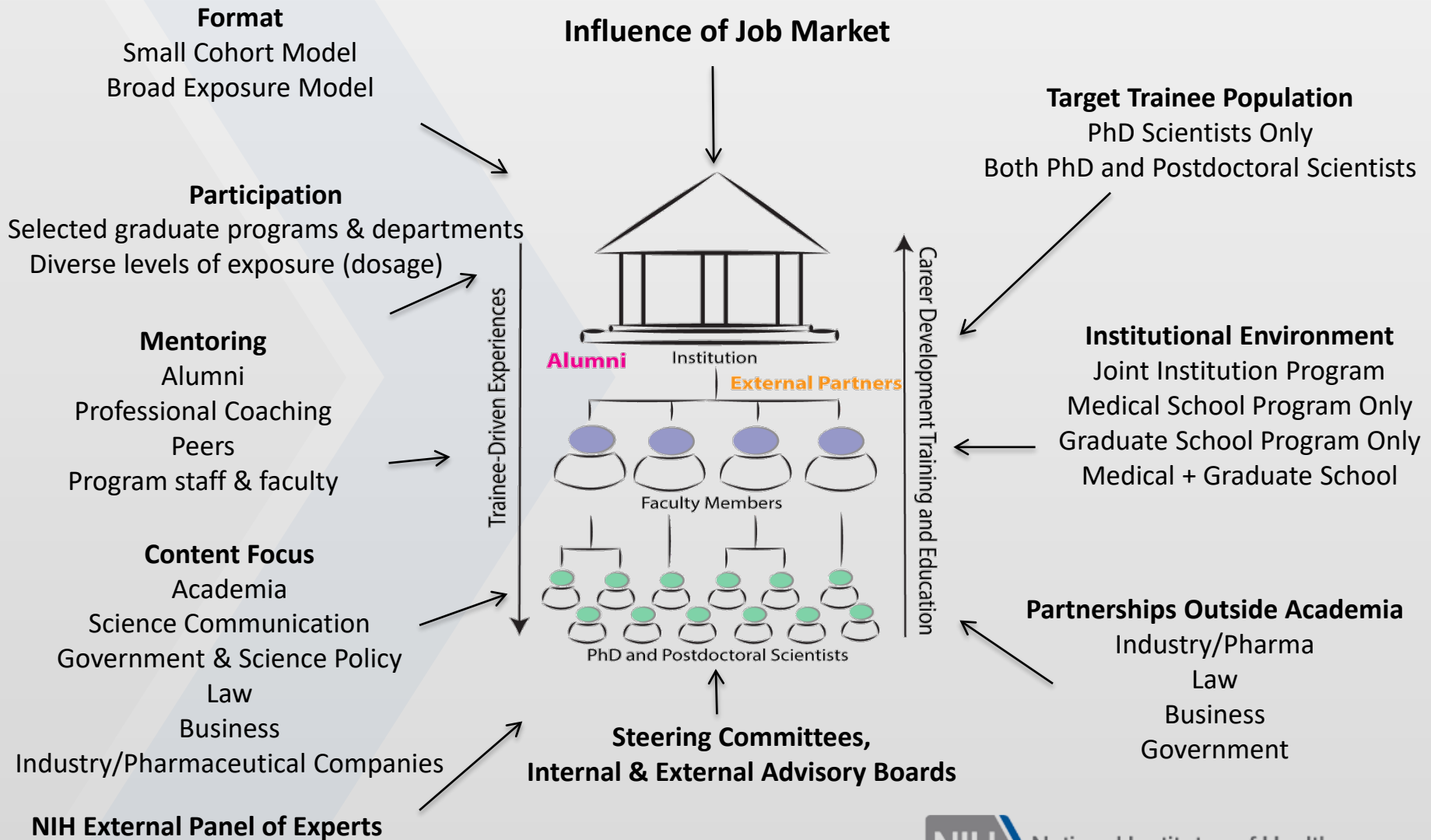
NIH BEST Grants



BEST

10 awards in 2013, 7 additional in 2014

General Features of BEST Programs



Common BEST Consortium Programmatic Elements

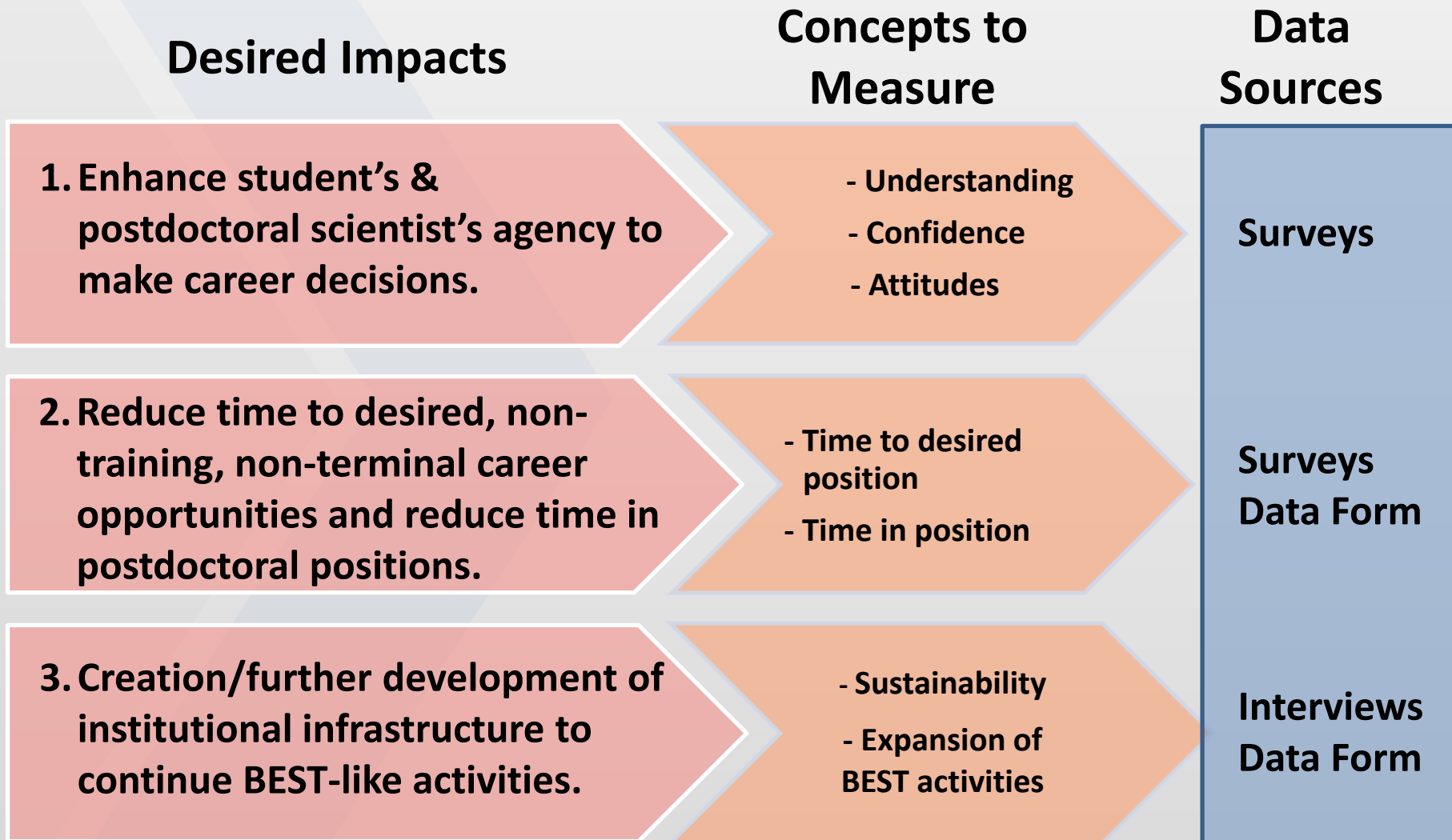
- **Career Development Skills:** Understanding career options, self-reflections, making use of Individual Development Plans (IDP), networking, and job search skills.
- **Professional Development Skills:** Team building, time management, oral and written communication, networking, leadership training, and cognitive assessment of leadership, conflict, and negotiation skills.
- **Experiential Learning:** Brief intensive experiences with partners outside of the University (*e.g.* biotechnology, science writing) or within the University. Seminar series, Entrepreneurial workshops.
- **Mentorship:** Primary research advisor as well as peer mentoring and/or connecting to alumni and professionals in their career(s) of interest.

Meyers, Frederick J., et al. "The origin and implementation of the Broadening Experiences in Scientific Training programs: an NIH common fund initiative." *The FASEB Journal* 30.2 (2016): 507-514.

Long Term BEST Consortium Goals

- Training at U.S. institutions will value a **commitment** to development of higher levels of research skills as well as exposure to and education in preparing for a broader and diverse range of careers.
- Establish high caliber **Offices of Professional Career Development** at all U.S. research institutions focused on graduate and postdoctoral education.
- Truth in **Recruiting** will become widespread, offering **data** on career outcomes.
- Universal recognition and support for philosophy **that choosing a non-academic career is not failure.**
- Evaluated approaches for career advisors and scientists-in training will be available on the **NIH BEST Consortium website** and **disseminated through publications.**
- Trainees will **have increased confidence** to pursue their career goals and will spend shorter times in training – the default into a postdoctoral training period will decrease/disappear.

NIH Evaluation: Desired Impacts



Note: These are being evaluated at the **INDIVIDUAL** level.



National Institutes of Health
Office of Strategic Coordination - The Common Fund

Longitudinal Design for Data Collection: Surveys

Year	Entrance Survey <i>2015: All current graduate students 2016-2019: Only new graduate students</i>	Interim Survey <i>All graduate students from previous entrance surveys</i>	Exit Survey <i>Only students graduating</i>	Post-exit 2-year
2015	•		•*	
2016	•		•	
2017	•	•	•	•
2018	•		•	•
2019		•	•	

Purple= data cleaned and analyzed
 Green = data being cleaned now
 Orange = data being collected now

No Common Fund commitment to fund this long term.

Could be a rich source of data for another entity.

Example of Question:
 How confident are you that you can do the following?

- a. Assess your abilities to pursue your desired career path(s)
- b. Determine the steps to pursue your desired career path(s)
- c. Seek advice from professionals in your desired career path(s)
- d. Identify potential employers, firms, and institutions relevant to your desired career path(s)
- e. Achieve your career goals

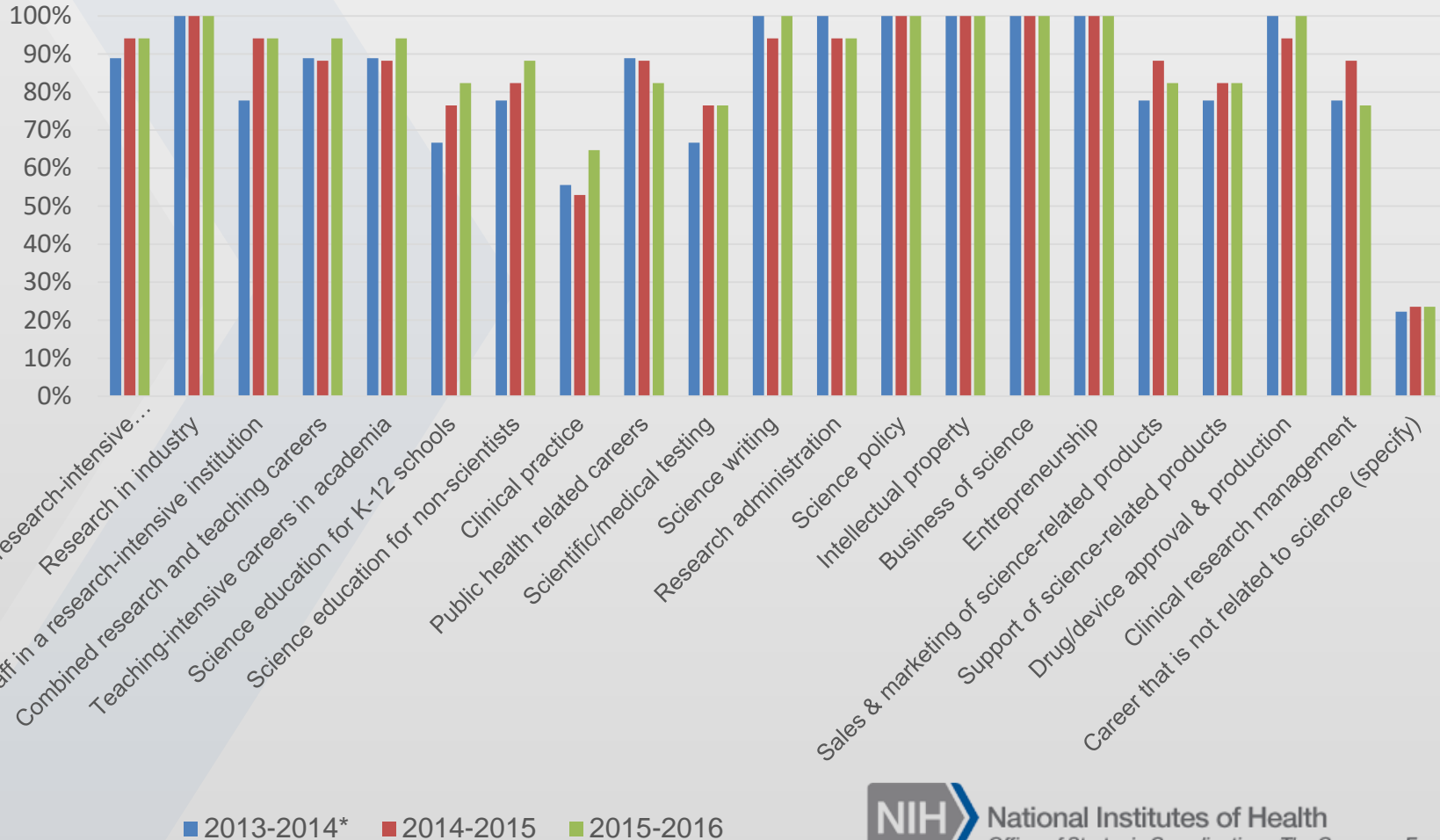
Where are we now.....

- Interested in determining the effect of participation in BEST activities over time. Not just differences between treatment and comparison.
- A small fraction of the trainees, and even smaller of BEST participants, have completed an exit survey (graduating or leaving postdoc).
- From those taking an entrance survey in 2015, about 7000 trainees remain in grad school or in their postdoc positions (:·: no exit data yet).
- Overall:
 - It is estimated that the number of **Graduate students** invited to take the exit survey will be approximately **14,972 (:·: over 5000 @ 40% response rate)**
 - The number of **Postdoctoral Scientists** invited to take the exit survey will be approximately **16,772 (:·: over 6500 @ 40% response rate)**

What we have learned so far:

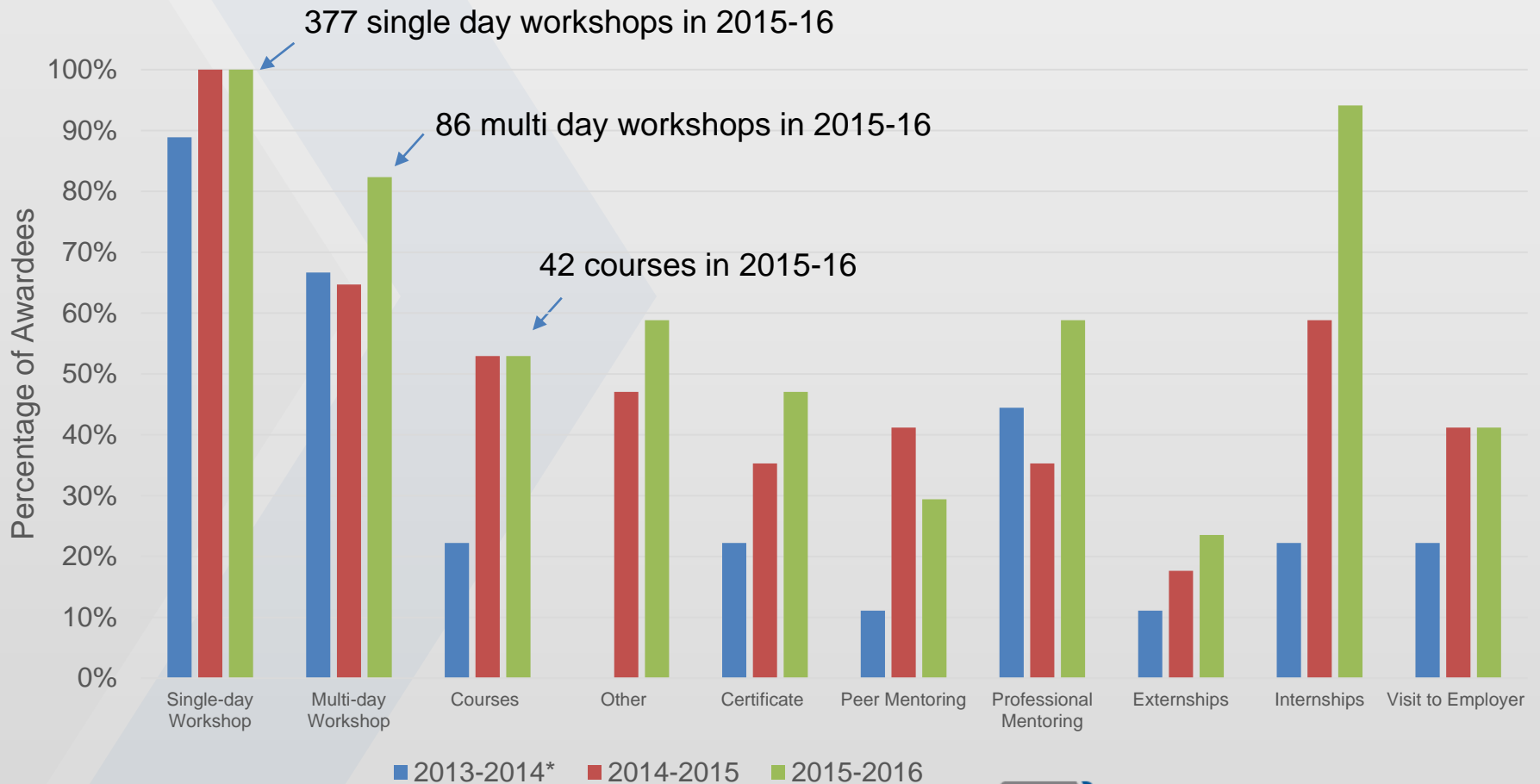
Offering exposure to a broad range of careers

Percent of Awardees



What we have learned so far:

Most sites offering Workshops and Internships

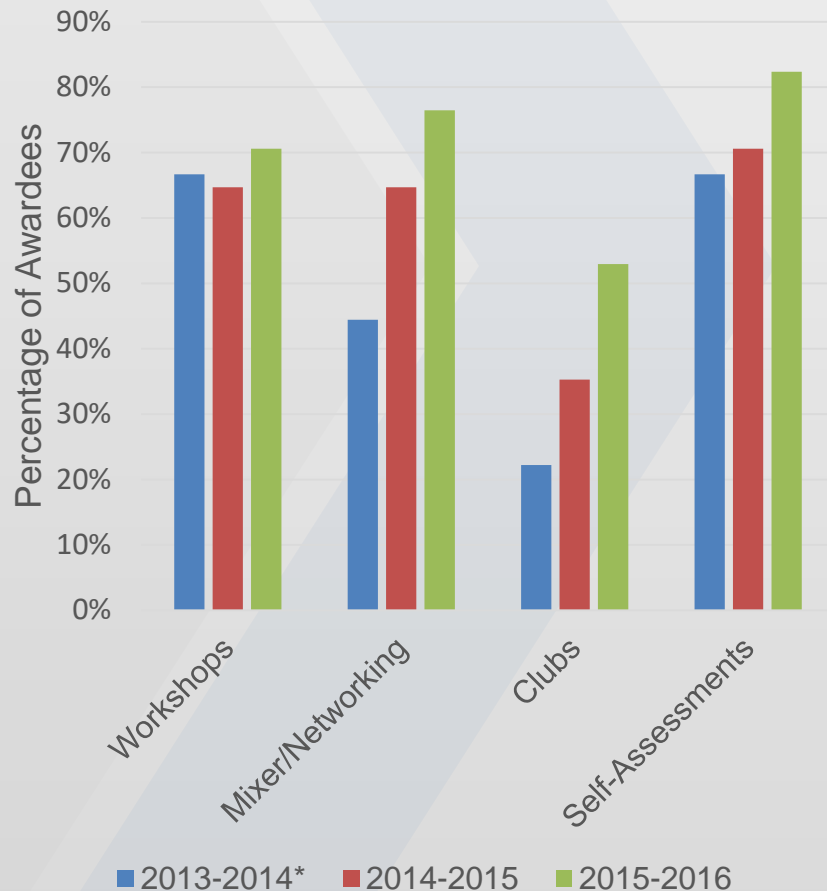


Attendance is tracked and mapped to specific trainees, so we know who is going to what, we then cross-ref this to the surveys.

What we have learned so far:

Some Activities Do Not Capture Individual Attendance

Aggregate Level Activities



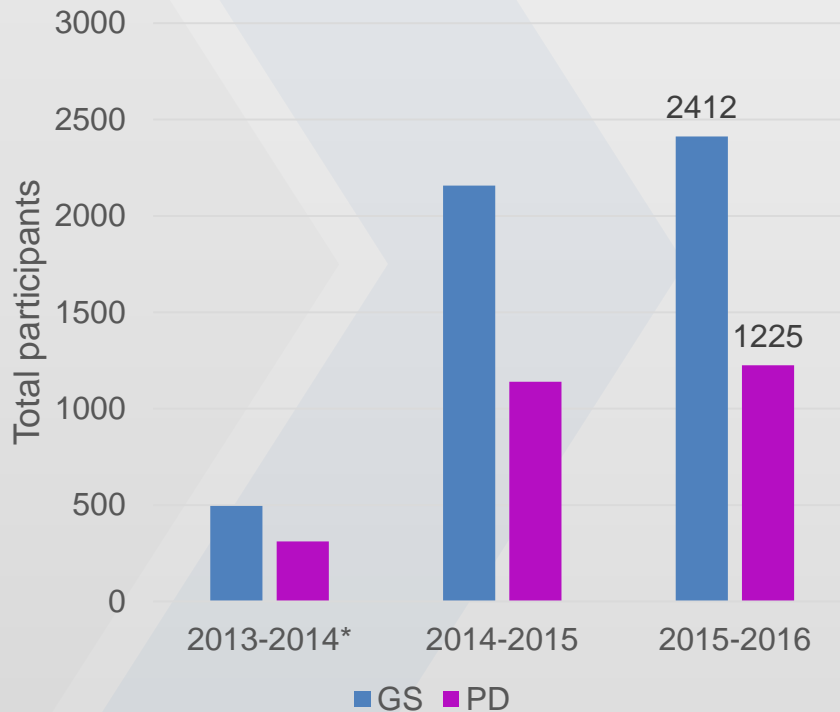
Aggregate-Level Activities are activities in which individual attendance is not captured.

Due to the open nature of participation, trainees from outside the recruitment pool may have attended some of these events.

Impacts issue of culture change and contaminates “control”/comparison group.

Reach of the BEST Programs

Tracked Total Individual Participation

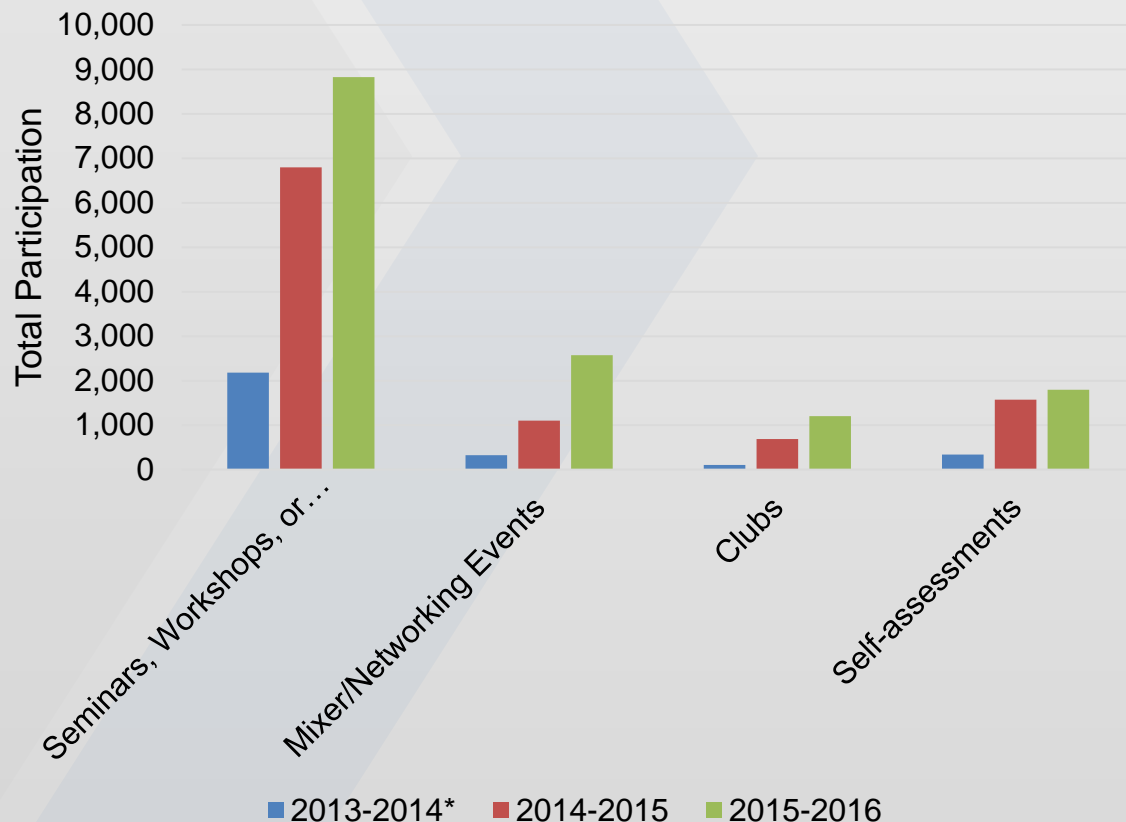


The BEST reach is expansive: In last year **over 2000 individuals** participated in at least one of many BEST activities, with varying “dosage” levels.

Reach of the BEST Programs

Participation in Aggregate Level Activities

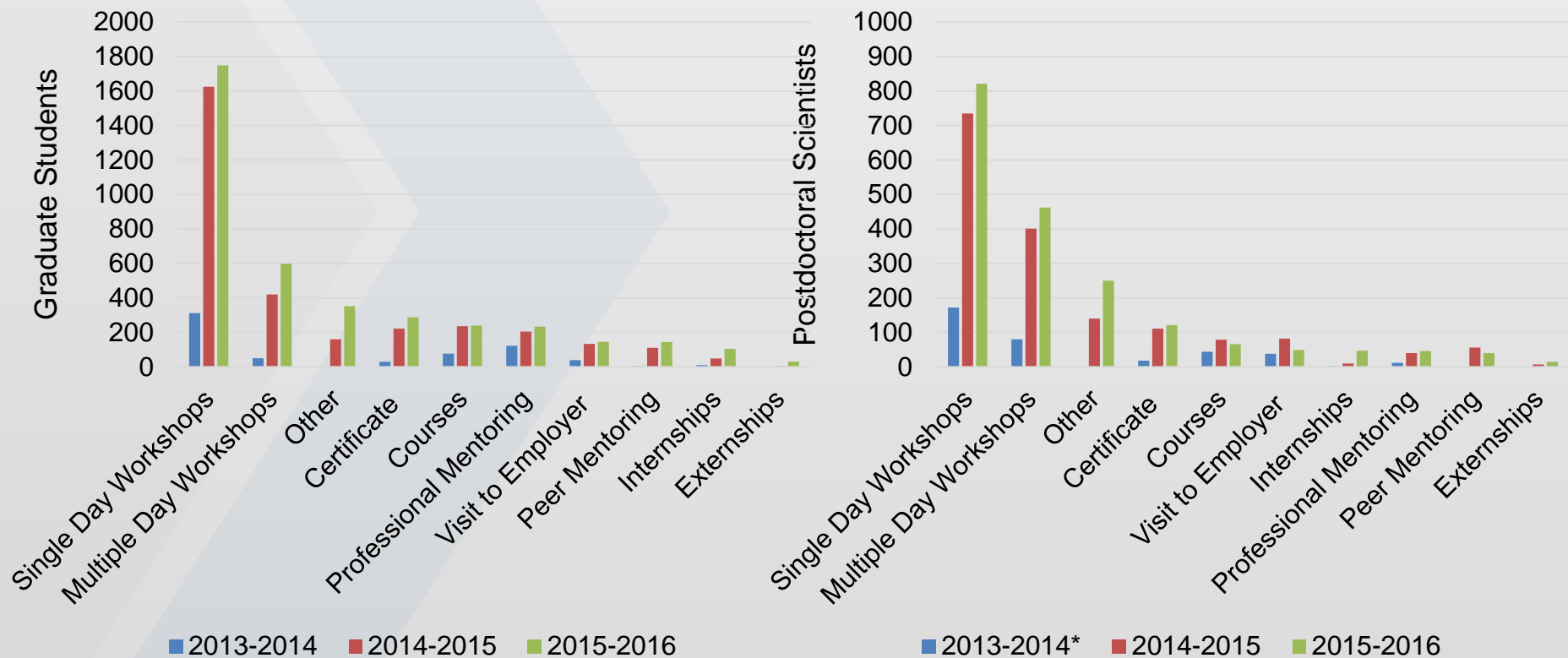
Approximate Graduate Students and Postdoctoral Scientists Attending Aggregate Level Activities



- Attendance isn't or cannot be tracked, it is estimated.
- Therefore, reach of BEST activities far exceeds what's tracked at individual level.
- Complicates "comparison" group in any analysis.

Reach of the BEST Programs

Grad Student and Postdoc Participation

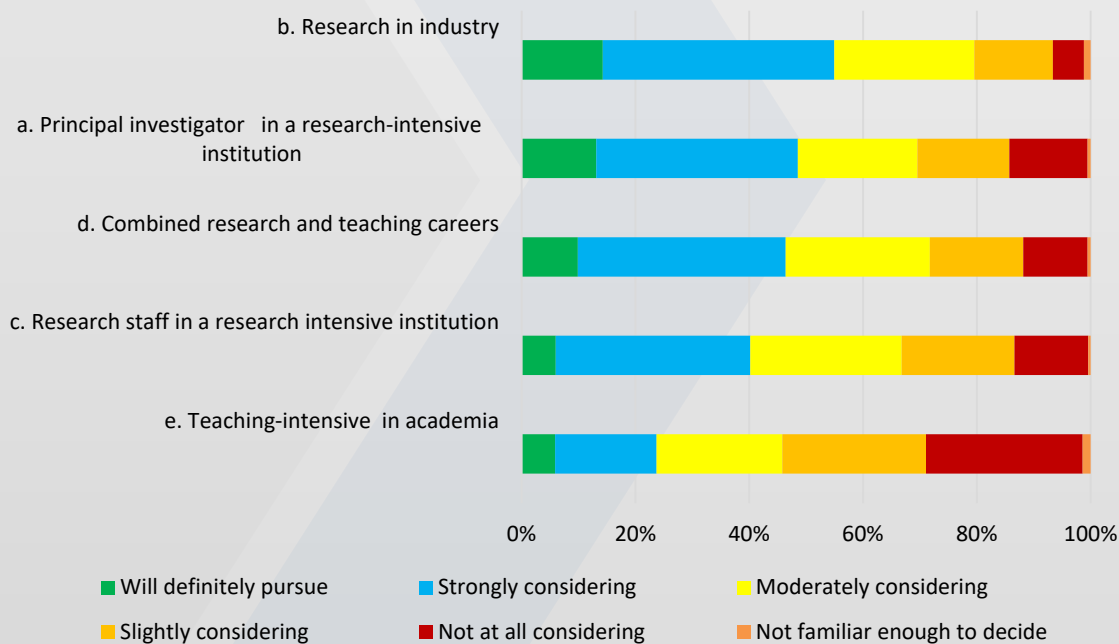


(Note: Y axis doesn't match)

Career Path Consideration

2016 Graduate Students at Entrance

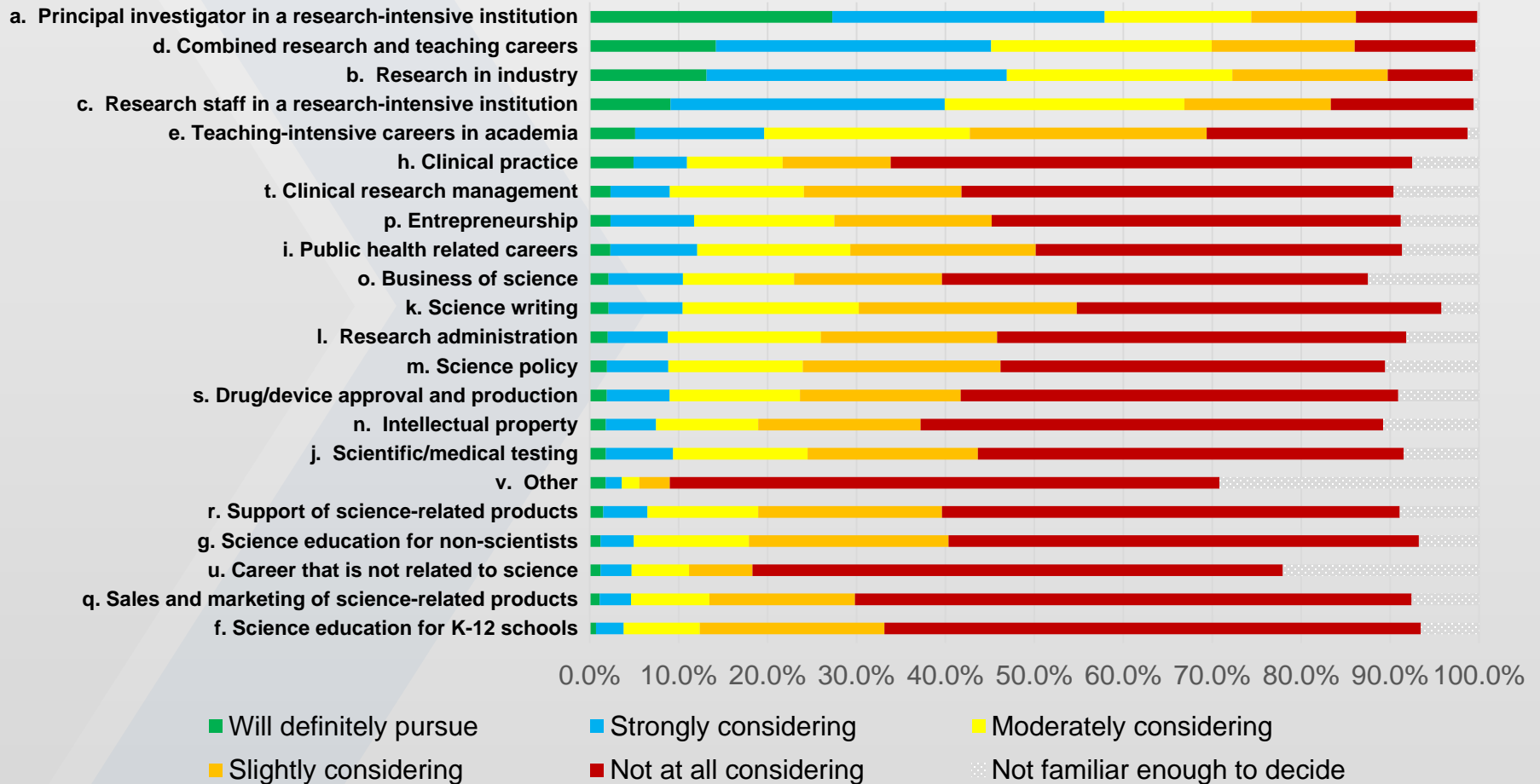
Top 5 Career Considerations



- Research in Industry is top career consideration, 56% will definitely pursue or are strongly considering at entrance
- 13.8% **not at all** considering PI in academia

Career Path Consideration

2016 Postdocs at Entrance



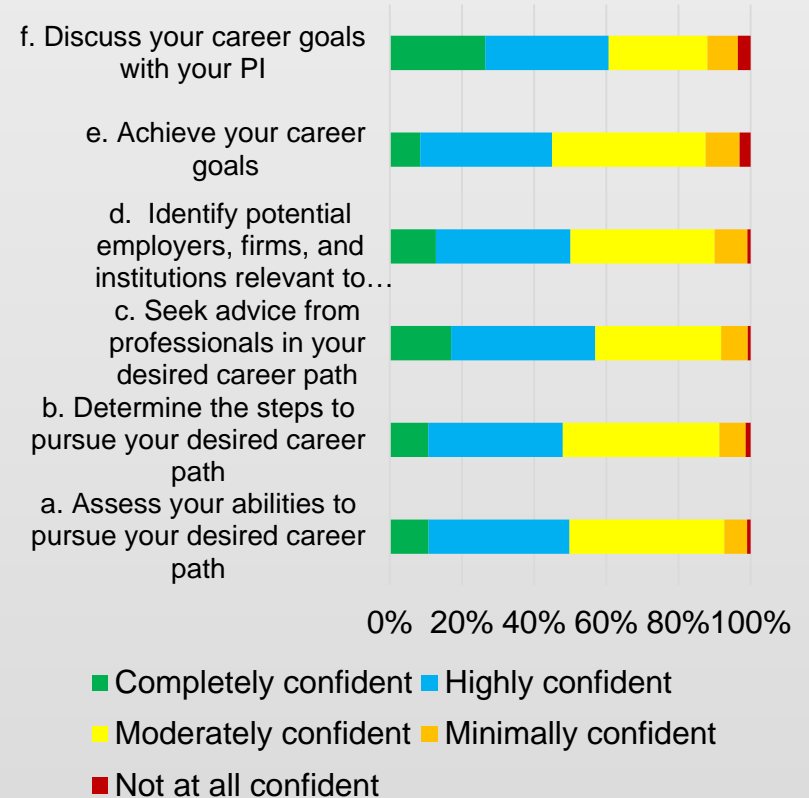
Confidence of Trainees

2016 Entrance Surveys

Graduate Students



Postdocs



Preliminary Analysis, 2015 Cohort

- Of **661 Graduate Students**; 367 were categorized as comparison, 271 as treatment, and 23 switched from comparison to treatment group

Graduate Student Respondents by Survey	Comparison	Treatment	Comparison in the Entrance but Treatment in the Exit	Total
Entrance survey only	106	86	NA ¹	192
Exit survey only	118	57	NA	175
Matched data (Both Entrance and Exit)	143	128	23	294
Total	367	271	23	661

- Of **367 Postdocs**, 235 were categorized as comparison, 118 as treatment, and 14 switched from comparison to treatment group at exit.
- The present analysis uses data from **294 trainees with matched entrance and exit surveys**. *This is not enough to draw statistically meaningful conclusions even if differences are “statistically significant”.*

Preliminary Analysis, 2015 Cohort

Helpfulness of BEST

- Unsurprisingly, trainees are finding the BEST programs helpful.
- *Understanding of Career Opportunities* – At exit, 75% of GS and 85% of PD felt the BEST program had been extremely or very helpful in providing information on a wide range of careers.
- Increases in **dosage were associated with significant increases in perceptions of how helpful the BEST program**: The more GS and PD participated, the more helpful they found the program in this regard.
- Graduate Students who reported getting the training they needed and encouragement to pursue their career goals **from their graduate program were more likely to find the BEST program helpful.**

Preliminary Analysis, 2015 Cohort

Familiarity with Career Paths

- Both treatment and comparison groups changed from entrance to exit, but there was no statistically significant difference between the two groups.
- However, **number and hours of participation in BEST activities were associated with familiarity with more career paths.**
- Perception of encouragement by their program/department to pursue their career goals associated with familiarity with more careers.
- Graduate Students who took more courses, workshops, and seminars were familiar with more career paths.
- Postdocs were familiar with more career paths as they participated in more hours of BEST activities.

Preliminary Analysis

Time to Degree for Grad Students

	Prior five years	2013-2014 *	2014-2015	2015-2016
Treatment		6.01 (n=40)	5.77 (n=116)	5.73 (n=312)
Comparison		6.00 (n=141)	5.71 (n=1163)	5.61 (n=1463)
Total	5.60 (n=8596)			

*Cohort 1 only

- BEST programs were to be designed to NOT impact time to degree or time in PD appointment.
- Must rely on exit surveys for individual level reporting.
- Based on only relatively small number of BEST participants graduating (likely already at the end of their graduate career in 2013-2015).

Preliminary Analysis

Time in appointment for Postdocs

	Prior five years	2013-2014	2014-2015
Treatment		2.46 (n=219)	2.29 (n=745)
Comparison		ND	ND
Total	2.29 (n=8815)	2.84 (n=1361)	2.39 (n=3797)

Reflects snapshot in time, not time to completion of Postdoc, or time to desired employment.

- BEST programs were to be designed to NOT impact time to degree or time in PD appointment.
- Reflects HR issues - classifying postdoctoral scientists differently, lack of uniform treatment, and reclassification.
- Must rely on exit surveys for individual level reporting.
- Have seen examples of MANY years in PD positions (10+).

Sustainability of the BEST Programs

- Over the 4 years, programs have **expanded** within their institutions—most sites have saturated their campuses. Many sites have expanded past biomedical departments.
- **Funding**—almost all sites (16 of 17) have acquired additional non-NIH funding to run their programs. Approximately 1M per year the last 2 years. This includes institutional funds, development (alumni) funds, partner funds (industry), and other government entities (NSF).
- Sites are **publishing** their results
 - [“Survey of checkpoints along the pathway to diverse biomedical research faculty.”](#) PLoS One 2018
 - [“An evidence-based evaluation of transferrable skills and job satisfaction for science PhDs.”](#) PLoS One 2018
 - [“Using Longitudinal Data on Career Outcomes to Promote Improvements and Diversity in Graduate Education.”](#) Change 2016
 - [“The “new normal”: Adapting doctoral trainee career preparation for broad career paths in science.”](#) PLoS One 2017
- **Workshop** to share approaches: “Proceedings of the BEST Practices Workshop” <http://www.nihbest.org/2017best-practices-workshop/>

Preliminary Insights

- All current “findings” are based on **small fraction** of GS and PD that have been or will be a part of BEST programs. However, many thousands have had some level of BEST exposure.
- Treatment effects are not yet evident on most measures. Even preliminary results are not statistically significant.
- Time to desired position and the employment outcomes (from post exit surveys) have not been conducted yet.
- The more trainees we have to follow in future years the more robust the analysis can be (attrition is expected).
- We are learning that **graduate program and department support is key to confidence.**
- There may be differencing career preferences between sexes and individuals from URGs and we may be able to understand factors influencing this.
- Understanding the right amount of “interventions” will be important to understand and inform the NIH and training communities what “works.”

Conclusions

- Training for the 21st century biomedical research workforce is changing rapidly and institutions need to adapt to recruit bright and talented trainees.
- NIH has multi-pronged approach to responding to changing landscape, including the Common Fund “Strengthening the Biomedical Research Workforce” Program with its **BEST awards**.
- The BEST program aims to **provide an evidence base** for what does and does not work and for whom.

NIH “Strengthening the Biomedical Research Workforce” Working Group

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