AAU PhD Education Initiative

Descriptions of Multi-Institutional and Professional Society PhD Career Outcomes Projects Provided by Project Leadership

Developed by the Association of American Universities for the "AAU PhD Program and Career Outcome Data Workshop" (NSF DGE-1822030) on May 31 – June 1, 2018.

Career Diversity for Historians
www.historians.org/careerdiversity

In 2014, the Andrew W. Mellon Foundation awarded the American Historical Association a grant to launch Career Diversity for Historians and support an exploration of the culture and practice of doctoral education in history at four pilot sites. In 2016, the AHA received a second grant from the Mellon Foundation to expand and continue its work.

The Pilot Phase
During the initiative's pilot phase, beginning in 2014, four pilot programs at Columbia University; the University of California, Los Angeles; the University of Chicago; and the University of New Mexico devised new courses and programming, including doctoral internships, revised professionalization seminars, new community spaces, and innovative grants for graduate students. Small grants awarded to an additional ten departments brought an even greater number of programming activities and a wider range of institutions into the mix. The initiative also included substantial programming at the AHA annual meeting and the creation of several key resources for students and faculty, including Career Contacts and Where Historians Work.

The most important lessons to emerge from the pilot phase emphasized the centrality and challenges of creating cultural change:

1. Preparation for careers outside the academy fundamentally overlaps with preparation for 21st century careers inside the academy, both professorial and otherwise.
2. Learning to be a professional historian cannot be separated from learning to teach history, including engaging with scholarly literature on history education.
3. The first step towards reconsidering a PhD program should be articulating its purpose. A department can choose to align purpose with actual outcomes, aspirations, both, or neither. But the choice should be intentional.
4. The experiences and learning opportunities that best prepare students for careers inside and outside the academy should be integrated into the curriculum rather than be defined as external or supplemental.
5. While the conversation around Career Diversity needs to be national in scope, solutions must be departmental.
6. Faculty leadership is essential. As the gatekeepers of the curriculum and set the tone for departmental culture, faculty are uniquely positioned to create long-term change.

The Implementation Phase
In December 2016, the Mellon Foundation awarded the AHA a $1.5 million grant to continue and expand its work on Career Diversity for Historians. The expansion of the initiative will help history departments better articulate the purpose and value of the history PhD, as well as continue the AHA's path-breaking work in creating

new resources for graduate students and early career historians. At the center of this next phase is a two-fold realization: that the skills and attributes required for a broader range of career paths also make for better professorial work, and that history PhDs are unevenly prepared for the teaching and administrative aspects of faculty positions in the 21st-century world of higher education. The goal of this work is to empower doctoral students to explore a variety of careers, and to help departments become more deliberate about how their graduate curricula and programming align with their students' career aspirations and actual outcomes. Over the next three years, the new grant will provide funding for PhD-granting departments from across the country to implement cultural and curricular changes designed to better prepare students to work both beyond the professoriate and as teachers in higher education.

The implementation phase began with a year-long series of three Faculty Institutes that brought faculty from 36 history departments together to discuss the lessons of the pilot phase and identify how they might be implemented in programs of different sizes, institutional cultures, and geographic locations. The Summer Institute introduced strategies and lessons learned from both the pilot programs and similar national initiatives, such as the NEH's Next Generation PhD and ACLS Public Fellows program. Those conversations set the stage for our Fall Institute, a series of small group discussions focused on identifying strategies for changing departmental culture and curriculum. A Winter Institute, held in conjunction with the 2018 AHA annual meeting, allowed faculty to place their work within the larger context of disciplinary conversations. Together, the three institutes encouraged departments to develop detailed plans for implementing Career Diversity in the heart of their graduate programs.

In the spring of 2018, 20 schools from the Faculty Institute cohort were awarded Career Diversity Implementation Grants. Each department will receive funding to support a Career Diversity fellow, a PhD candidate from the department who will collaborate with a faculty team to better prepare history PhDs for careers inside and beyond the academy. Over the next two years, the faculty team and the fellow will work together to rethink the structure and purpose of their doctoral program by developing workshops, lectures, and networking events; creating graduate level internships; and instituting curricular changes designed to prepare students to teach in diverse environments, produce important historical scholarship, and succeed in multiple career paths.

Implementation Grant Recipients:

Brown University
Georgetown University
Georgia State University
Iowa State University
Loyola University, Chicago
Michigan State University
Texas A&M University
University at Buffalo, State University of New York
University of California, Berkeley
University of California, Davis
University of California, Irvine
University of Illinois, Chicago
University of Illinois, Urbana-Champaign
University of Michigan
University of Missouri, Kansas City
University of Texas, Austin
University of Texas, El Paso
University of Utah
Wayne State University
West Virginia University

Affiliate Programs:

Columbia University
Duke University
Northwestern University
Southern Illinois University, Carbondale
Texas Christian University
University of California, Los Angeles
University of Florida
University of North Carolina

University of Pittsburgh
University of New Mexico
University of Washington
University of Wisconsin, Milwaukee

AAUDE PhD Outcomes Project Summary

AAUDE is not affiliated with or endorsed by the Association of American Universities (AAU), and the views expressed in this document are solely those of AAUDE and not AAU.

Project title: **PhD Outcomes Data Exchange Pilot**

Source of funding: N/A

Project website: N/A

Participating institutions: 7 AAU institutions to date; 3-4 more planning to submit data in 2018-19

Project purpose and goals

The project grew out of attempts to improve the PhD outcomes data that was already being shared via the AAUDE Doctoral Exit Survey. The survey at the time used questions derived from the Survey of Earned Doctorates, which did not do enough to capture the range of career outcomes experienced by current PhD students. In addition, PhD career outcomes often take time to stabilize. Since several institutions already had collected data at the five-year post-PhD mark, we decided to run a pilot effort to share that data.

Since the AAUDE-AGS project on graduate education data was getting underway at the same time, this project came under that "umbrella" for the purposes of reporting progress back to AAUDE and so on.

Project activities, methods and progress to date

In order to allow comparisons, we created a taxonomy to code existing data and formed a working group of IR workers and graduate deans to refine it. By the summer of 2017 there was a working taxonomy that was then used by a group of 7 institutions as part of the pilot in 2017-18.

The data was collected in late 2017 and provided back to institutions for analysis. In total, around 2,000 PhD outcomes were shared. "Knowledge rates" for PhD cohorts ranged from 80-90% among institutions that relied on public data sourcing, to ~50% among those using surveys or other forms of student self-reporting.

This dataset resulted in several on-campus analyses, including at least one project to compare institutional outcomes at the program level to those among a benchmark group. The data sharing agreement restricted such benchmarking to internal discussion documents, although institutions are of course free to use their own data in public materials.

In spring 2018, during and following the annual AAUDE meeting, a new working group was formed to review and further refine the taxonomy, which resulted in some modifications. The result of this process is version 6 of the taxonomy (attached) which will be in use for data sharing in 2018-19. As mentioned

above, we hope to have data from at least 10 institutions by the end of this year's cycle, including several institutions with multiple cohorts.

One further outcome of the project has been to further align the Doctoral Exit Survey categorization of outcomes with the revised taxonomy. In particular, the survey now makes stronger distinctions between the *type of work* a respondent is doing and the *type of employer or institution* at which the work (or other outcome) is carried out.

Biggest surprise to date

N/A

Future trajectory of the project

Several institutions are keen to submit data (and obtain benchmarking data in return) in 2018-19. It is unclear whether the project will become a regular (annual) AAUDE data sharing item, and in fact it may be more appropriate as a project in which institutions can participate on a less frequent basis (as a one-off benchmarking exercise, say, or on a regular cycle longer than one year).

The taxonomy is now in a stable state and has been through multiple rounds of review. There are plans to extend it to better cope with outcomes at other levels (undergraduate, masters, professional degrees), as part of a broader discussion around benchmarking outcomes for those students.

Finally, as part of the drive towards increased public sharing of PhD program data for the benefit of prospective students, active discussions are underway to define a mapping from the taxonomy to a high-level summary of student outcomes, bearing in mind the different audiences for such data, along with their various needs and levels of comfort/understanding around outcomes data.

AAUDE Student Outcome Sharing Format

V6: In use for data sharing in 2018-19

This document defines the format for sharing data on student outcomes. Currently it is principally used for PhD outcomes at the 5-year post-degree mark, and the data definitions reflect that focus, but it could be used for other degree and timing combinations. Suggestions for additional coding options for broader applicability are noted at the end of the document.

Even version numbers (V2, V4, V6 etc.) are stable versions used for data sharing, while odd numbers are development versions used to suggest and discuss modifications.

This version, V6, will be used to share data in academic year 2018-19.

Key changes in V6

- Research institutions that do not grant degrees are now no longer classified under "A – Academic"; they are instead classified under the appropriate mode of control (e.g., "G – Government" in the case of government-run laboratories)
- Administrative workers at universities now have their top-level employer type coded as "A – Academic" (their top-level occupation type remains "W – Work")
- A specific NAICS code has been added for K-12 education (as distinct from educational institutions in general)

1. High-level summary of mandatory fields

The following data fields are mandatory:

- AAUDE institution code, reporting year, and basic student degree information (level, CIP, year awarded, MD/PhD flag)
- Binary Y/N flag indicating whether data was found (remaining fields left blank if "N")
- Top-level occupation: one of: further study; academic career stage; other research position; other full-time work; exclude from cohort; other (includes non-work occupations such as travel)
- Second-level occupation: academic career stage, SOC (occupation code), or detail if top-level is "other"
- Top-level employer type: Academic, Industry, Non-profit, Government, Entrepreneurial, Freelance
- Second-level employer type: institution type or NAICS industry code
- Country and city of employment (or current residence if place of employment not known)
- Method, source and timeliness of data

Together, they allow the following example questions to be answered:

- How do graduates in a specified field break down between academic, industry, non-profit and government employers?
- What percentage of graduates use their disciplinary knowledge in non-research/non-academic occupations?
- What percentage of graduates remain in the US vs. other countries?
- How do academic positions break down by different institution types (e.g., R1 institutions)?
- What percentage of graduates are in postdocs or other non-permanent positions at the five-year point?

2. Data fields

This section lists the data fields and then defines them in more detail. The fields are reported on a per-student basis (unit records). First, there are unchanging identifiers for the institution and year of reporting:

1. AAUDE institution code
2. Data reporting year

Next, we include details on the student degree details:

3. Report-specific unique student identifier (optional – see notes)
4. Level of degree
5. Joint degree flag (used to indicate MD/PhD and similar)
6. CIP of degree
7. Year of degree

Next, we include high-level details on the outcome type. From this point on, fields marked (*) are mandatory while the others are all currently optional:

8. (*) Outcome data is available (binary flag; if the field is “No” then all further fields are left blank)
9. (*) Top-level occupation (one of: “F” – further study; “A” – academic post-study career stage; “R” – work that makes direct use of academic discipline content as described in notes; “W” – work of any other kind; “O” – other; “X” – exclude from cohort)
10. (*) Second-level occupation (academic career stage detail, SOC or “Other” detail)
11. CIP code of academic work (only filled in if top-level outcome is “A” or “R”)
12. (*) Top-level employer type (or institution in the case of further study)
13. (*) Second-level employer/institution type: academic institution subtype or NAICS code of industry/company
14. Use of PhD disciplinary content (“D – Discipline”; “G – General”; “N – No” – see discussion in section 3)
15. Job function detail (required if “Use of PhD” is filled in as “D”)
16. Specific job title
17. Specific institution/organization

Next, we include optional fields about postdocs:

18. Number of different postdocs held to date
19. Total years spent in postdocs to date

Next, we include location details for current position:

20. (*) Country
21. City or zip code

Finally, we include meta-data on the method, source and timeliness of data:

22. (*) Method of data collection (public data retrieval; student self-report; state tracking)
23. Source of data (LinkedIn; full CV; department or work bio page; alumni news page; other)
24. (*) Timeliness of data (known to be current; at most 12 months; 1-2 years; more than 2 years)

Detailed definitions follow.

2. 1. AAUDE institution code

Self-explanatory

2. 2. Data reporting year

This should be the academic year in which the data were collected. Due to the timing of this item, where data are typically collected in fall/winter and may not be compiled/reported until the following late spring or summer, the year should reflect the collection even if AAUDE sharing happens at the start of the following academic year. This also influences the meta-data "timeliness" variable.

2. 3. Report-specific student identifier

If used, this should be a unique identifier for this student. However the identifier should not correspond to any other identifiers used for the student in any other reporting. If used, it may enable future analysis of position changes over time. A crosswalk of identifiers to students should be maintained locally and not shared with AAUDE.

2. 4. Level of degree

The level of the student's degree (for now, "PhD").

2. 5. Joint degree flag

Left blank for PhD only; can be "MD/PhD" etc.

2. 6. CIP of degree

CIP field, as used in reporting PhD time-to-degree and completions.

2. 7. Year of degree

The academic year in which the PhD was obtained. For the current definition of "five years out", we are collecting data on students after five full years have elapsed after the end of the academic year of the

PhD. This means that the difference between the "year of degree" field and the "data reporting year" will be 6 in this case (e.g., for students who graduated in AY 2010-11, we begin collecting data in the fall of academic year 2016-17, and 2017 – 2011 = 6).

2. 8. Outcome data is available

Binary Y/N flag; if "N" is selected then all other fields beyond this will be ignored.

2. 9. Top-level principal occupation

One of the following codes, which are presented in "trumping order", i.e., if an individual could be described as being engaged in more than one of these activities, use the first listed:

- F – engaged in full-time further study
- A – full-time academic career stage (see list below in second-level occupation)
- R – full-time work that is not an academic career stage but which consists mostly of research that is a continuation of PhD/postdoc work (see discussion below in section 3)
- W – all other full-time work, including self-employment
- O – other (generally applies to < 5% of individuals; includes known unemployment, part-time work, work in the home, and other voluntary outcomes other than full-time work)
- X – exclude from cohort (follow IPEDS cohort exclusion rules; mostly for deceased individuals)

2. 10. Second-level principal occupation

This is taken from one of two lists. If the top-level occupation is "F" or "A", one of the following values (full list is shown for completeness, in approximate career order; options in italics are rarely used for post-PhD outcomes):

- *Undergraduate*
- *Masters*
- *Pre-PhD non-degree student (e.g., a research position in a lab)*
- Professional degree
- PhD
- Postdoc
- Primarily teaching appointment (NTT)
- Primarily research appointment (NTT)
- Clinical/medical appointment (NTT)
- Tenure track
- Tenured

See section 3 below for discussion of the tenure track, non-tenure track and postdoc categories. The FAQ also provides guidance on how to code positions.

If the top-level occupation is "R" or "W" use one of the following SOC codes (note, this list is under development):

- Education, Training and Library Occupations
- Scientists; Social Scientists
- Computer and Mathematical Occupations
- Architecture and Engineering Occupations
- Arts, Design, Entertainment, Media and Sports Occupations
- Finance Professional
- Legal Occupations
- General Management Occupations
- Healthcare Practitioners
- Other Occupations
- Unknown

In section 5, we preserve a list of suggested job functions. Future work will map these to SOC codes to provide a similar "frequently-used" listing to the NAICS approach.

If the top-level occupation is "O", this field can optionally be filled in with a brief description of the "other" outcome ("unemployed"; "traveling" etc.).

2. 11. CIP code of academic or research work (optional)

Fill in if top-level outcome is "A" or "R". Will often, but not always, be the same code as that of the PhD.

2. 12. Top-level institution/employer type

One of the following (lists of institutions are provided separately):

- A – "Academic" degree-granting institutions (beyond K-12); research institutions that do not grant degrees should be classified under the codes below according to their mode of control/ownership (e.g., government-run laboratories should be classified under "G")
- I – "Industry"; for-profit organization
- N – Non-profit, non-government organization (note this includes public and private K-12 education, non-profit research organizations, and non-profit hospitals not under the control of a degree-granting institution)
- G – Government, elected or civil service; includes national labs and government research and development centers (note that the US government maintains a list of federally funded R&D centers: https://www.nsf.gov/statistics/ffrdclist/#ffrdc)
- E – "Entrepreneurial"; the individual is a founder or co-founder of a start-up or similar organization
- F – "Freelance"; the individual works independently

2. 13. Second-level institution/employer type

If the top-level institution/employer type code is "A", use one of the following:

- A01 - AAU institution (~60 institutions)
- A02 - Non-AAU US R1 (~60)

- A03 - Non-R1 US Selective (~100)
- A04 - Other US 4-year and above (includes law schools etc.)
- A05 - US 2-year
- AF1 - Foreign university in select list (see note below in section 6)
- AF2 - Other foreign university
- AF3 - Other foreign academic institution (e.g., community college equivalents, or degree-granting institution not easily classified above)

In the case of a different top-level code (i.e., other than "A"), use a NAICS code from the provided AAUDE-specific list (see below in section 4). Note that the code corresponds to the output of the organization, not to the role within it (so a legal officer in a manufacturing company should be coded as "manufacturing", not "legal services").

In the specific case of for-profit, non-profit or government research centers and laboratories, including national laboratories, use the NAICS code 5417.

2. 14. Use of the disciplinary content (optional)

This code reflects whether the work directly uses the disciplinary content knowledge gained during the degree; this is also covered in the discussion in section 3 below. If the field is "D", the next field (job function) must be filled in.

- D – discipline-specific: It is unlikely that a graduate from a different 4-digit CIP code would be hired for this work (this distinguishes between, say, an economist and a sociologist)
- G – general disciplinary area: It is unlikely that a graduate from a different 2-digit CIP code would be hired for this work (this distinguishes between physical scientists and social scientists)
- N – no: graduates from most/all disciplines could do this work (although it may still require general skills typically gained during a PhD, such as the ability to structure and investigate a research question)

2. 15. Job function detail (optional)

Free text field for job function detail. Must be filled in if the "use of the degree" field is "D" with a job function that explains why the disciplinary content is key (e.g., "Economist"; "Software architect"; "Art museum curator" etc.).

2. 16. Specific job title (optional)

Self-explanatory

2. 17. Specific organization or institution (optional)

Self-explanatory; if the institution is a university then the campus-level name should always be named; the specific school or department can be appended if desired (e.g., "University of Michigan – Department of Psychology").

2. 18. Postdocs held to date (optional)

The number of postdocs the individual has held (whole numbers). If populating this field, use (-1) to indicate that this information is unavailable for a given individual whose outcome is otherwise known.

2. 19. Total time in postdocs (optional)

The total number of years spent in postdoc positions to date (whole numbers). Use (-1) in the same way as for the previous item.

2. 20. Country of position

Self-explanatory. If individuals are working remotely, the location of employment should take priority over the location of residence.

2. 21. City or zip code of position

Self-explanatory; if used, the zip code should be in 5-digit format.

2. 22. Method of data collection

One of the following:

- PB: Public data sourcing
- SR: Student self-report via a survey or non-survey method
- ST: State tracking
- O: Other

2. 23. Source of data (optional)

A brief description of the data source ("online CV"; "department web page"; "alumni survey" etc.).

2. 24. Timeliness of data

One of the following codes:

- A – position is known to have been current as of the target point in time
- B – position is known to have been current at most 12 months before the target
- C – position is known to have been current 1-2 years before the target
- D – information is more than 2 years out of date

If the accuracy of the data is very unclear, the individual should be coded as "no data" rather than supplying uncertain information.

3. Discussion of academic, research and non-academic work

The main difficulty in coding PhD student outcomes is in producing comparable metrics on the gray area of work that crosses over academic, research and non-academic boundaries. This discussion centers on work that "makes use of the disciplinary content of the degree". In other words, this is work where a similar individual who had completed a PhD but *not in the same specific field* would not be able to carry

out the tasks as effectively/would probably not have been hired to do that work. For this purpose, "the same specific field" can be thought of as a 4-digit CIP code. This is important, for example, because it illustrates the difference between work that a PhD-trained economist or sociologist could do equally well and work that requires specific content knowledge in, say, the macroeconomics of developing countries, which the economist could do but (probably) not the sociologist.

3. 1. Observations on the categorization of academic and research work

Work requiring disciplinary content knowledge can fall into (at least) the following categories:

- Tenure track positions and foreign equivalents; see note below
- Non-tenure track research and teaching positions at degree-granting institutions
- Positions at research labs and similar organizations
- Research/analytical positions at for-profit and non-profit organizations
- Certain non-research but academic-oriented positions (e.g., art curation)
- Entrepreneurial endeavors in a particular discipline-oriented area (e.g., bio/pharm startup)

Note on tenure track positions and foreign equivalents

It is becoming hard to distinguish between tenure track and non-tenure track in the US, and foreign institutions have their own standards which makes direct equivalence difficult. Currently, the guidance is to include in this category those individuals with (any of) the following characteristics:

- Individuals who specify "tenure track" or "tenured" in their public profile or response
- Individuals in the US with "bare" or "unqualified" ranks of Assistant Professor, Associate Professor, Professor (i.e., this excludes "Research Assistant Professor", "Teaching Assistant Professor" and so on)
- Individuals at foreign institutions with these same "unqualified" ranks, or with different ranks but who include "Assistant Professor Equivalent" or similar in their self-description
- Individuals at foreign institutions with other ranks which are known to be tenure track equivalent; the most salient example is the "Lecturer" or "University Lecturer" rank at institutions in the UK and related systems (Australia, New Zealand etc.)

In practice, this means that "tenure track" becomes a shorthand (in the US) for "professorial rank with no parenthetical qualification or other indication that the position is NOT tenure track".

3. 2. Notes on coding academic, research and discipline-specific positions

Capturing all these variations is difficult without making the coding schema highly complex. But, in the current system, individuals doing this type of work will be coded in one of the following ways:

- Top-level occupation is "A" or "R" ("academic" or "research")
- Top-level occupation is "W" and the "Use Degree" flag is set to "D" (see further discussion below)

Since the "Use Degree" flag is currently optional, care should be taken when interpreting the absence of this flag, as some institutions may not categorize anyone in this way.

Depending on the exact question asked, the population can be further refined via analysis of the data. The criteria above indicate that the individual is using the disciplinary knowledge, but not necessarily doing research. Individuals doing research, but not on the tenure track, would be coded:

- Top-level occupation “R”, or
- Top-level occupation “A” and second-level occupation one of “Postdoc” or “Research Appointment (NTT)”

Other combinations may be useful for other specific questions.

If the top-level outcome is “W” and the “Use Degree” flag is “D”, the job function field must be filled in, to help indicate why the disciplinary content is necessary to do this job. At UChicago, for the 2011 cohort at 5 years out, roughly 10% of (all) PhD graduates ended up in this category of using the PhD knowledge in a non-research, non-academic role. Common job functions include:

- Economist
- Curator
- Quantitative analyst
- Content-based manager (e.g., lab director)

The “Use Degree” flag can also be set to “G”, which indicates that the position is suited to a graduate from a broad subject area (e.g., “Social Sciences”) but does not require specific disciplinary knowledge. Again, the difference between “D” and “G” can be thought of as the difference between requiring content knowledge from a 4-digit vs. a 2-digit CIP code.

Finally, a wide range of jobs make use of skills acquired during a PhD (how to structure a research question, teaching experience and so on). Not setting the “Use Degree” flag, or setting it to “N”, does not indicate that the job does not require “PhD skills”. It simply indicates that the job does not require discipline-specific knowledge.

See the FAQ in this document for further guidance on how to code positions.

4. NAICS codes

The following NAICS codes are used to categorize the industry of employers or of entrepreneurial activity, and are used in the second-level employer/industry type when the top-level type is not “A”. The recommended list uses a mix of code lengths to capture the most frequent industries of employment but also allows rolling up to 2-digit codes.

If the organization does not fall into any obvious category, the code “99” can be used.

The following list accounts for roughly 80% of a sample of recent graduates, and includes several key industries of interest:

- University or college, 4 year or above: 6113

- Other educational organization: 61 (but K-12 education is listed below as 6111)
- Computer/electronic device manufacturing: 334
- Data analytics and telecommunications: 518
- Finance/banking/insurance: 52
- Hospitals: 6221
- K-12 education: 6111
- Legal services (but gov't court systems, etc., go in "public administration"): 5411
- Libraries: 51912
- Management consulting: 5416
- Museums: 712
- Pharma/drug manufacturing: 3254
- Public administration/government: 92
- Publishing (other than internet): 511
- Religious organization: 8131
- Research organization (includes government-run laboratories and social science basic research such as NORC): 5417
- Think tank, social advocacy, private grant administration: 813

The full list of 2-digit NAICS codes is as follows; where a category uses multiple 2-digit codes, use the lowest number (e.g., code manufacturing as 31):

- Agriculture, Forestry, Fishing and Hunting: 11
- Mining, Quarrying, and Oil and Gas Extraction: 21
- Utilities: 22
- Construction: 23
- Manufacturing: 31-33 (sub-codes in list above)
- Wholesale Trade: 42
- Retail Trade: 44-45
- Transportation and Warehousing: 48
- Information: 51 (sub-codes in list above)
- Finance and Insurance: 52
- Real Estate and Rental and Leasing: 53
- Professional, Scientific and Technical Services: 54 (sub-codes in list above)
- Management of Companies and Enterprises (e.g., holding companies): 55
- Administrative and Support and Waste Management and Remediation Services: 56
- Educational Services: 61 (sub-codes in list above)
- Health Care and Social Assistance: 62 (sub-codes in list above)
- Arts, Entertainment and Recreation: 71 (sub-codes in list above)
- Accommodation and Food Services: 72
- Other Services (Except Public Administration): 81 (sub-codes in list above)
- Public Administration: 92

5. Suggestions for future SOC code listing

- Art curation/cultural management
- Banking/accounting/financial analysis
- Communication/public relations
- Consulting
- Creative/design
- Data analysis
- Development/fundraising
- Education/teaching
- Engineering/technical product development
- Entertainment/artistic
- General administration
- Government (elected office)
- Professional practice (legal, medical etc.)
- Military service
- Programming/software development
- Social work

6. Note on research-intensive and selective foreign institutions

Currently, the "select list of foreign institutions" is simply taken to be any non-US institution in the top 100 of the most recent Times Higher Education global ranking. Since the top 100 includes many US institutions, this is equivalent to roughly 40 non-US institutions.

7. Suggested coding flowchart dealing with common cases

This section suggests a flowchart for coding occupations, which covers a significant proportion of individuals.

1. If the position title is "Assistant Professor" (or states "Assistant Professor equivalent") at a university or college (in the US or abroad), code as A; Tenure track
2. If the position title is "Associate Professor" or "Professor" (or states that it is equivalent) at similar institutions, code as A; Tenured
3. If the position title is "Postdoctoral Scholar", "Postdoctoral Fellow", or similar, code as A; Postdoc
4. If the position title is "Lecturer" or "University Lecturer" in the UK, Australia or New Zealand, code as A; Tenure Track
5. If the position title is "Lecturer" anywhere else, code as A; NTT (Teaching)
6. If the position title is "Research Associate", "Scientist", "Senior Scientist", code as "R"
7. If the position title is "Research Assistant Professor", "Teaching Assistant Professor" or similar, code as A; NTT (Teaching or Research, as appropriate)

Note: In sample datasets, at this point in the flowchart ~50% of positions are coded.

8. If the position is at a known non-academic for-profit firm, non-profit or government entity with a job title that does not suggest field-specific academic research, code as W
9. If the position is at an academic organization and is clearly primarily a staff/administrative appointment, code as W
10. If the individual is primarily working on a startup that he or she founded (or co-founded), code as W with second level as appropriate, and organization type as E
11. If the individual is working freelance, code as W and organization type as F
12. If the individual is pursuing further study, code as F

Note: In sample datasets, at this point in the flowchart ~75% of positions are coded.

8. Frequently-asked questions

8. 1. How should I code an administrator at a university or college who also teaches some/occasional courses?

These positions should be coded as:

- Top-level occupation: W - work
- Second-level occupation: according to administrative job function
- Top-level employer type: A - Academic
- Second-level occupation: According to institution type

In general, the teaching content should be regarded as secondary and should not affect coding, as it is not the main/full-time occupation.

8. 2. Should I code [position X] as a "postdoc"?

The National Postdoctoral Association maintains a definition of "postdoc" that is available here:

http://www.nationalpostdoc.org/?page=What_is_a_postdoc

That definition is as follows:

Postdoc: A postdoctoral scholar ("postdoc") is an individual holding a doctoral degree who is engaged in a temporary period of mentored research and/or scholarly training for the purpose of acquiring the professional skills needed to pursue a career path of his or her choosing. [Retrieved May 2018]

In general, we code as "postdocs" positions that satisfy the following three criteria:

- Intended to be held by a recent (within 5 years) doctoral graduate
- Fixed-length (maximum 5 years)
- Primary activities (90%+ of effort) are research and (post-K12) teaching

Humanities and social science PhD graduates often take positions that satisfy all three of the above but do not have "postdoctoral" in the job title (e.g., "teaching fellow", "stipendiary instructor", "visiting researcher"). Up to and including the five-year point, if positions satisfy all three criteria above, they should be coded as postdocs. Strictly after the five-year point, positions should be coded as non-tenure track (or possibly top-level occupation of "R") unless they are clearly designated as "postdoctoral" (meaning that this word appears in the job title).

8. 3. How should I code K-12 educators?

- Top-level occupation: W – work
- Second-level occupation: Educators (SOC code 25)
- Top-level industry: N – non-profit
- Second-level industry: K-12 education (NAICS 6111)

8. 4. What if the individual holds two simultaneous positions?

Try to determine which position is "more long-term" and use that one. Often, an individual will have a longer-term job at one institution but will be using a fellowship or similar arrangement to visit another institution for a year or less. In this case the first institution/position should be used as the coding value.

This also applies if a student is in a degree program and performing some teaching work that is clearly adjunct in nature. This often arises with latter-stage PhD students who teach at nearby institutions. These individuals should be coded as "further study".

In the case of judgement calls (e.g., multiple entrepreneurial or freelance endeavors), either code one position that appears to be closest to full-time employment, or categorize as "other" if no occupations genuinely qualify as full-time work.

8. 5. Should I code the city of the job or the city of residence?

In the case of remote work, the individual may have a job in one city and live in another. If both are known, the city of work should take priority over the city of residence. However, if the "work city" is really the headquarters of an organization and the individual is performing work for which residence in a different city is required (and thus not strictly "working remotely"), the local city should be used.

8. 6. How should I classify an assistant professor if I know the position is not tenure track?

In this case, classify the position as non-tenure track. If including the specific job title, please indicate in parenthesis any appropriate information, e.g.: Assistant Professor (CV indicates "teaching track").

8. 7. How should I classify someone who is traveling/a caregiver/engaged in some other uncompensated activity?

Use the top-level occupation "O – Other" code for this type of activity; generally the percentage of such individuals should be relatively small (< 5%). Leave the second-level occupation and both employer type fields blank.

8. 8. How should I code (for example) the United Nations or World Bank?

Use top-level employer type "G" and second-level NAICS code 92 (public administration). In practice, most positions at these organizations can be coded (in terms of occupation) as "R – Research" or "W – Work" and an appropriate SOC function.

8. 9. How should I code a researcher at a research lab subsidiary of a for-profit organization (e.g., IBM Research Lab)?

If performing research, the individual should have the top-level occupation of "R – Research". Employer type should be top-level "I" and second-level should be a NAICS code corresponding to the employer's sector.

8. 10. How should I code post-MD residencies and fellowships?

Code these positions as:

- Top-level occupation: A – Academic
- Second-level occupation: Postdoc

Employer type should be coded according to the actual institution; if the hospital is part of a research university, code as that university (optionally including the hospital or department name if listing the institution name). Note that setting the MD/PhD joint degree flag will be helpful in tracking this particular population.

9. Suggested mapping from taxonomy to reporting

The taxonomy is highly detailed; in practice, it will often be necessary to aggregate multiple categories to produce a readable report or one that shows meaningful percentages for discipline-level populations. Additionally, although the occupation/industry split allows rich data to be captured, data consumers will often expect to see outcomes broken down along a single dimension. This section suggests a mapping from taxonomy to reporting that answers high-level questions in a way that has been found to make sense to data consumers (provosts, deans, prospective students etc.). Groups are presented in trumping order, i.e., individuals are categorized in the first group for which they qualify.

- Group 1: Tenure track: Any individual with a second-level occupation of "tenure track" or "tenured"
- Group 2: Non-tenure track: Any individual with one of the "non-tenure track" second-level occupations
- Group 3: Postdocs: Second-level occupation of "postdoc"
- Group 4: Other researchers: Top-level occupation of "R"
- Group 5: Industry: Top-level occupation of "W" and top-level employer type of "I"
- Group 6: Non-profit: Similar to 5 with top-level employer type "N"
- Group 7: Government: Similar to 5 with top-level employer type "G"
- Group 8: Entrepreneurial/Freelance: Similar to 5 with top-level employer type "E" or "F"

- Group 9: Further study: Top-level occupation of “F”
- Group 10: Other (all other individuals not classified above)

The suggested presentation is to show percentages of known outcomes according to this breakdown, and to show the knowledge rate separately (i.e., if the knowledge rate is 80%, show this figure, but the breakdown among groups 1-10 should total 100%).

PROJECT TITLE: Determining career taxonomy reliability
PROJECT LEAD: Abby Stayart, myCHOICE Program Director, University of Chicago

FUNDING
NIH Common Fund RFA NIH Director's Biomedical Research Workforce Innovation Award
Broadening Experiences in Scientific Training (BEST) (DP7OD018421)

CONSORTIUM DESCRIPTION
The Broadening Experiences in Scientific Training (BEST) funding mechanism was established to "seek, identify and support bold and innovative approaches to broaden graduate and postdoctoral training, such that training programs reflect the range of career required for a robust biomedical, behavioral, social and clinical research enterprise." It is notable that BEST programs are not intended to be 'alternative career programs,' but rather are designed to provide critical career development skills that will benefit all trainees, regardless of career trajectory. The program enables institutions to build the infrastructure, curriculum, internships, and training opportunities to expose trainees to the myriad of career options in research and associated career tracks, while emphasizing workforce sustainability through evaluation of longitudinal outcomes. The awardee sites are part of a comprehensive cross-site evaluation designed to understand trainee agency, time to desired careers, and culture changes at academic institutions.

17 participating institutions in the BEST Consortium:

Boston University School of Medicine	Wayne State University
Emory University and Georgia Institute of Technology	Cornell University
New York University School of Medicine	Michigan State University
University of California, Davis	Rutgers University
University of California, San Francisco	University of California, Irvine
University of Colorado Denver|Anschutz Medical Campus	University of Chicago
University of North Carolina Chapel Hill	University of Massachusetts Medical School
Vanderbilt University School of Medicine	University of Rochester
	Virginia Polytechnic Institute and State University

PROJECT AUDIENCE: The project is intended to aid in the implementation of a career outcomes taxonomy and therefore is likely to be most relevant to academic administrators and institutional offices.

ACTIVITIES, METHODS OF IMPLEMENTATION, PROGRESS TO DATE
In Spring 2017, the BEST Consortium formed a working group to design a taxonomy of career outcomes that would reflect their combined experience in career development programming. Using the Science Careers myIDP career categories as its starting point for revisions, refinement, and additions to the categories, the working group added a subcategory, now called Job Functions and, recognizing the need for binning of the 24 Job Functions, suggested Workforce Sector as an entry point for classification. The resulting taxonomy was subsequently incorporated into another collaborative effort led by Rescuing Biomedical Research, which included a diverse set of representatives from AAU, AAMC, NIH, and academic institutions both internal and external to the BEST Consortium. The end

product is presented here and is an exceptional example of cross-organizational communication, collaboration, and compromise.

The taxonomy is three-tiered, first prompting selection of a Workforce Sector, then a binning into Career Types, and finally a granular refinement into 24 Job Functions, defined by specific skillsets and/or credentials required for employment in that function. The Consortium anticipates that it will develop further suggestions for a fourth tier that refines each of the Job Functions. Adoption of this taxonomy will help to streamline and standardize required classification for training grant tracking and other alumni data administrative functions. The taxonomy permits clear public representation of data, empowering prospective graduate students and postdoctoral candidates to easily compare the longitudinal career outcomes between institutions and consider that information in their decision-making process.

Nonetheless, the BEST working group had significant concerns about whether the nuances of the taxonomy could be reliably interpreted across institutions. In the absence of reliable and replicable interpretation, the actual goal of cross-institutional comparisons would be severely hampered. To investigate the reliability of the 3-tier taxonomy, the group designed an experiment in which standard interrater reliability analyses were employed to identify particularly troublesome taxonomic categories. The first round of the experiment included the coding of 600 alumni records (provided by Emory, Vanderbilt, and UNC Chapel Hill) by six independent coders, according to the 3-tier career outcome taxonomy. The coders were all career development professionals, most of whom had participated in the original working group. The data revealed that while the Workforce Sector tier was consistently applied (77% agreement) by the six coders, the Career Type (55% agreement) and Job Functions (36% agreement) tiers presented significant challenge to the group of expert coders. Within Career Type, “Primarily Research” and “Primarily Teaching” were the primary source of discordance; within Job Functions, the faculty functions were by far the most problematic, followed by “Administration,” “Business Development,” and “Science Communications.” Specific job titles that caused discordance included all types of faculty designations (assistant, associate, adjunct, teaching, research), medical affairs, medical science liaison, program or project manager, and entrepreneurs.

The coders discussed the results, the potential sources of error, and minor revisions or clarifications to the taxonomy that could result in greater concordance. A new dataset of 219 records was coded by the same set of coders, plus 3 new ‘naïve’ coders, to evaluate whether the rubric clarifications resulted in greater concordance between raters. To address the challenges posed by faculty job functions, the group agreed to test a system for classifying faculty that has been developed by Vanderbilt over recent years and will implement that classification strategy in the 2nd round of coding. The resultant data indicate vastly improved reliability (Sector = 90%, Career Type = 73%, Job Function = 69%).

FUTURE DIRECTIONS

The working group is analyzing the second round of data in more detail and developing final recommendations for revisions to the current 3-tier career outcomes taxonomy; these revisions lie mostly in the definitions of the categories, with the exception of the faculty job functions which we recommend to be conflated and notated using a faculty flag. The group intends to publish the work in a peer-reviewed journal in early Summer 2018. The group is happy to share the revisions prior to

publication, since we feel that accurate implementation of the taxonomy is in the best interest of all institutions.

Purpose and Goals: CIRTL uses graduate education and post-doctoral preparation as the leverage point to develop a national STEM faculty with the capability and commitment to implement and improve effective teaching practices for the learning of all students.

Participating Institutions: 40 major research universities (please see www.cirtl.net).

Overarching Strategy: The strategic leverage point through which CIRTL seeks to shape the future of STEM undergraduate education is graduate education at research universities.

Nearly 80% of STEM PhDs are granted at only 100 research universities, allowing for a highly targeted intervention before graduates flow into faculty positions at the 4400 U.S. research universities, comprehensive universities, liberal arts colleges, and community and tribal colleges.

Current Sources of Funding: Member dues; ongoing development from National Science Foundation.

Brief History: CIRTL began as an NSF Center for Learning and Teaching in 2003. CIRTL first established a prototype learning community at the University of Wisconsin–Madison (UW) in 2003; demonstrated that the CIRTL core ideas can be integrated into an existing graduate professional development program at Michigan State University (MSU) in 2005; and launched a successful prototype CIRTL Network of six diverse universities in 2007. After major expansions in 2011 and 2016, the CIRTL Network now includes 40 research universities in the United States and Canada.

The 40 universities of the current CIRTL Network produce 30% of the nation's STEM Ph.D.s. Importantly for broad preparation of the future national STEM faculty, these CIRTL Network universities are diverse—private and public, large and small, some minority-serving, and geographically distributed.

Change Strategies and Interventions: Three core ideas provide the conceptual framework for all CIRTL activities:

• **Teaching-as-research** (TAR) is the deliberate, systematic, and reflective use of research methods by STEM instructors to develop and implement teaching practices that advance the learning experiences and outcomes of all students.

• **Learning communities** (LC) bring together groups of people for shared learning, discovery, and generation of knowledge. To achieve common learning goals, a learning community nurtures functional relationships among its members.

• **Learning-through-diversity** (LtD) capitalizes on the rich array of experiences, backgrounds, and skills among STEM undergraduates and graduates-through-faculty to enhance the learning of all. It recognizes that excellence and diversity are necessarily intertwined.

CIRTL interventions incorporate these ideas at multiple levels. Local CIRTL learning communities at each university are the foundation, with programming and connections that enable members to investigate the effects of teaching practices and capitalize on their diverse perspectives. Second, the CIRTL Cross-Network Learning Community enables all future faculty to learn online from the diversity of graduates-through-faculty, undergraduates, university cultures, etc. of the Network. Finally, the leaders and implementers of the campus learning communities are themselves a Network learning community sharing resources, experiences, and ideas with each other and the nation.

Learning Outcomes: CIRTL has established a detailed set of learning outcomes for future faculty organized in three developmental levels. The CIRTL **Associate** understands how to implement research-based practices to achieve defined learning goals. The CIRTL **Practitioner** engages research-based best practices to achieve defined goals. The CIRTL **Scholar** produces public scholarship to advance teaching and learning.

Evidence of Impact: Figure 1 shows the major concepts and approaches to teaching presented by respondents to evaluation questions about teaching a scientific concept (Pfund et al., 2012, Change, 44:6, 64-72). Current education research supports the argument that the national goal of improving STEM undergraduate learning will be advanced by STEM faculty who characterize and engage in their teaching similarly to the future faculty in this study.

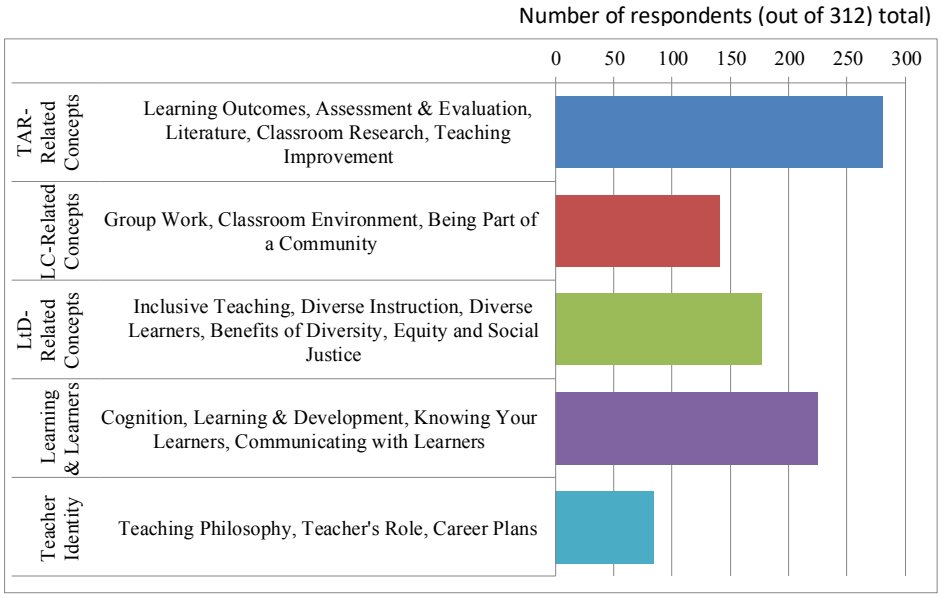

Figure 1. Learning outcomes of CIRTL future faculty in high-engagement activities. The listed items to the left of the bars are the teaching concepts presented in the approaches to teaching of the CIRTL participants studied. (Adapted from Pfund et al., 2012.)

The CIRTL hypothesis has been that future faculty will embrace these research-based high-impact approaches to teaching by doing teaching-as-research, having learning community experiences, and experiencing learning-through-diversity—and furthermore, that their *self*-discovery will lead to deeper understanding and engagement with these ideas.

In 2005 CIRTL initiated a longitudinal study of 83 future faculty (Benbow, Byrd & Connolly 2011; see also Connolly et al. 2016). In 2011, 80% remain in higher education, 49% are currently associated with undergraduate education, and 30% are in tenure- track faculty positions. Of the last, half are in predominantly undergraduate institutions.

Respondents' *current* perceptions of learning gains from their CIRTL experiences fit into four broad thematic categories: *diversity of perspectives* (e.g., the most commonly reported cognitive gains related to diversity in the classroom); *importance of engaging students in active learning*; *connections between teaching and scientific research* (e.g., that the teaching process can be enhanced by scientific methods); and *design and organization to meet specific learning goals*.

A majority of study respondents (76%) found ways to use the knowledge and skills they gained from teaching development in their subsequent undergraduate teaching. Respondents most frequently cited delivering *instruction that increases student engagement* (e.g., through active learning techniques, inquiry-based learning, or the creation of learning communities within the classroom). They also frequently cited what they had learned in *assessment* and *course preparation and planning*, especially backward design by starting with learning goals.

Project title:
Coalition for Next Generation Life Science
Project leaders: Peter Espenshade (Johns Hopkins University) and Elizabeth Watkins (UCSF)

Source(s) of funding:
Gordon and Betty Moore Foundation, anonymous donor

Project website:
http://nglscoalition.org/

Coalition Members:
Cornell University
Duke University
Fred Hutchinson Cancer Research Center
Johns Hopkins University
Massachusetts Institute of Technology
University of California – San Francisco
University of Maryland – Baltimore County
University of Michigan
University of Pennsylvania
University of Wisconsin

Target audiences:
Doctoral students, postdoctoral fellows, university administration, faculty

Project purpose and goals:
Coalition members commit to collecting and publishing data for life science trainees using common standards on:

- Admissions and matriculation data of PhD students.
- Median time-to-degree and completion data for PhD programs.
- Demographics of PhD students and postdoctoral scholars by sex, underrepresented minority status, and citizenship status.
- Median time in postdoctoral status at the institution.
- Career outcomes for PhD and postdoctoral alumni, classified by job sector and career type using a common taxonomy, developed and approved by the 17 institutions in the BEST grant consortium and the institutions attending the Rescuing Biomedical Research workshop in August 2017.

In addition, Coalition members agree to work broadly to provide meaningful career exploration and placement support for a broad array of potential career paths, improve mentorship at both the doctoral and postdoctoral stages, and increase and improve recruitment and retention aimed at diversifying the life sciences workforce.

Science article describes project in detail.

Brief description of project activities / methods and progress to date:
Project began Summer 2017. Each Coalition member identified staff from university administration (e.g. graduate dean) and institutional research to participate. The dean team worked to define the goals and data milestones for the project. The institutional research team worked on specifics of data definitions and mechanisms for data display. Two teams coordinated work through regular phone calls and email correspondence.

In February 2018, Coalition members published data on PhD admissions and time to degree, http://nglscoalition.org/coalition-data/.

Future data milestones are:

July 1, 2018 – Demographics of postdoctoral scholars by sex, underrepresented minority status, and citizenship status

October 1, 2018 – Time in postdoctoral training at the institution

February 1, 2019 – Career outcomes for PhD alumni

July 1, 2019 – Career outcomes for postdoctoral alumni

What has been the biggest surprise to date?
Although 8 institutions have contacted us about joining the Coalition, we expected a bigger response.

What is the future trajectory of the project?
There is a strong commitment from the 10 Coalition institutions to update data going forward. Currently, we are in discussions with 8 institutions about joining the Coalition. In addition to completing project milestones, the Coalition will test different recruitment strategies to increase membership and adoption of best practices.

Understanding PhD Career Pathways for Program Improvement
("PhD Career Pathways") http://cgsnet.org/understanding-career-pathways

Funders: The current project is supported by the National Science Foundation (#1661272) and The Andrew W. Mellon Foundation. Mellon and the Alfred P. Sloan Foundation supported a feasibility study (2014,) and Mellon, Sloan and NSF (#1534620) supported a planning phase (2015-2016).

Funded Partners:

- **Arizona State University**
- **Brown University**
- **Emory University**
- **Morgan State University & University of Maryland, Baltimore County**
- **New York University**
- **The State University of New York (SUNY) Consortium:**
  - SUNY Albany
  - SUNY Binghamton
  - SUNY Buffalo
  - SUNY Stony Brook
- **Texas A&M University & The University of Texas at Austin**
- **University of Arkansas**
- **U. of California System Consortium:**
  - University of California, Berkeley
  - University of California, Davis
  - University of California, Irvine
  - University of California, Los Angeles
  - University of California, Merced
  - University of California, Riverside
  - University of California, San Diego
  - University of California, San Francisco
  - University of California, Santa Barbara
  - University of California, Santa Cruz
- **University of North Carolina, Chapel Hill**
- **University of Notre Dame**
- **University of Virginia**
- **University of Washington**
- **University of Wisconsin, Madison**
- **Wayne State University**

Affiliate Partners:

- **City U. of New York Graduate Center**
- **Cleveland State University**
- **Colorado School of Mines**
- **Florida International University**
- **Fordham University**
- **Georgia State University**
- **Indiana University**
- **Iowa State University**
- **Louisiana State University**
- **Medical University of South Carolina**
- **Michigan State University**
- **North Carolina A&T State University**
- **Northwestern University**
- **Rice University**
- **Rochester Institute of Technology**
- **University of Arizona**
- **University of Central Florida**
- **University of Delaware**
- **University of Georgia**
- **University of Illinois Urbana-Champaign**
- **University of Kentucky**
- **University of Massachusetts Amherst**
- **University of Minnesota**
- **University of Missouri, Columbia**
- **University of Nebraska-Lincoln**
- **University of Nebraska Medical Center**
- **University of Oklahoma**
- **University of Oregon**
- **University of South Carolina**
- **University of Wisconsin-Milwaukee**
- **West Virginia University**
- **Worcester Polytechnic Institute**

Target Audiences: CGS and its project partners seek to engage the following audiences:

- Via the CGS PhD Alumni survey, invite **PhD alumni** to share information about their career pathways and to provide feedback on the career preparation they received while enrolled in PhD programs. The PhD Alumni Survey is used to collect data from alumni 3, 8, and 15 years post-graduation.
- Via the CGS PhD Student Survey, invite **current PhD students** to reflect on their career aspirations and professional preparation. The survey may also serve as an intervention, communicating the idea that many different career options are possible for PhDs, and encouraging career planning.
- Give **graduate faculty** useful information about the breadth of careers pursued by PhD alumni and the quality of career preparation received in their programs.
- Give **faculty, graduate deans and other university leaders** information that they can use to improve doctoral preparation at the program and university-wide levels, as well as data they can use to benchmark metrics like satisfaction with career preparation and other measures of quality.
- Offer **prospective graduate students** a better understanding of the careers pursued by PhD alumni.
- Offer **researchers and policymakers** a more nuanced picture of the career diversity among PhD holders and the career preferences of current PhD students.

Purpose and Goals:
To support the diverse careers pursued by current and aspiring PhD holders, U.S. universities need a better understanding of PhD career pathways and professional preparation. With support from the National Science Foundation (NSF #1661272) and The Andrew W. Mellon Foundation, CGS has launched a project to help universities collect data on the career pathways of STEM and humanities PhDs. Currently the project includes 61 institutional participants: 29 doctoral institutions have been selected for sub-awards from CGS to gather information about the professional aspirations, career pathways, and career preparation of their PhD students and alumni, and an additional 32 universities are using their own resources to participate in the project as affiliates. Over the course of this three-year project, universities will enhance their internal infrastructures to administer a CGS-developed PhD student survey and PhD alumni survey and use resulting data to strengthen career services, professional development opportunities, and mentoring. CGS serves as the central repository for the data collected, providing participating institutions with data resources and reporting on aggregate analysis.

Project Activities, methods, progress to date:
- Implementation of the first round of PhD alumni and PhD student surveys, resulting in about 6,400 alumni responses. The first data resource for participating institutions will be released in Fall 2018.
- Regular meetings with project directors (i.e., graduate deans) and survey administers (e.g., assistant/associate deans, IR professionals) to share challenges, strategies for overcoming them, and sustainability planning.
- CGS has received supplementary funding from NSF to include up to four additional Minority-Serving Institutions (MSI's) as funded partners. Award announcements will be made in June 2018.

Biggest Surprise to Date:
The large number of universities willing to participate as unfunded partners, as well as the high response rates to the alumni survey, which have been over 50% at some institutions and 35% on average.

Future trajectory of the project:
Participating awardees, and some affiliates, are developing sustainability plans in conversation with one another and CGS. CGS is also developing options to sustain its role in the data-collection efforts beyond the current funding period.

Ivy+ Public Reporting of PhD Program Data | May 2018

Website: none (see individual institution sites, below) **Funding source**: n/a

Goal: help prospective students to make informed choices about graduate study by providing public, comparable data on key factors for each doctoral program across all fields

Background: the Ivy+ Provosts and Graduate Deans had each been discussing such an initiative in early 2017, and in September 2017 the AAU Chief Academic Officers issued a statement on Doctoral Education Data Transparency. Yale agreed to coordinate this initiative for the Ivy+ schools, in the hope of spurring progress among a manageable but significant portion of the AAU schools. This project is meant to deliver on the intent of the CAOs' statement.

Participating institutions:

- Brown University
- California Institute of Technology
- Columbia University
- Cornell University
- Dartmouth
- Duke University
- Harvard University
- Johns Hopkins University
- Massachusetts Institute of Technology
- Princeton University
- Stanford University
- University of California Berkeley
- University of Chicago
- University of Pennsylvania
- Yale University

Principles

- Keep it simple – prioritize getting version 1.0 up, knowing that we can improve over time
- Design for transparency, not to foster inter-institution competition. Each institution will host this data on its own site, and we will not provide a summary of head-to-head comparisons
- Focus on public reporting of data, not private sharing among institutions. Do not allow the logistics of sharing to be an impediment to progress
- Provide common data elements wherever possible so students can make apples-apples comparisons
- Utilize AAUDE definitions rather than inventing new metrics; where AAUDE standards are not available, allow flexibility wherever possible (e.g., outcome bins)
- Provide demographic information sparingly, both to minimize possible individual identification of current students, and to focus the metrics on the program rather than on demographic group differences within a program

Process to date: participating schools have held phone calls to (a) coordinate on data categories and definitions, and (b) review the status of each institution's reporting.
Regarding data categories and definitions, the group feels strongly that we should utilize AAUDE taxonomies, and coordinate wherever possible with ongoing AAUDE-AGS efforts. This will avoid reinventing the wheel on definitions, minimize the burden on institutional research (also reporting data to AAUDE), and pave the way for eventual consortia sharing of comparative data. However, we also recognize the value of flexibility so have sought to mandate as little as possible in the interest of getting as many institutions as possible to participate with "version 1.0" data.

The following data will be provided by School and Degree Program (as defined at the institution), over the last 5 years:

I. Admission measures applications received, offers made, number of matriculating students; total enrollment (demographic breakdown for this metric only by: international/domestic, URM classification, gender)
II. Program completion completion rate (% of entering students receiving degree) and time-to-degree (median and distribution; measured by years since entry per AAUDE definitions)
III. PhD placement we have not enforced strict standards here; institutions plan to provide some version of employment type (for Yale: student, faculty, post-doc, other) and sector (for Yale: academic, business, government, non-profit); the timeframe varies, but we expect most will end up with 3-5 years post-graduation

Some institutions already provided this information, while others have since begun reporting. Those with public information are listed below:

Institution	Link
Cornell	https://gradschool.cornell.edu/academics/program-metrics/facts-and-figures
Duke	https://gradschool.duke.edu/about/program-statistics
Johns Hopkins	http://oir.jhu.edu/graduate-students/doctoral-students/doctoral-statistics/
MIT	http://web.mit.edu/ir/pop/students/graduate_statistics.html
Princeton	https://gradschool.princeton.edu/about/statistics
UC Berkeley	https://www.universityofcalifornia.edu/infocenter/graduate-admissions; https://www.universityofcalifornia.edu/infocenter/time-to-doctorate; https://www.universityofcalifornia.edu/infocenter/doctoral-rates
U Penn	http://www.upenn.edu/ir/NGLScoalition.html
Yale	https://gsas.yale.edu/academics/programs-departments/program-statistics-computers

Surprises

- Not surprising, but bears emphasis that placement data is most challenging: all face difficulty obtaining good data at a meaningful stage since graduation, and for some there is still internal resistance to making outcomes data public at all
- Details for each school are quite heterogeneous. This reinforces how bogged down we could have gotten if we mandated everything must be in common. Institutions also make different choices in how to visualize data, where to place it on a website, etc. I believe we will learn a lot by seeing these different choices, and expect some natural convergence over the coming years.

Future trajectory

Two priorities remain. First, improve outcomes data quality and help more institutions get comfortable sharing this data. Second, more fully harmonize with other efforts, most importantly the AAUDE-AGS pilot on career outcomes. This will enable a potential next step of sharing aggregate data for overall reporting.

Jessica and Ron Liebowitz, “What is an Academic Job?”
May 2018
Brandeis University

Seed funding for this project is currently being provided by Brandeis University. Our research partner is Burning Glass Technologies, a Boston-based data analytics firm that specializes in the study of labor markets and workforce dynamics. The target audience for our project is the higher education community, including students, faculty, staff, deans and senior administrators. The project is intent on making its data findings as open as possible, seeking to be of use to students across disciplines and institutions rather than restricting access to the deans and academic administrators for whom jobs data about the university are usually aimed. We believe it is essential for students to see how jobs in the university have changed over time, including not only job types by academic discipline in teaching and research positions, but also in all the other divisions of the university, including the library, athletics, student services, technology licensing, facilities management, enrollment planning and the like.

The goal of our project is to assemble longitudinal data showing changes in the types of jobs in higher education over the past decade. We will combine this with real-time analysis of all current job offerings within the higher education sector. We aim to create a database that is searchable by job type and discipline as well as division and function, including, for example, the number of tenure-track jobs in literature or biology, the number of multi-year contract positions in classics or environmental studies, the number of jobs in alumni affairs, or investment management, or implementation of Title IX regulations.

The purpose of our project is to help put in larger context the long-term changes in the professoriate that have been of concern to Ph.D. students. It is not only the professoriate that is changing dramatically from a workforce point of view. It is the university as a whole. This creates challenges but also opportunities for Ph.D. students. By integrating big data sets of all job postings in the United States together with data from government sources, such as the Census Bureau or the Bureau of Labor Statistics (BLS), we seek to track how many completed Ph.Ds. are moving into higher education jobs across university divisions and departments.

To define which jobs count as part of the higher education sector, we are relying on the universe of institutions that participate in the Integrated Postsecondary Education Data System (IPEDS). Within this group, we will be able to disaggregate higher education jobs based on IPEDS institutional categories -- such as whether an institution is private or public, 2-year or 4-year or Ph.D. granting, for-profit or non-profit.

To disaggregate teaching and research positions by discipline, we are relying on the NSF’s classification of fields of study. As we learn more about the faculty jobs data, we may add fields that show strong demand but are not included in the NSF classifications. We may also consolidate into larger categories those fields that show minimal demand for jobs.

To show job growth by division and function across the university outside of the professoriate, we are relying on the description of the “typical university” in “Making the Right Moves: A Practical Guide to Scientific Management for the Beginning Academic Administrator,” published by Howard Hughes Medical Institute and the Burroughs Wellcome Fund in 2004. As we will do with the faculty specializations, we may remove or consolidate administrative or non-faculty job categories that are

inconsistently referenced in job postings. Our data analytics are continually evolving to guard against undercounting or otherwise inaccurate measures of workforce demand.

Regarding progress to date: we have developed rules for software algorithms to map faculty job openings to NSF fields, as well as to classify those jobs as tenured, tenure-track, part-time contingent, or full-time contingent. We are in the process of manually validating these mappings, which is to say testing whether the algorithms are working correctly, and then tweaking the rules accordingly. We have also developed rules for defining the categories of divisions and functions that make up the "typical university" structure. We will start running data through these categories once we complete the mappings between IPEDS institutions and the employers listed in job postings.

Finally, we have pulled data from the BLS and Census Bureau on the number of Ph.D. holders in jobs throughout the U.S. workforce over time. We are currently evaluating how best to classify information about Ph.D. holders within the higher education sector. Our aim with this data is to make it possible for current and prospective Ph.D. students across all disciplines to better gauge the job opportunities that might be available to them within universities.

The biggest challenge we have faced so far, not surprising in its existence, but surprising perhaps in its depth, is the intense decentralization of the hiring process in the higher education sector. Job postings often refer to the hiring department or division or school within a university without naming the university itself. In other words, the name of the hiring institution is not always in the job description. This is unusual in comparison to other industry sectors. As a result, it has been more time consuming than we expected to map IPEDS institutions onto the individual employers posting jobs. We have algorithms specifically aimed at properly matching all job postings to their respective institutions, so we are not concerned about assembling the data. It's just taking longer than we expected.

The future trajectory of this project is to create an interactive web portal that would enable the higher education community to access our findings on-line. Our intent would be to update the data on a regular basis. Broad dissemination of this information will enable the higher education community to better understand the changing nature of the university from the point of view of professional opportunities for Ph.D. holders. It will also enable research projects focused on standardizing Ph.D. outcomes data to explore higher education itself as a non-trivial destination for "alt-ac" careers.

In the long run, our study could provide a model for tracking Ph.D. holders moving into industry sectors beyond higher education. If we can better understand, through granular, national, longitudinal, open access data, job details about the careers built by those with doctoral education – including but not limited to the traditional academic job -- it will be easier to see the evolving role of doctoral education in our society.

Update on Rescuing Biomedical Research's efforts on collecting and presenting data on biomedical Ph.D. alumni

Project title: Becoming more transparent: Collecting and presenting data on biomedical Ph.D. alumni

Project purpose and goals: For the past 30 years, the biomedical research community has consistently recommended the collection and presentation of biomedical Ph.D. career outcomes. Instituting such a tracking mechanism would be beneficial for a variety of constituencies concerned with how well current Ph.D. students are trained and prepared for their careers. The goals of our project were to define a set of data collection and presentation methods by finding consensus with institutions that had already carried out such projects.

Progress to date: On Aug. 7, 2017, Rescuing Biomedical Research sponsored a meeting at the AAAS in Washington, D.C., to compile information about successful institutional data collection efforts with the goal of disseminating the findings to universities. There were two notable outcomes from this meeting. First, we developed a broad set of methods to collect data on Ph.D. alumni. Second, we developed a single, unified taxonomy to classify career outcomes. These tools will help universities launch successful data collection efforts on Ph.D. alumni.

A broad set of methods:
Over a dozen universities represented at the RBR meeting were in the process of collecting data or had already published these data. With few exceptions, each university followed basically the same protocol: (1) Identify alumni through university resources, (2) Administer a survey to alumni and (3) for alumni that did not respond to the survey, use cybersleuthing methods to determine their current position.

Of interest to most institutions that have not yet begun the data collection and publication process, discussions of the time and cost necessary to implement such a system was determined to be fairly small.

A unified taxonomy:
The BEST consortium and UCSF were each using a two-tier taxonomy to classify Ph.D. career outcomes, and we combined them to generate a three-tier taxonomy. Tier 1 is the broadest classification indicating the general job sector the alumnus works in. Within the sector, Tier 2 indicates the alumnus' career type.

Tier 3 is the finest scale tier describing job function. This tier generated the most discussion due to varying degrees of uncertainty in classifying job types. However, this tier is also the most malleable—job functions can be added, split and redefined if needed. Ultimately, the taxonomy will need to be tested over several years at multiple institutions to determine where the taxonomy succeeds and where it needs improvement.

Participating institutions: Attending the Aug. 7, 2017 meeting were representatives of the Association of American Universities, the Association of American Medical Colleges, the National Institutes of Health and a number of universities including those that were part of the NIH's Broadening Experiences in Scientific Training (BEST) consortium and the Coalition for Next Generation Life Sciences (CNGLS).

Target audiences: University presidents, chancellors, deans, administrators, and faculty interested in pursuing career outcomes data collection efforts.

Biggest surprise: That the adoption of the methods and taxonomy has happened as smoothly as it has.

Future trajectory: Continued monitoring of the outcomes of the RBR meeting and regular meetings with BEST consortium, CNGLS members and others to determine how the taxonomy is being used.

Website: https://bit.ly/2yo6iSp (Project description on the RBR website); https://bit.ly/2jvG1tj (meeting report)

Funding source: Open Philanthropy Project and the Rita Allen Foundation

SREB-State Doctoral Scholars Program

In 1990, the question posed to the Southern Regional Education Board's Executive Committee was: "Why are there so few minority faculty members on college campuses in America?" The answer was two-fold: (1) there are not enough minority students seeking Ph.Ds. and (2) there is a lack of focus in effective hiring policies and practices on predominantly white campuses.

SREB states recognized the problem, as well as the national scope of the issue. In response, in 1993 SREB established the SREB-State Doctoral Scholars Program and welcomed its first class of 13 doctoral students. Twenty-five years, more than 1,500 doctoral scholars and more than 925 graduates later, the Doctoral Scholars Program has established an impressive track record and is recognized as a national leader among programs that produce minority Ph.Ds. Program participation has expanded beyond the original 16 SREB states to include individual institutional partners both in and outside the SREB region. As its motto implies, the key to the program's success is a commitment to provide scholars with ***"more than a check and a handshake."*** The program provides multiple layers of support including financial support, academic/research funding, professional development funds, career counseling and job postings, scholar counseling and advocacy, regular contact and follow-up, mentoring, online scholar directory for networking and recruiting, support to attend the annual Institute on Teaching and Mentoring, and continued early career support. These program services are designed to help prepare graduates to become successful college and university faculty members.

Program Highlights

- More than 1,500 scholars served; 430 scholars currently matriculating.
- More than 925 graduates.
- 122 graduates have earned tenure.
- Nearly 90 percent retention/graduation rate.
- High faculty employment rate: 80 percent employed in education — 92 percent on campuses as faculty, administrators and postdoctoral researchers; nearly 70 percent employed in SREB states.
- Reduced time-to-degree: scholars entering the program with a bachelor's degree graduate on average in 5.1 years. Scholars entering with a master's degree graduate on average in 4.8 years.
- Strong fields of study: 36 percent in science, technology, engineering and mathematics; 27 percent in social and behavioral sciences; 15 percent in humanities; and 21 percent in other fields of study.
- Online Scholar Directory: database information on almost 2,000 minority Ph.D. scholars available to college and university faculty recruiters.
- Host the annual Compact for Faculty Diversity Institute on Teaching and Mentoring — the nation's largest gathering of minority doctoral scholars who aspire to become faculty members.
- Recipient of the 2012 American Society for Public Administration Equal Opportunity Award, 2010 John Hope Franklin Award, and 2000 Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring.

Learn more: www.sreb.org/doctoral-scholars-program

TRaCE 2.0
Track, Report, Connect, Exchange
http://iplaitrace.com/

What is TRaCE 2.0?
In the last two decades, Canada has more than doubled the number of doctoral graduates (still placing Canada mid-range in OECD rankings). Employers in the private and public sectors and doctoral graduates, particularly in the humanities, social sciences, and fine arts, have not yet found a meeting place for the talents cultivated by PhD programs. In fact, we do not have anything like a clear or complete picture of the career pathways of PhD graduates.

By tracking and reporting on career pathways, by connecting graduates, faculty, and PhD students, and by fostering the exchange of knowledge and knowhow between those inside and outside the academy, TRaCE 2.0 will mobilize the learning and energy of PhD graduates for the benefit of the Canadian university system, the economy and society of Canada, and the graduates themselves.

TRaCE 2.0 will help rethink graduate education in Canada and also contribute to broader social change by purposefully recruiting, as TRaCE researchers, graduate students from marginalized backgrounds, with particular attention to Aboriginal students. The statistical and narrative-gathering work of Aboriginal and First Nations student researchers will enable all Canadian universities and communities to hear and learn from the stories of the students and graduates, to engage with those young researchers and educators from their community and participatory-based perspectives, and to support a meaningful and inclusive change at the university system level.

TRACE 2.0 is a national project headquartered at Graduate and Postdoctoral Studies, McGill University. The project is building a database about the careers of PhD graduates in the humanities (including Architecture, Education, and Law as well as the traditional humanities disciplines), the social sciences (Political Science, Sociology, and Economics, etc.), and fine arts (Visual, Performing, Design, and Digital Arts). It will also enable graduates to tell their stories and create a storehouse of narrative knowledge about the challenges, obstacles, opportunities, and successes of thousands of doctoral researchers, teachers, and creators.

The participating universities and partners are

- University of British Columbia
- Simon Fraser University
- University of Alberta
- University of Guelph
- University of Toronto
- University of Waterloo
- York University
- Queen's University
- Carleton University
- Concordia University
- Université de Montréal
- McGill University
- Canadian Association for Graduate Studies
- Federation for the Humanities and Social Sciences

Origins of TRaCE 2.0—the TRaCE Pilot Project

The project builds on the one-year TRaCE pilot project (2015-2016). Funded by the Social Sciences and Humanities Research Council of Canada (SSHRC), the Canadian Association for Graduate Studies, the Federation for the Humanities and Social Sciences, and the participating universities, the pilot project tracked over 2,700 humanities PhD graduates from 60+ departments across Canada, reported on what they had achieved, connected them with each other and with graduate students and faculty members.

TRaCE PhD student researchers interviewed 300 graduates. The interviews added to the store of statistical data and also enabled the graduates to tell their stories—their pathways to, through, and from their PhD programs; what they learned by doing a PhD; and how that learning has helped them move forward and/or slowed them down in their lives and careers.

The TRaCE website features new data on PhD outcomes, stories of students and graduates, and a networking capacity. The website serves as a network for PhD graduates, connecting them with other graduates and current PhD students. The ultimate goal is to present narratives that will inspire graduates and students, allowing them to reach out to people whose stories speak to their interests and aspirations. On account of TRaCE, a community that did not know it existed is beginning to become visible to itself.

What led to the TRaCE project

In 2013, we gathered faculty and students from Canada and the USA to think about the humanities PhD. Together we wrote the White Paper on the Future of the PhD in the Humanities, which recounted how few PhDs get academic jobs, made an argument for the value of the work—inside and outside the academy—done by humanities PhDs, and recommended reforms so that the PhD would lead and would be seen to lead to a multiplicity of worthwhile and fulfilling career paths.

The positive uptake of the work encouraged us to create the Future Humanities Project, a national conversation about the PhD coupled with a conference at McGill, May 2015. Twenty-six universities prepared reports, videos, and vision statements in advance of the conference. The opening plenary was presented by graduate students who came to the meeting from across the country. One outcome of the meeting was a national determination to work for the betterment of PhD students and graduates, especially by keeping track of what PhDs do with their degrees and by giving the humanities a more prominent and dynamic social role.

What makes TRaCE 2.0 different?

There are a number of excellent ongoing PhD outcome tracking projects (for example, at the University of Toronto, at the University of British Columbia, and under the auspices of the Council of Graduate Schools in the USA). These focus on statistical data collection, they are transdisciplinary, and they concentrate on either a single university or a small cluster of schools.

TRaCE 2.0 will be the first project in the world to

- combine data collection and large-scale narrative knowledge gathering;
- focus on a large cluster of disciplines, which we call (after the French model) "the human sciences," and focus that way precisely because these fields of study are more embattled than other fields, both inside and outside the academy. We need a much better picture of what the human sciences already contribute to society in order to understand how these contributions can be enhanced and expanded;
- address a major challenge across a whole university system with a view to systemic reform and national community building.

Impact on PhD students, universities, and society

- **PhD students** will develop a broader, evidence-based understanding of how the PhD leads to multiple career pathways rather than to only one. They will learn how their learning and their skills can operate and flourish outside as well as inside the university;
- TRaCE 2.0 is designed to undo the still widely-held idea that not getting a tenure-track job after graduation amounts to failure. The many kinds of success reported by the project will help redress the alienation experienced by the many grads who do not find themselves in tenure-track jobs;
- the new, wider understanding of PhD outcomes will enable students to plan their careers more realistically and creatively, will help to reduce the non-completion rate (now approximately 50%), and will perhaps eliminate altogether the heartache and the wasted time (five or more years) that PhD graduates who do not secure tenure-track university jobs (the great majority) often undergo before they find their career pathways.
- **Universities** will be able to undertake well-informed graduate program reform in light of a clearer picture of the career pathways of PhDs;
- since not everything that counts can be counted, students, faculty, and departments are justifiably distrustful about data-only tracking exercises. TRaCE 2.0 combines statistical data with robust narrative accounts of the challenges, costs, opportunities, and value of doctoral education;
- the methodology we have developed for tracking grads on the web makes it easy to do longitudinal studies of PhD outcomes;
- if Canadians in all walks of life are to understand and appreciate the value of humanities, social sciences, and fine arts research and teaching at the top of their form, and if they are to understand what graduate education contributes to society, they need to know much more about what PhDs do inside and outside the university.
- **Canada** already benefits from the knowledge and creativity of PhDs in the human sciences who teach tens of thousands of young people each year in colleges and universities across the country;
- Canadian society will accrue additional benefits from the hundreds of PhDs who have learned from TRaCE 2.0 how to take their talent and energy into multiple sectors of work and action outside the university;
- PhD graduates who do not secure tenure-track jobs will start contributing to their own well-being and to the public good sooner since they will not suffer the five or more years it often takes to come to terms with their "failure";
- the creation of a web-based infrastructure for a national human sciences teaching and research community that will include the universities and multiple non-academic sectors will open new ways of thinking about the challenges facing society in the 21st century.

For more information, contact TRaCE Director, Paul Yachnin, Tomlinson Professor of Shakespeare Studies at McGill University, at paul.yachnin@mcgill.ca or Bianca Brigidi, TRaCE Research Associate and Project Manager, at bianca.brigidi@mcgill.ca.