

Understanding PhD Career Pathways for Program Improvement





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A CGS Report

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Foreword

What do we know about PhD career pathways? The best available data tell us roughly one-half of PhD holders find their first jobs in non-academic sectors such as non-profits and governmental agencies, corporations, and start-ups. We do not know, however, the specifics of their careers: the nature and kinds of work produced and their long-term trajectories. Because the current indicators of doctoral program quality (e.g., citations, publications) take into consideration only scholarship produced within the academy, a substantial portion of the work doctoral recipients produce remains unmeasured. Our incomplete knowledge of these contributions to US research, scholarship, and innovation prevents us from fully articulating the public and private value of graduate education. The lack of information about PhDs who work beyond the university additionally renders it impossible to know how well their doctoral education prepared them for these varied contexts. In other words, we need to know more.

The gaps in our understanding can seem overwhelming, but as I closed our workshop on PhD career pathways held in late September 2014, I was struck by the energy and optimism generated over those two days. All agreed that better PhD career pathways information will help students, faculty, and administrators alike. A fuller understanding could help us address the questions many stakeholders now ask about the long-term public and private value of the doctoral degree, and will allow graduate educators to develop curricula and professional development programs that better prepare students for the full range of careers they are likely to follow. Although many challenges remained, I felt confident that better PhD career pathways could be collected through collaboration with deans, faculty, researchers, and peer organizations.

Better data means program-level numbers, which are the only data likely to move the hearts and minds of those who insist that their responsibility ends with the preparation of students for R-1 faculty positions. It means moving beyond first placement, and building a national baseline of standard data collection so that prospective students can compare programs. Better data means pulling apart not only the ubiquitous “Other” category, which has traditionally been a catchall for all “nonacademic” work, but also the “Academic” category, which includes tenure-track and contingent faculty, librarians and administrators alike. Better data, therefore, will not be easy to come by, but must be pursued. If the graduate education community can begin with a very small, carefully curated set of indicators, we will already have better information to build strong programs as well as a strong case for graduate education to the public at large.

This report summarizes the findings of a feasibility study exploring how we might deepen our knowledge of the career pathways of PhD holders. It outlines the current state of the study and practice of collecting and using information about career pathways at the doctoral level in science, technology, engineering, and mathematics (STEM), humanities, and social science fields. It includes the results of a CGS-administered survey of graduate deans at doctoral-granting institutions in the US and Canada, and served as background for discussion at the workshop hosted by CGS in September. This workshop underscored the critical need for more and better PhD career pathways data, and gave us one more thing we do know: it is time to get to work.

Suzanne T. Ortega
CGS President

Acknowledgments

This feasibility study benefited from the hard work of many of our colleagues. CGS is grateful to The Andrew W. Mellon Foundation for supporting our work to understand the careers of PhD holders in the humanities and social sciences, and to the Alfred P. Sloan Foundation for allowing us to continue two earlier grants to support our study of STEM PhD career pathways.

We owe many thanks to the participants at the PhD Career Pathways workshop at Airlie in Warrenton, Virginia on September 29–30, 2014. Their insights, questions, and feedback helped strengthen this project and our thinking on these complex issues.

Thanks are also due to the CGS staff who contributed to this report, especially the project's co-PI's: Jeff Allum, Julia Kent, and Maureen McCarthy. Thanks also to the full project team, including Keonna Feaster, Jeannine Blackwell, and Daniel Denecke. Finally, I'd like to personally thank my predecessor, Debra W. Stewart, for her leadership in initiating this project and for her wise council and contributions as CGS Senior Scholar.


Suzanne T. Ortega
CGS President

Executive Summary

This report explores how the graduate education community might deepen its knowledge of the career pathways of PhD holders. The report summarizes the current state of the study and practice of collecting and using information about career pathways at the doctoral level in science, technology, engineering, and mathematics (STEM), humanities, and social science fields. It includes the results of a CGS-administered survey of graduate deans at doctoral-granting institutions in the US and Canada. The information collected here served as background for discussion at a workshop hosted by CGS in September of 2014. This report, the survey of deans, and the workshop represent the three main components of a study determining the feasibility of a larger project to develop standards, definitions, procedures, and practices in collecting information on career pathways of PhD holders and for using this information to inform improvements of graduate programs.

No single existing dataset can give graduate programs the granular PhD career pathways information they need to improve their programs. National datasets such as the Survey of Earned Doctorates (SED) and the Survey of Doctorate Recipients (SDR), while valuable for demonstrating certain aspects of PhD careers at the national level, “have limited usefulness when individual programs have such variability in their placement outcomes” (Pannapacker, 2013). Independent efforts to collect and analyze this information have proven unsustainable or difficult to compare due to a lack of common data elements. For example, the Mellon-funded “PhDs Ten Years Later” study from 1999 provides important snapshots of student experiences in particular disciplines but does not offer data over the long term (Nerad and Cerny, 1999).

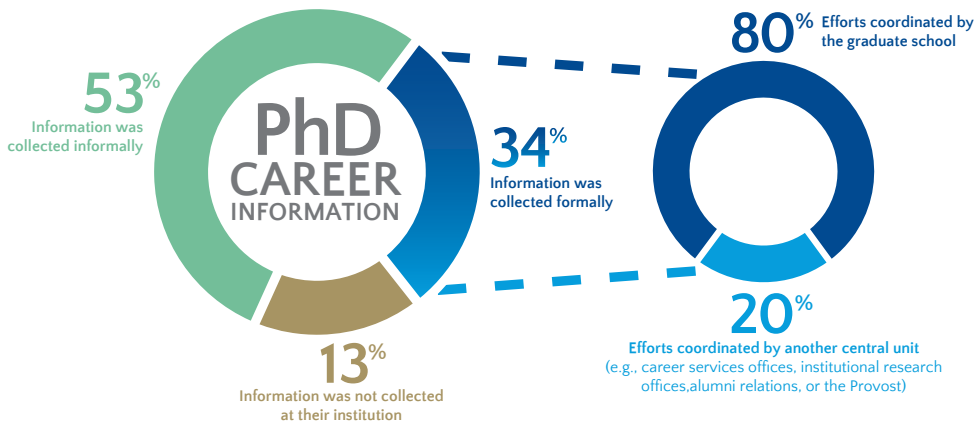
The CGS study asks four main questions in order to understand how to collect and use PhD career pathways information for program improvement: What information should be collected? Who should collect it? How should that information be collected? How should that information be used? Currently there exist no standards, definitions, processes, or procedures for collecting or using PhD career pathways information, and the feasibility study found a clear need for a nationally-coordinated effort to identifying such standards. Better understanding the career trajectories of PhD students and alumni could strengthen graduate education in a variety of important ways for a range of stakeholder groups:



What information should be collected? Who should collect it? How should that information be collected? How should that information be used?

- For **deans**, access to PhD alumni career information at the program level would give graduate schools a crucial metric for assessing and improving doctoral programs.
- **Faculty** would be able to develop more relevant offerings and provide better mentorship with a clearer understanding of the real and potential impacts of graduate study on their students' career trajectories.
- **Prospective graduate students** would be empowered to make better decisions about program fit using data comparable across programs and institutions.
- **Current graduate students and alumni** would be more informed about the full range of professional opportunities available to them. Doctoral students from **underrepresented minority groups** might particularly benefit, since they have been found generally more likely to follow nonacademic career pathways than those from well-represented groups (Gibbs & Griffin, 2013; Gibbs, McGready, Bennet & Griffin, 2014; Goulden, Frasch, & Mason, 2009; Turk-Bicakci and Berger, 2014; Turk-Bicakci, Berger, & Haxton, 2014).

- Understanding the various career pathways taken by PhD students and alumni would also help make the broad case for the continued importance and relevance of advanced training in these disciplines to the **higher education community and the general public**.



Findings from the graduate dean survey indicate graduate schools play an important role in coordinating efforts among the pioneering institutions already engaged in this work. Of the 34% of graduate deans reporting that PhD career information is collected at their institution through formally-established standards, processes, and procedures, 80% reported that such efforts are coordinated by the graduate school, while 20% reported that such efforts are coordinated by another central

unit (e.g., career services offices, institutional research offices, alumni relations, or the provost). Roughly one-half (53%) of respondents reported that PhD career information was collected only informally, and 13% percent that PhD career information is not collected at their institution. These findings are perhaps unsurprising given the graduate dean's unique position to support the success of data collection projects that concern all graduate programs.

The workshop convened representatives of a range of stakeholder groups including graduate deans who have initiated data collection efforts and those who have not; researchers of career tracking such as Bruce Weinberg, Associate Professor of Economics at The Ohio State University; representatives of disciplinary societies such as the Modern Language Association of America (MLA) and the American Historical Association (AHA); other experts such as representatives from the National Science Foundation; and recent PhD graduates. These diverse groups reached consensus on a number of key points:

- 1 Gaps remain.** Institutions and programs need information on the long-term career pathways of their own PhD alumni. Lack of career information beyond first placement makes it difficult to change cultures, improve programs, and advocate for the importance of graduate education at institutional, local, state, and national levels.
- 2 Common standards needed.** Narrowing these information gaps requires common definitions, processes, and a set of core questions for collecting data useful for program improvement.
- 3 National leadership needed.** A centralized national organization should take the lead in developing these standards for data collection and use.
- 4 Disciplinary diversity can be accommodated.** The group concluded that the types of core career information collected need not require different instruments or standards for different disciplinary fields.

The workshop witnessed strong calls for CGS to launch a major follow-on project to develop a draft survey instrument and methodological standards designed to track the career pathways of doctoral degree holders.

Echoing the findings from the survey of graduate deans, the workshop speakers noted that different data collection efforts serve different purposes, often resulting in overlapping, and sometimes duplicative efforts. Laboring in isolation causes institutions to grapple alone with challenges that affect everyone, resulting in inefficiencies because of the large up-front costs of developing an instrument and collecting alumni contact information. Michael Roach, the J. Thomas and Nancy W. Clark Assistant Professor of Entrepreneurship at Cornell University, suggested in his remarks that a common set of definitions developed by a central national unit would decrease costs. According to Melanie Sinche (2014), a workshop participant and Senior Research Associate in the Labor and Worklife Program at Harvard Law School, “The Council of Graduate Schools seems uniquely poised at this moment to take a leadership role by developing a system to collect comprehensive data on Ph.D. career pathways. Given the overwhelming support that I observed [at the workshop], I am hopeful that CGS will initiate action around this endeavor.” This idea was echoed by graduate deans, who indicated a central standard for data collection and use (including standardized responses for occupational categories and positions) would remove a major barrier for institutions.

Graduate school leadership in this area is important for several reasons. First, graduate schools offer distinct expertise on the practical challenges of collecting data on the career pathways of PhD alumni. Second, many graduate deans are proven coalition builders who can reach across campus units to enact change, and the support of a variety of stakeholders will be necessary to successfully embed PhD career pathways data collection in institutional cultures. In conclusion, many questions remain unanswered with regard to the career pathways of PhD holders. Although a variety of challenges exist, the benefits of knowing more about the true career pathways of PhD holders may be worth the effort to collect that information. With such varied stakeholders, however, it is important that data collection efforts be clear about the purposes for which the data would be used, and reasonably sure that the chosen methods will yield data suited to these purposes.

Understanding PhD Career Pathways for Program Improvement

I. Overview

Although able to collect and utilize data on enrollment, completion and attrition rates, and degrees awarded, graduate schools for the most part lack structures to collect information about another important benchmark of their effectiveness: the career pathways of their alumni. Since at least the early 1990s, the disconnect between how PhD students are prepared and the careers they enter has sparked persistent calls for reform (CGS & AAC&U, 2003; CGS & ETS, 2012; LaPidus, 1995; National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, 1995). While much has changed in the intervening years to strengthen doctoral career preparation—particularly in the area of preparing future faculty—the disconnect remains, partly due to the lack of common standards for collecting and using career pathways information.

Currently only the most basic career pathways information about US PhD holders is available (e.g., initial placement, some salary data), and much of what is currently collected is aggregated nationally and therefore only minimally useful to individual programs. For example, aggregate numbers suggest that roughly 50% of PhD holders enter an academic first job; this estimate varies widely across fields (National Science Foundation, 2012). Those few institutions that do collect more comprehensive career pathways data classify and use them in differing ways. Some universities ask graduating students directly for initial placement information; others rely on individual departments to track data on their own students, sometimes over several years. Some institutions retain data for internal purposes; some publish the statistics on their websites and marketing materials. This diversity makes it difficult to locate the career pathways information that exists—and it is virtually impossible to compare institution-level data.

This report explores how the graduate education community might deepen its knowledge of the career pathways of PhD holders. It summarizes the current state of the study and practice of collecting and using information about career pathways at the doctoral level in science, technology, engineering, and mathematics (STEM), humanities, and social science fields. It includes the results of a CGS-administered survey of graduate deans at doctoral-granting institutions in the US and Canada, and served as background for discussion at a workshop hosted by CGS in September of 2014. This report, the survey of deans, and the workshop represent the three main components of a study determining the feasibility of a larger project to develop standards, definitions, procedures, and practices in collecting information on career pathways of PhD holders and for using this information to inform improvements of graduate programs.

Gap Analysis


The Survey of Earned Doctorates (SED) is perhaps the most comprehensive data source on PhD careers in the US available today. A cross-sectional survey, the SED captures first-placement information on virtually all PhD graduates across all broad fields at the time of graduation. The survey enjoys a very high response rate and collects data on a wide array of variables, including information about program of study, financial support, student debt, and postgraduate plans, including expectations regarding salary and work activities. Data are reported approximately two years after collection.

The Survey of Doctoral Recipients (SDR), a longitudinal survey, captures career information over the long term for a sample of individuals who have already earned a PhD in science and engineering fields. The survey captures detailed data regarding employment status, employer characteristics, occupational

information, previous employment, and other education and work-related experiences. Data are reported approximately one year after collection. There was a humanities-oriented version of the SDR that collected data on humanities graduates, the SDR-H, but the survey was discontinued after the 1995 cycle (National Academies Press, 1997). Since that time, there has been no national effort to follow humanities graduates through their careers (Ingram & Brown, 1997) although projects such as Humanities Indicators provide important baseline information such as enrollment trends, degree trends, completion rates, and information related to departmental size.

Other federal efforts make important contributions to the state of knowledge of the career paths of PhD graduates, particularly in STEM fields. The NIH ACD Biomedical Workforce Working Group added information in the biomedical sciences. The NSF is currently piloting the Early Career Doctorates Survey (ECDS), which is likely to use a questionnaire that is more comprehensive than either the SED or SDR. The survey is intended to reach individuals who earned their first doctorate within the past 10 years and who work in US academic institutions, federally funded research and development centers, or the National Institutes of Health intramural research programs. The survey will collect data on educational history, professional activities and achievements, employer characteristics, professional and personal life balance, mentoring, training, and research opportunities, and career paths and plans. No field of study will be excluded, so this survey will also capture some portion of humanities and social science graduates. Data from the pilot phase of this effort are projected to be available by the fall of 2016, and the full survey will be implemented thereafter.

The American Association of Universities Data Exchange (AAUDE) has encouraged graduate schools from AAU member institutions to exchange data generated by a common set of questions intended to be asked of newly-minted PhD students. The questions generally concern student satisfaction with aspects of their doctoral experience (e.g., orientation, advising, mentoring, academic supports, research opportunities), as well as some information about their postgraduate plans, using variables included in the SED.



No single existing dataset can give institutions or graduate schools the granular information they need to improve doctoral programs.

Independent reports such as those from the Center for Research and Innovation in Graduate Education (CIRGE) also provide important snapshots of career paths, job satisfaction, and how doctoral alumni valued their education in particular disciplines but do not offer data granular enough for use in program improvement (Nerad & Cerny, 1999; Nerad, Rudd, Morrison, and Picciano, 2007-2009). While immensely valuable for demonstrating certain aspects of PhD careers at the national level, these examples provide aggregated data, which, as was recently noted, “have limited usefulness when individual programs have such variability in their placement outcomes” (Pannacker, 2013).

Data collection efforts remain uneven across disciplines. Some disciplinary associations capture career pathways information, but the scope of their data collection efforts is constrained by the domains of their membership and by sample limitations. For instance, the American Historical Association’s 2011 “Career Paths Survey” collected information about first-employment, career mobility, and career satisfaction, but limited their sample to senior history faculty at four-year colleges and universities (Townsend, 2012). To develop a fuller picture of “The Many Careers of History PhDs,” AHA recently commissioned a report to determine the career outcomes of a sample of History PhDs who graduated between 1998 and 2009 using social media outlets. Even this more comprehensive project, however, “can only provide a snapshot of the employment picture at one moment in time” (Wood & Townsend, 2013, p.6). Similarly, the American Chemical Society (ACS), American Mathematical Society (AMS), and the American Philosophical Association (APA) have successfully collected career pathways information from their members. The ACS implements one of the largest and longest-running annual salary, employment, and education surveys of its kind (American Chemical Society, 2012). The APA similarly collects yearly profile

information on employment characteristics of APA members through their Center for Workforce Studies.

Although some information does exist in the area of PhD career pathways, no single existing dataset can give institutions or graduate schools the granular information they need to improve doctoral programs. However, some of the information collected by the various surveys is useful at this level. For example, the SED information, coupled with a longer-term data collection effort, might be able to give a broad overview to institutions about the career pathways of their PhD graduates. The Early Career Doctorate Survey (ECDS) will also provide a valuable parallel source of information about PhD career pathways. It will be particularly valuable if individuals' information is shared with the relevant institutions based on their educational history, but this effort will not capture the full breadth of careers pursued by PhDs. The ECDS will not collect data on PhD holders employed in non-profit organizations, the private sector, or national, state, or local government agencies, nor will it provide long-term career pathways information due to its focus on early career researchers. The SDR provides an important source of national-level information, but needs to be coupled with more localized information (and reintroduce the humanities survey) to be truly useful to PhD programs.


As part of the work of the feasibility study, CGS reviewed over 100 existing domestic and international survey instruments to explore the state of knowledge in this field. Further analysis of this large collection of instruments will also provide thorough background information for any future project to develop common definitions, processes, and procedures in PhD career data collection. These surveys included those administered by federal agencies, disciplinary societies, independent sources, and individual programs. Our sample included longitudinal and cross-sectional surveys as well as both graduate- and undergraduate-focused surveys. This review resulted in two major findings. First, combining datasets generated by various data collection efforts is likely to be highly problematic due to the wide variety of variables, taxonomies, and indicators employed by different surveys (e.g., the SED and SDR have different ways of collecting salary information). Second, although a number of data collection efforts capture various types of information on career pathways of doctoral students, none collect the program-level longitudinal career information directly pertinent to program improvement. Because it would be impractical to list all of the variables collected in all 110 surveys, a selected summary is presented below. Please see Appendix A for an overview of the variable clusters collected by six of the most relevant and visible surveys analyzed.

Project and Goals

The past 20 years have witnessed increasing calls for the collection of PhD career pathways information. Even though some consensus exists on what the benefits of such collection might be, information gaps remain for students, educators, administrators, funding agencies, and the community at large about the career pathways of PhD holders. In 1995, the Committee on Science, Engineering, and Public Policy of the National Academies recommended that career pathways information for STEM PhDs be collected and widely disseminated (National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, 1995). Despite these and other strong recommendations (Association of American Universities, 1998; Golde and Dore, 2001; Monk, Foote, & Schlemper, 2012; Rogers, 2012; Sanford, 1999; Woodrow Wilson National Fellowship Foundation, 2005) the need for career pathways information still remained a pressing need when CGS began work on *The Path Forward: The Future of Graduate Education in the United States* (CGS & ETS, 2010). *The Path Forward's* calls to provide "career path transparency" led to the major policy study *Pathways Through Graduate School and Into Careers* (CGS & ETS, 2012). The Pathways study included the recommendation of a 14-member commission composed of industry leaders, university presidents, graduate deans, and provosts that universities improve practices in professional development and understanding career trajectories. It highlighted the increasingly urgent need for a more comprehensive, systematic, standardized method of understanding PhD careers.

A critical mass of recent national reports on graduate education has echoed the *Pathways* findings in identifying this as an area of need. The National Academies' report *Research Universities and the Future of America* (2012) concludes that "[a]t a minimum, research universities must require their doctoral programs to track their graduates" (p. 155). The report continues, "[t]racking data [is] a crucial starting point for understanding both the careers of program graduates and how programs should be better aligned to support those careers" (National Research Council, p. 155). The American Academy of Arts and Sciences' influential *The Heart of the Matter* (2013), likewise calls for "universities [to] clarify and strengthen the pathways that lead from graduate study to a range of careers" (p. 43), linking this call to the parallel need "to publicize existing routes, create new routes, and support scholars in their transition to nonacademic employment" (p. 43). The Modern Language Association of America's *Report of the MLA Task Force on Doctoral Study in Modern Language and Literature* (2014) insists that career transparency is an essential reform that modern language and literature departments should adopt. The report recommends "Departments . . . provide information, preferably on their web site, regarding their placement record in different types of positions" (p. 18).

Many voices have joined in this chorus, demanding not only the more widespread and comparable collection of career pathways data, but also dissemination and use of such data among stakeholder communities. Groups as diverse as the National Institutes of Health's Biomedical Research Workforce Working Group (2012); international associations such as the European University Association (Byrne, Jørgensen & Loukkola, 2013) and the Organisation for Economic Co-Operation and Development (Auriol, 2010); the European Science Foundation and the Fonds National de la Recherche Luxembourg (2012); US higher education commentators and journalists (Benderly, 2013; Cassuto, 2012; Pannapacker, 2013; Tuhus-Dubrow, 2013); researchers (Sauermann, cited in National Academy of the Sciences, National Academy of Engineering, and Institute of Medicine, 2014, p. 22; Sauermann and Roach, 2012) and an online community of "alternate academics" (Rogers, 2012, p.10) have joined the effort. An NIH report perhaps summed up the sentiments of these diverse groups best, saying, "Graduate programs . . . should openly communicate the career outcomes of their graduates to potential students" (National Institutes of Health, 2012).



"Tracking data [is] a crucial starting point for understanding both the careers of program graduates and how programs should be better aligned to support those careers".

– *The National Academies*

Potential Benefits

These communities and others have suggested that understanding the career trajectories of PhD holders could strengthen graduate education in two particularly important ways. First, career pathways information would provide graduate schools with a crucial metric for assessing, improving, and recruiting the best students for their programs (Council of Graduate Schools, 2012; Davidson-Shivers, Inpornjivit, & Sellers, 2004; Gaebel, Hauschildt, Mühleck, & Smidt, 2012). Second, prospective graduate students would have a better understanding of the potential fit between their career ambitions and programs they are considering, as well as a more comprehensive view of their career options after graduate school (CGS and ETS, 2012; National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, 1995; Sauermann and Roach, 2012).

Career pathways information could provide an important metric now largely absent from graduate program review, a process exclusively devoted to improving graduate programs. Graduate program review "asks graduate programs to engage in self-studies that assess, as objectively as possible, their own programs" for the purpose of "mak[ing] specific recommendations for future changes" (Baker, Carter, Larick, & King, 2011, p. 4). Among other questions, effective graduate program review should address the following: "How well is the program advancing the state of the . . . profession?; How well does it respond to the profession's needs?" (Baker, Carter, Larick, & King, 2011, p. 5). Accurate career

pathways information at the program level should inform program review, with an understanding of “the profession” as all work related to a discipline—both within the academy and beyond it.¹

With comprehensive long-term career pathways information, programs could also more effectively assess their own contribution to the profession. In conjunction with other information, possibly provided from a disciplinary society, the program would be able to more fully understand how well it is responding to the needs of the profession at large. Without career pathways information from its alumni, a program may not be able to effectively address these questions because it would be working largely from anecdotes and incomplete information. By being able to fully address these questions, programs would be able to determine if their curricular offerings meet the needs of students with regards to their individual careers as well as the profession as a whole. The addition of alumni feedback on programming and their career outcomes might particularly strengthen the process and outcomes of graduate program review.

Institution-level data on career pathways might have other direct benefits to faculty and students. Not only would faculty better understand the impacts and potential impacts of graduate programs on their students’ career trajectories, but graduate students, benefiting from improved programs and mentorship, would be better prepared for the full range of professions they enter in both academic and nonacademic sectors. Making this information more freely available might reduce program attrition by

- 1 Encouraging students who might not persist in a program due to perceived misaligned career goals,
- 2 Providing clearer pathways into a diversity of careers (Rutledge, Carter-Veale, & Tull, 2011), and
- 3 Decreasing the sense of isolation that PhD students sometimes report when considering a career beyond the academy (Golde and Dore, 2001; Sauermann and Roach, 2012).

The Woodrow Wilson National Fellowship Foundation’s Responsive PhD project suggested that “The misnamed problem of time-to-degree can be solved only when graduate students are helped to understand better the full range of career possibilities opened to them by their graduate training” (2005, p. 6). Understanding the various career pathways taken by PhDs could also help make the broad case for the importance of graduate education as a public good, and convince students considering a doctoral program to view it as a valuable credential for a variety of sectors.

Current and recent doctoral students have indicated they do not receive adequate or accurate career information before or during their PhD programs. In the CGS *Pathways* student survey, 54% of those currently enrolled in a PhD program or recent completers of the PhD felt they received less information about careers than needed before entering graduate school. Even more troublingly, 10% reported receiving no information at all. Of the information they received, 21% rated it “not at all helpful” and 64% rated it merely “somewhat helpful” (Wendler, 2014). These statistics demonstrate the need for increased access to quality career information for prospective and current PhD students.

¹ This sense of “the profession” is more common in some disciplines than others. For example, the American Chemical Society webpage features a communities section called “Profession” that offers members resources in pursuing a wide range of careers in industry, education, and government (2014). The Modern Language Association of America, in contrast, publishes a peer-reviewed journal entitled *Profession* that deals exclusively with materials for “language and literature teachers,” generally at the college level (Brod & Neel, quoted in Feal, 2012).

These numbers indicate that Golde and Dore's 2001 assertion holds true: "the training doctoral students receive is not what they want, nor does it prepare them for the jobs they take" (p. 3). Golde and Dore found "a three-way mismatch between student goals, training, and actual careers" (p.5):

Doctoral students persist in pursuing careers as faculty members, and graduate programs persist in preparing them for careers at research universities, despite the well-publicized paucity of academic jobs and efforts to diversify the options available for doctorate-holders. The result: Students are not well prepared to assume the faculty positions that are available, nor do they have a clear concept of their suitability for work outside of research. (p. 5)

Although some institutions have made changing this landscape a priority, the situation remains similar for many of today's doctoral students, particularly at the research-intensive universities that produce the largest numbers of doctoral students. One of the reasons this situation is allowed to persist is the paucity of information on the actual career pathways of doctoral graduates. Because of a lack of program- or even institutional-level data, "graduate programs are deprived of a feedback loop to know how their programs relate to the actual careers of their alumni" (Gaff, 2002).

Numerous studies have found that PhD students shift career aspirations away from the academic track through the course of their training, but students' nonacademic career goals tend to be less well-defined and less well-supported by their academic programs (Fuhrman, Halme, O'Sullivan, & Lindstaedt, 2011; Gibbs & Griffin, 2013; Gibbs, McGready, Bennet & Griffin, 2014; Golde & Dore, 2001; Goldsmith, Presley, & Cooley, 2002; Goulden, Frasch, Mason, 2009; Mason, Goulden, Frasch, 2009; Monk, Foote, & Schlemper, 2012; National Research Council, 2012; Sauermann and Roach, 2012). Although in the aggregate roughly 50% of PhD holders do not enter first positions in academia, this estimate varies across fields (National Science Foundation, 2012).

"The misnamed problem of time-to-degree can be solved only when graduate students are helped to understand better the full range of career possibilities opened to them by their graduate training."

– The Woodrow Wilson National Fellowship Foundation

According to data generated by the 2012 Survey of Earned Doctorates, 50.6% of total graduates reported entering an academic job on graduation, while compared to 13.4% in engineering and 82.9% in the humanities. These numbers present only a partial picture of the overall employment situation of PhD holders, however, for three reasons:

- 1 The SED captures employment that students have confirmed at the time of graduation,
- 2 First employment is an inadequate measure of long-term career progression, and
- 3 Not all students who secure definite commitments do so before completing the survey.

Take the example of the humanities. Although the SED indicates very high percentages of first employment in academe (about 83%), Cerny and Nerad's (1996) *PhDs—Ten Years Later* survey found that in 1995 only 53% of English PhDs ten years removed from the completion of their PhDs were tenured, and 5% occupied tenure-track positions. A more recent report by the American Historical Association


(Wood and Townsend, 2013) similarly found that only 53% all those in its sample of history PhDs who had graduated between 4–15 years earlier were pursuing careers on the tenure track at a two- or four-year institution. One possible explanation is that humanities PhDs initially accept contingent appointments that do not lead to careers in academia, and eventually move into other sectors.

In STEM fields, the numbers are even less indicative of a linear academic career path. The SDR, which captures longitudinal data on a sample of individuals who receive a doctorate in science, engineering, and health fields, shows that in 2010, 61% of employed STEM PhD holders were employed in nonacademic positions. Viewed through the longer-term lens of those at least ten years since degree, academic employment in these fields dips even further. After at least ten years, positions at a postsecondary institution (including non-tenure-track, academic administration, and research positions) in engineering account for only 23%, physical science 44%, and life sciences 42% of employed respondents (National Science Foundation, 2010).

While most researchers recognize the value of doctorate holders to a wide range of occupational sectors (Bender, 2006; Fuhrman, Halme, O'Sullivan, & Lindstaedt, 2011; Nerad, 2009; Sauermann and Roach, 2012; Turk-Bicakci, Berger & Haxton, 2014), the mismatch between the training of doctoral students for academic careers and increasing competition for available full-time faculty positions (Shapiro, 2003) has caused some to lament the “oversupply” of PhDs (Benderly, 2010; Massy & Goldman, 1995; PBS Newshour, 2014). While precise matching of supply and demand in any workforce is never a simple matter, it would be a mistake to assume that PhDs only enter—or are only prepared to enter—one kind of labor market.² Given the broad skills and deep knowledge PhDs possess, the issue might well be one of underutilization of those talents rather than overproduction. One important step towards right-sizing PhD production is determining what graduates actually do and are skilled to do, and then giving potential students that information so that they can make informed decisions. Without this information, it is impossible to know whether the larger employment market can sustain the current numbers of PhDs, or indeed even whether we are producing enough PhD graduates to meet the real demands of an innovation-driven global economy.

Scope of the Study

The current study asks four main questions in order to understand how to collect and use PhD career pathways information for program improvement: What information should be collected? Who will collect it? How should that information be collected? How should that information be used? Currently there exist no standards, definitions, processes, or procedures for collecting and using PhD career pathways information. Developing these standards is no simple task, and relies on the answers to these four questions.



First-time employment is insufficient for measuring educational outcomes, particularly at the PhD level.

What Information Should Be Collected?

It holds true that attempts to determine a postsecondary degree's value have most often measured “not . . . the most important outcomes . . . but . . . the easiest outcomes to measure” (Gallup, Inc., 2014, p. 3). Almost without exception, studies that attempt to understand career pathways in secondary and post-secondary education rely on salary information (Dansky, 1996; Dinovitzer, 2006; Dreher & Ryan, 2002; Elnicki et al.,

² One notable intervention is the US National Institute of Health's recent Broadening Experiences in Scientific Training (BEST) awards, which “provide support for institutions to develop novel ideas in training and workforce development” for graduate students in the Biomedical Sciences. According to the grant announcement: “The goal of this program is to better prepare predoctoral students and postdoctoral scientists for the breadth of careers in the biomedical research workforce and to establish a network to develop, share, evaluate, and disseminate best practices within the training community” (Department of Health and Human Services, 2014).

1999; Forret & Dougherty, 2004; Miree & Irene, 1999). Salary is a convenient and often useful indicator of success, but it remains largely dependent on geographical region, sector of employment, and number of years of employment. It is well established that first-time employment is insufficient for measuring educational outcomes, particularly at the PhD level. Even simple indicators such as higher earnings often do not manifest fully until later in a career (Carnevale, Rose & Cheah, 2011; Finamore et al., 2013; Fry, Cohn, Livingston & Taylor, 2011; Hartmann & Hayes, 2013; Humphreys & Kelly, 2014). Other initiatives to capture career outcomes information of doctoral program alumni have operated under the principle that long-term outcomes are important. For example, when evaluating European universities' abilities in this area, Byrne, Jørgensen & Loukkola (2013) considered the ability to follow student careers over the long term an essential component:

When concretely asked about systematic tracking, only 23% of the survey respondents claimed to do this and only 12 universities tracked graduates for more than four years after graduation. Taking into account that the benefits of a doctorate will often be evident through a longer career path, these results would not be satisfactory in terms of demonstrating the full value of the doctorate. (p. 39)

Although one's first job may once have been an accurate predictor of a long-term career, this is no longer the case. Career theorists widely agree that today's careers progress in a less linear fashion than their twentieth-century counterparts (Savickas, et al., 2009). Although the progression from graduate student to postdoc to tenure-track to tenured professor remains relatively direct, this progression describes the minority of PhD careers. Since long-term career pathways information is not collected on PhDs, it is possible that even this much is speculation. Even the academic career may no longer follow this neat trajectory. The rise of contingent academic labor (Curtis, 2014) and lengthened postdoctoral periods (Rockey, 2012) suggest that more non-linear paths might more closely match the reality, even in academe. It is also possible that the divide between an academic career and one in business, government, or nonprofits (BGN) is less rigid than it once was. Whatever the case, the lack of information spawns speculation and a reliance on anecdotal evidence. Even if we agree that "long-term" information is needed, other factors come into play when considering what information to collect. How many years must a PhD remain in her career before her pathway information may be considered "long-term"? How many data points are needed to develop a nuanced understanding of career pathways?

Another challenge lies in the fact that there exist disciplinary differences in determining the successful placement of an early-career researcher. Most notable are differences in the practice of pursuing postdoctoral appointments, or "postdocs." In many science and engineering fields, the postdoc constitutes an established stage in the career of a researcher. After completion of the PhD, 60% to 70% of life science PhDs pursue postdocs, compared with 45% to 55% of physical sciences PhDs, and 40 to 45% of engineering PhDs (National Science Foundation, 2012, p. 11). Since the economic downturn in 2008, "postdocs" are more ubiquitous than ever, and even those fields that have not traditionally included postdoctoral appointments in their career paths have begun to grow their postdoctoral research options. More than one-third of social sciences PhDs reported in the 2012 SED that their first position was a postdoc (National Science Foundation, 2012, p. 11). The number is even growing in the humanities, although percentages do not yet approach those in other fields. How should postdoctoral placements be evaluated? Are they a successful/desirable outcome? How many years are acceptable for a postdoc to remain in this position?

Differences remain also among the types of career pathways PhD holders may pursue. Studies that attempt to trace faculty career pathways include outcomes such as academic rank, rates of promotion and tenure, numbers of peer-reviewed publications and grants (Cohen et al., 2008; Gallivan & Benbunan-Finch, 2008; Krousel-Wood et al., 2012). Studies of STEM fields also capture whether and how often the person was the lead researcher on projects and publications (Krousel-Wood et al., 2012). Since the majority of PhD graduates do not follow academic career paths, using these measures as the main indicator of success fails to account for a large proportion of successful PhDs. There is evidence that it also disproportionately excludes PhDs who belong to underrepresented minority groups (Gibbs,

McGready, Bennet & Griffin, 2014; Goulden, Frasc, & Mason, 2009; Turk-Bicakci and Berger, 2014; Turk-Bicakci, Berger, & Haxton, 2014). Other common quantitative outcomes that may be more suited to nonacademic career mobility include number or frequency of promotions (Briscoe & Kellogg, 2011; Dreher & Ryan, 2002; Elnicki et al., 1999; Forret & Dougherty, 2004; Miree & Irene, 1999) and retention (Briscoe & Kellogg, 2011; Dreher & Ryan, 2002; Higgins & Thomas, 2001).

The scholarly literature on career outcomes manifests an increasing interest in measuring and capturing qualitative indicators such as career or job satisfaction (Chiaburu, Diaz, & De Vos, 2013; Dansky, 1996; Feldman & Bolino, 2000; Greenhaus et al., 1990), perceived skill development and use (Dansky, 1996; Feldman & Bolino, 2000), psychological well-being (Feldman & Bolino, 2000), prestige of job or field (Dinovitzer, 2006; Feldt & Woelfel, 2009); and intellectual stimulation/opportunity for personal development (Feldt & Woelfel, 2009). These may be extremely important indicators for the purposes of program improvement (Davidson-Shivers, Inpornjivit, & Sellers, 2004). The recent Gallup-Purdue Index report, *Great Jobs, Great Lives*, described a pioneering effort by Gallup, Inc. and Purdue University to measure holistic well-being indicators and their correspondence with certain undergraduate experiences. This effort takes seriously the claims of undergraduate programs to offer students a richer and more fulfilling life through education. Although this is not typically considered one of the chief aims of graduate study, the Gallup-Purdue Index may provide a model for how to approach the measurement of more subjective outcomes and point to specific areas for program improvement. The study found correlation between certain specific undergraduate experiences (e.g., having a professor who cared about your success) and work engagement, which in turn strongly predicted wellbeing. If these same correlations held at the graduate level, it might enable programs to strengthen particular program attributes (e.g., providing internship/externship opportunities or improving mentorship).

Operational Definitions for Current Study

The current paper uses the term career pathways to refer to the process of individuals engaging in meaningful work throughout their lives. It uses *career outcomes* when discussing specific data points (whether quantitative or qualitative), but PhD *career pathways* refers to the movement of doctoral degree holders through their careers. This usage builds on CGS's work with the *Path Forward* and *Pathways* reports, and refers to pathways through graduate school and into careers.

It is worth noting that these definitions do not completely align with some dominant uses of the terms. Speaking generally, in scholarly writing and studies that attempt to capture career information, the term *career outcomes* is more often used to describe measurable or quantifiable indicators of career success, while the use of the term *career pathways* generally signals a more qualitative approach to understanding the career process. Very occasionally researchers will use the terms interchangeably, but career outcomes is used most commonly in the literature.

CGS considers the broad range of meaning attributed to *career pathways* as a strength that allows us to join a robust community of researchers and educators grappling with issues related to understanding career preparation and the career movement of students over time. In the scholarly literature on careers, the term *career pathways* is often used to refer to school-to-career-pathways, or the educational programs that make it possible for a student to pursue a career. It is also used as a term to describe the process of how or why an individual pursues a specific profession or field, or how those in a particular profession or field advance through predetermined ranks. A large body of education literature uses *career pathways* to refer specifically to "school-to-work pathways" (Adam, 2003; Adkisson & Lane, 1995; Bragg, 2007; Deitz, 1993; Flaherty, 2014; Hackmann & Waters, 1998; Hull, 2005; Schoelkopf, 1995). These are defined generally as "a coherent, articulated sequence of rigorous academic and career courses . . . designed to lead to rewarding careers" (Warford, 2006, p. 8).

Other academic literatures describe *pathways* to a specific career or field from the point of initial academic training. For example, Kendrick & Kendall (2008) discuss career pathways as different ways to funnel research fellows into the field of academic primary care research. Raines & Tagliaireni (2008) similarly trace career pathways and the academic progression of nursing professionals, as do Giles, Ski

and Vrdoljak (2009) when they measure the international mobility and career choice of Australian science, engineering, and technology postgraduates. An additional facet of the term *career pathways* includes the meaning of pathways through a career, or the movement through the ranks of a career (McColgan, 2008; Smith, Crittenden & Caputi, 2012; Yong-Lyun & Brunner, 2009). O'Neill (2012) explains, "Career pathways are often considered linear—you do a job for a year then progress upwards or perhaps laterally to broaden your skill set and knowledge base." Increasingly, researchers recognize that modern-day careers rarely follow such linear patterns. This is yet another reason to prefer the term *career pathways* to describe this progression.

Despite the fact that the literature more often uses *career outcomes*, the term *career pathways* is better suited to the current project's goals and values. A study of *career pathways* would trace the series of opportunities and decisions that over time build a person's career. CGS considers the career choice and progression of PhD holders as an ongoing, lifelong process. This emphasis on process and a fuller understanding of doctoral careers does not mean that a larger CGS-led project would not capture what are traditionally known as *career outcomes* data (e.g., salary, rank, job title), but rather that these would be part of an array of information collected through diverse methods.

Who Will Collect PhD Career Pathways Information?

If it is agreed that PhD career pathways information should be collected, the question remains as to what off- or on-campus unit(s) should be responsible for its collection. Multiple entities have some stake in the collection of career pathways information, and might be interested in spearheading the effort. The most prominent voice on this matter has been the US federal government, which for now has concentrated on the undergraduate level. The White House directed the US Department of Education to develop a federal college rating system, with the intention of better informing students considering college. It is also designed as an accountability measure for public funders to assess university performance. Under the proposed scheme, employment rates and average salaries of graduates will be key indicators of university performance. While the motivations for this push are clear and reasonable, rooted in a desire for transparency, career outcomes—and most particularly first placement—do not represent the full range of educational outcomes.


There has been significant negative university reaction against the system notwithstanding its admirable motives. The National Commission on Accountability in Higher Education articulated the differences between the positions of educators and policymakers in a 2005 report: "Many educators believe externally imposed accountability is a tool to place blame or avoid responsibility for inadequate financial support. Many policymakers . . . believe stronger external accountability is the only way to get improvement" (State Higher Education Executive Officers, 2005, p. 11). University opposition has ranged from educators who fear that such schemes will put undue weight on earning money as opposed to serving the public, to those who fear such a system would undervalue graduate school attendance, to still others who worry about the broader impact of federal intervention in what has historically been a relatively independent higher education system. Additionally, universities argue they would be unfairly punished for graduating students into recession-era economies, when they have no control over the labor market conditions.

Educators recognize an inherent tension between accountability measures and internally-motivated self-assessment for improvement. This difference was elaborated by a 2005 report from the National Commission for Accountability in Higher Education:

Accountability for better results is different from accountability for minimum standards. The organizing principle for accountability must be pride, not fear. To achieve better results, accountability in higher education must be a democratic process through which shared goals are explicitly established, progress is measured, and work to improve performance is motivated and guided. (p. 11)

Any approach to the collection of career pathways information must be planned with the ultimate goal of improving programs rather than meeting minimum requirements. Only institutions know how best to use alumni career information to inform their program review and strategic plans, motivated by the desire to improve. Institutions therefore should be empowered to use this information as they see fit.

Other units external to the university have a stake in learning the career outcomes of doctoral education. Disciplinary societies have contributed enormously to the overall state of knowledge about PhD career pathways. For information to be truly useful to the improvement of programs, however, it needs to be distillable down to the program level. Disciplinary societies, while they possess a deep understanding of individual fields often have different goals than a university or university unit might in collecting similar information, and do not offer broad, program-level data. However, it should be noted that any effort to collect career pathways information should seek to learn from and coordinate with disciplinary societies, their best practices, and their deep knowledge of the differences among disciplines with regards to career pathways.



Any approach to the collection of career pathways information must be planned with the ultimate goal of improving programs rather than meeting minimum requirements.

Alumni offices often collect and maintain alumni contact records in efforts to engage donors or participants in alumni activities. Alumni offices, however, tend to be heavily undergraduate-focused, and may not perceive a PhD career data collection effort to fall within the realm of their mission. Career service offices, although often very concerned with career outcomes, similarly tend to focus on the undergraduate population, and many may not feel equipped or motivated to take on the task of expanding the collection of career information to the PhD level. Nationally, this seems to be the case, as evidenced by the fact that the National Association of Colleges and Employers (NACE) recently released a set

of *Standards and Protocols for the Collection and Dissemination of Graduating Student Initial Career Outcomes Information for Undergraduates* (NACE, 2014).

Individual departments may be curious to know how their alumni's careers progress, and may enjoy much stronger ties to graduate student alumni than the institution at large. However, they might also suffer from a conflict of interest that disincentivizes collecting and/or publicizing information about alumni careers considered less prestigious in the academic framework. As Rogers (2012) indicates, "Perceived reputational risk is a significant roadblock to increased transparency regarding post-graduate [Ph.D.] career paths. A common refrain among the respondents was a call to collect and publicize employment data. However, departments have little incentive to collect this information" (p.7).


The graduate school has a clear motivation for collecting PhD career pathways information. With the ultimate goal of ensuring the best match between student and program and improving the quality of graduate programs, the graduate school could also provide a logical home for PhD career pathways collection efforts. As the individuals with direct responsibility for the quality of graduate programs at their institutions, graduate deans would then be the parties with the ultimate responsibility over such efforts. Others have recognized the special role of graduate deans in this area. For example, Golde and Dore's landmark report *At Cross Purposes* (2001) strongly recommends that graduate deans be the party responsible for collecting and disseminating accurate information on career outcomes.

Graduate deans, many with a proven record of consensus building, may be able to harness the collective power and motivation of all the above-mentioned groups to build the institution-wide political will necessary to support a comprehensive PhD career pathways collection effort much as they have led the effort in collecting PhD completion data. CGS has found in the PhD completion project as well as others such as the Project for Scholarly Integrity and the Enhancing Student Financial Education project that deans are able to communicate the value of data collection efforts across their institutions, to create

incentives for faculty and staff to participate in data collection processes where appropriate, and to facilitate the collaboration of various campus units.

A number of graduate schools have recognized the importance of PhD career pathways data collection and have made some progress on their own in spearheading projects. Over the past decade of CGS annual meetings and summer workshops, graduate deans have consistently raised this issue as a critical one, have shared promising practices in this area, and have discussed the many challenges associated with collecting long-term career pathways information. According to the National Research Council's *Assessment of Research Doctorate Programs* (2012), between 60% and 83% of doctoral programs report some collection of doctoral alumni employment information (p. 91). There is evidence to suggest that this range is artificially high, driven by the fact that many programs that participate in the Survey of Earned Doctorates (SED) may have answered "yes" to the question, "Does your program collect employment outcomes for all your doctoral graduates?" Because the SED captures only initial placement, this 60% to 83% should not be interpreted as the percentage of programs collecting long-term career pathways information.

Additionally, the 2012 *Pathways* survey of graduate deans similarly found that the majority of institutions collect some type of employment data on their graduate school alumni, these efforts are scattered across units and heavily skewed towards first employment only (CGS & ETS, 2012). This survey also may have captured SED efforts to collect first employment. Most importantly, however, it found that a large majority (85%) of graduate deans surveyed at that time reported they were somewhat or very dissatisfied with their institution's ability to collect career pathways information for graduate school alumni. Likewise, 81% of deans were dissatisfied with their institution's ability to use career pathways information (Wendler, Kline, Kent, McGeean, 2012, pp. 66-67).



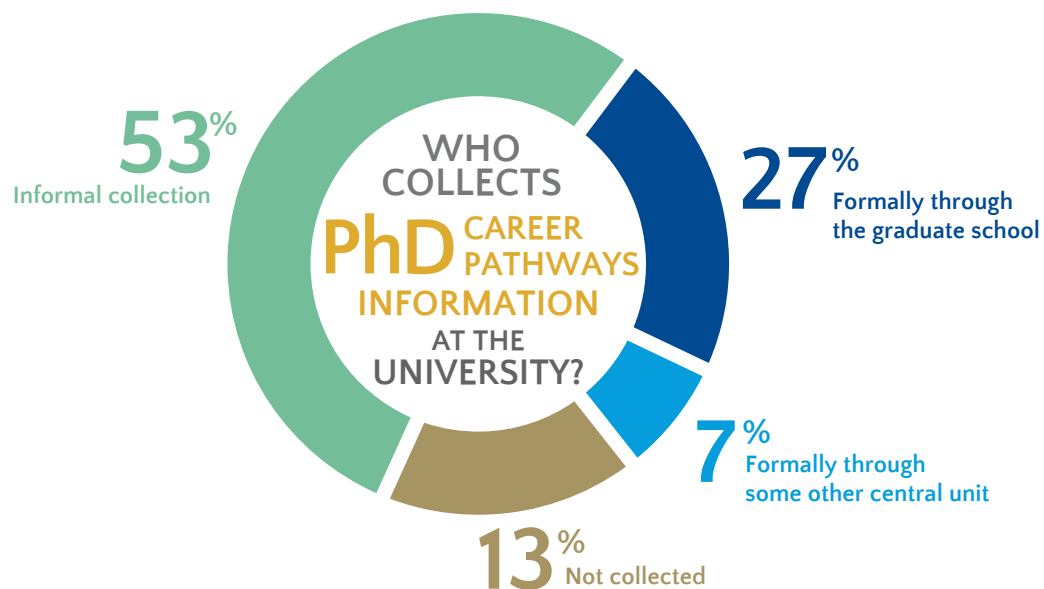
Graduate deans, many with a proven record of consensus building, may be able to harness collective power and motivation to build the institution-wide political will necessary to support a comprehensive PhD career pathways collection effort.

II. Current Practices

In order to learn more about the current state of collecting and using PhD career information, particularly those that use formally established standards, processes, and procedures beyond the SED, CGS implemented a graduate dean survey in April 2014. The survey was sent to 271 graduate deans at CGS-member doctoral granting institutions in the US and Canada. A total of 119 responses were received for a 44% response rate, though response rates to some questions in particular were lower. The survey specifically asked about career pathways collection besides those related to the SED.³

While formally established standards, processes, and procedures of data collection methods are not widely used among survey respondents, graduate schools play a primary role in those that use them. Of the 34% of graduate deans indicating that PhD career information is collected using formally established standards, processes, and procedures, 80% are coordinated by the graduate school, while 20% are coordinated by another central unit (e.g., career services offices, institutional research offices, alumni relations, or the provost). Roughly one-half (53%) of respondents reported that PhD career information was collected informally, and 13% percent reported that PhD career information is not collected at their institution. Please see the figure below for an illustration of the distribution of responsibility of both formal and informal data collection efforts within the university, according to this survey.

Survey respondents report a preponderance of first-placement data being collected about PhD graduates. By a margin of two-to-one, respondents indicated that first placement PhD career information is collected over subsequent placement PhD career information. Moreover, roughly 90% of survey respondents indicated that employer information and occupation information were collected but only small numbers of respondents indicated that they collect data on items such as PhD alumni compensation, professional accomplishments, and satisfaction, among others. The use of student surveys to collect PhD career information was widespread. Student or alumni information management system/portals, reports/data from alumni affairs or career services offices, and reports for program evaluations were reported to be used less frequently. Employers were least frequently mentioned as a source of information.



³ Initial instructions to the survey asked respondents to “[t]ake a moment to think about CURRENT formally established standards, processes, and procedures for collecting PhD career information AT YOUR INSTITUTION, excluding the NSF Survey of Earned Doctorates (SED) or any other federal career information survey.” See Appendix B for the full survey instrument.

While the collection of PhD career information was reported to be concentrated on collecting first-placement information using student surveys, the uses to which career placement information is being put by graduate deans is far more disparate. Aside from a number of survey respondents who indicated that they do not use or cannot use data because of their limitations, uses of PhD career information was distributed across a number of types. The most frequent uses include: for general program improvement, to inform professional development offerings, to inform program review and assessment, to provide information to faculty, to inform academic program content and quality, and to inform and/or recruit prospective students. Less frequently cited purposes were for media/public information, to fulfill accreditation requirements, to provide information to policymakers, and for accountability purposes. Survey respondents described three predominant barriers to collecting PhD career information:

- 1 Insufficient resources, including inadequate staff time, professional expertise, and technology;
- 2 Inadequate alumni contact information, which includes challenges inherent in obtaining and maintaining valid contact information; and
- 3 A lack of standards, process, and procedures for collecting PhD career information, particularly among institutions with large numbers of PhD programs across their campuses.

Other challenges were described as well, although by considerably fewer survey respondents, including a lack of interest among PhD alumni to participate in data collection efforts, a lack of institutional prioritization and leadership, a lack of willing and/or informed partners, and conflicts with other related data collection efforts.

By far the most frequently mentioned challenge with using PhD career information, according to responding graduate deans, was the lack of sufficient, complete, or otherwise useful data. Deans expressed concerns with low response rates, which often lead to anecdotes instead of large datasets. Finally, “data lag” was mentioned as an inherent barrier to using these kinds of data: by the time PhD graduates begin their careers (and PhD career information data collection efforts commence), their programs may have morphed so much that their careers no longer reflect the outcomes of the current doctoral programs. The second most commonly mentioned challenge to using PhD career information was the fact that some of the intended beneficiaries of this information are skeptical about how the information will be used. Respondents described concerns among some on their campuses that PhD career information data gathering and usage efforts may be co-opted by those who wish to use the efforts for fundraising campaigns, while others may cherry-pick PhD alumni for recruiting purposes (i.e., only touting those with tenure-track jobs at research-intensive universities) instead of providing a comprehensive portrayal of PhD careers.

The Graduate Dean Survey drew attention to a few items that were alluded to in the literature review:

- 1 Efforts to collect PhD career information are not widespread;
- 2 The graduate school is playing an important role in coordinating such efforts among the few institutions that are doing this kind of work.

Graduate deans appear to be highly reliant on collecting first-placement PhD career information using student surveys, and far less reliant on collecting career information from employers. They also appear to use PhD career information more for internal purposes (program improvement) as opposed to external purposes (informing the public and policymakers (and perhaps employers)).

The Graduate Dean Survey also sheds light on an important conundrum to be resolved. An underlying assumption behind any effort to collect and use PhD career pathways information is one of transparency: information provided by one group of individuals (i.e., PhD alumni) is intended to be used by another group of individuals (e.g., graduate deans, graduate program directors, employers, prospective students, and others). This raises a question about *collection*: Given the relatively small number of PhD alumni from any given program, how can institutions assure PhD alumni that: such efforts are a good use of their time; and that their input will be anonymized and/or remain confidential? This also raises a question about *utility*: Given the relatively small numbers of PhD alumni within any given program within any given institution, how can collection efforts yield enough data to be generalizable beyond mere anecdote?

Despite the motivation of graduate deans and the demonstrated need for program-level career information, the continued lack of collection programs may be explained by several factors. First, the lack of national standards of collection, dissemination and use of PhD career information require each program to build its own effort from the ground up. Second, differing levels of access to resources result in uneven efforts across institutions and even across programs within the same institution. Past CGS best practice projects suggest that graduate deans occupy a unique position to support the success of data collection projects that concern all graduate programs. Questions addressed in the current project include whether a set of demonstrated best practices in this area—informed by a broad range of fields—might be able to assist in implementing campus-based programs to gather career pathways information.

How Should PhD Career Pathways Information Be Collected?

Once the question of who should collect career pathways information is settled, it becomes necessary to determine how to collect this information. This question elicits other considerations, such as what methods should be used (e.g., surveys, interviews), who should be contacted (e.g., alumni, employers), when the information should be captured (e.g., at graduation, five years since degree, 15 years since degree), and how often this effort should be attempted (e.g. annually, once every three years). There may be more than one answer to each of these questions. Some research suggests that a multi-pronged approach (e.g., sending three-year surveys along with information about the existing events and efforts of the alumni office and conducting periodic interviews with a representative cohort) is often more successful (Tansey & Yarrish, 2008). As an end result, institutions require information that is valid, reliable, comparable, long-term, and useful. While some information exists, no current studies meet all of these essential criteria using a common set of methods necessary to truly improve PhD programs and provide students with useful statistics and narratives.

Efforts to capture career outcomes information employ a variety of methods, including broad surveys (field or cross-field, alumni, crowd-sourced), interviews (of alumni or employers), tracking through an online relationship management system and social media tracking. Each method has its strengths, benefits, challenges and limitations. Additionally, considerations about audience and temporal situation (e.g., whether a study is longitudinal, cross-sectional, or retrospective cross-sectional) will determine with whom, at which times and which intervals these methods might be employed.

Surveys: **Broad, fine or cross-field surveys** like the SED, SDR, OECD/UNESCO Institute for Statistics/Eurostat Careers of Doctorate Holders project in Europe (Auriol, 2010), Graduate Careers Australia's (2012) Postgraduate Destinations survey, and those issued by disciplinary societies like the American Mathematical Society (2014) or by the Arts and Humanities Research Council (UK) (Renfrew & Green, 2014), provide even, comparable data; current information; and the large response pools give a "big picture" state of field. They can, however, present challenges in finding and maintaining contact information databases and securing funding for multiple surveys over time. Achieving high response

rates can be extremely difficult since individuals do not always feel incentivized to participate. Furthermore, the data captured through this method are not as relevant for individual graduate programs and departments because they cannot speak to the specific situation of each institution or program.

In contrast, **alumni surveys** of PhDs reach targeted groups and provide information relevant to individual programs, therefore sometimes making it easier to justify funding. They also potentially benefit from pre-existing institutional loyalties that may serve to increase response rates. However, depending on the unit administering the survey (e.g., academic department, college, alumni services, career services), the information collected may be decentralized, difficult to access, and may not be used specifically to improve academic programs. The data are also unlikely to be comparable across departments and institutions due to different types of categorization and uneven collection of information relating to academic and nonacademic career pathways.

Different ways data are collected for PhD pathways

	BENEFITS	CHALLENGES
SURVEYS:		
Broad, fine or cross-field surveys	Provide even, comparable data; Current information; Large response pools	Building and maintaining information databases; Funding multiple surveys over time; No incentive for respondents
Alumni surveys	Information relevant to individual programs; Pre-existing institutional loyalties serve to increase response rates	Decentralized information, difficult to access; Unlikely to be comparable across departments and institutions without a common instrument
Crowd-sourced online surveys	Cost-effective; Requires minimal time commitment; Reach a range of PhDs at different points of their careers	Samples can be skewed towards a particular population; Difficult to capture respondents' careers over time
Employer-centered approaches	Offers general information; Specific suggestions for improving programs in different disciplines and across disciplines	Unable to follow up with individual PhDs over time, does not capture the full range of PhD careers; Inaccurate picture of the full range of PhD careers
PUBLICLY-SOURCED SOLUTIONS:		
Student and alumni information management systems	Can comprehensively trace student progress from matriculation to career; Basic demographic information is already available	No built-in incentive for alumni to log in; Expensive to maintain
Social media	Freely-available information online; Increasing numbers of alumni are locatable; Cost-effective	Information is not necessarily accurate or current; Time-consuming and requires staff resources; Information limited by what is publicly available; Raises privacy concerns
State unemployment records	Large datasets of unit records	Does not capture students who found employment out of state;

Crowd-sourced online surveys of PhD-holders offers a solution that is extremely cost effective and requires a relatively minimal time commitment. They also have the potential to reach a broad range of PhDs at different points of their careers. However, depending on where the survey is hosted, samples can be skewed towards a particular population. For example, *The Chronicle of Higher Education* announced plans for a PhD Placement project and launched an initial survey housed on their website (Holdaway, 2013). Because readers of *The Chronicle* are more likely to work in higher education, the results from this effort will likely over-represent the academic sector. Further, aggregated data is of little use to individual programs, and the usually anonymous, one-time nature of the surveys makes it more difficult to capture respondents' careers over time.

Employer-centered approaches offer the potential to form a picture of the workforce preparation of PhDs in general. They may offer specific suggestions for improving programs in different disciplines and across disciplines. This method too, suffers from an inability to follow up with individual PhDs over time, and a desire to target employers with large numbers of PhD employees risks not capturing the full range of PhD careers. For example, the newly-announced Early Career Doctorates Project from the National Center for Science and Engineering Statistics, NSF, will reach out to recent PhDs through key employers of doctorate-holders such as universities and national laboratories. This approach will capture a very large swath of the (STEM) PhDs working in the US economy, but will not be able to give an accurate picture of the full range of careers PhDs pursue, particularly in the humanities and social sciences (National Science Foundation, 2013).

Publicly-Sourced Solutions: More integrated methods at the university level such as the use of **student and alumni information management systems** offer some solution to the decentralized model in their ability to comprehensively trace student progress from matriculation to career. Alumni are often already familiar with such systems from their experiences as students, they have already given their consent, and basic demographic information is already available to administrators seeking to analyze responses and/or use of the system. Despite these benefits, there is often no built-in incentive for alumni to log in once they've graduated, and systems can be difficult and expensive to maintain.

Since some alumni cannot be enticed to report back to their alma maters, some institutions have attempted to search for alumni via popular **social media** sites such as LinkedIn, Facebook, and Twitter, and through Google search engines for personal websites and curricula vitae. The benefits to this method include its use of the often freely-available information online and eliminating the necessity of soliciting responses from alumni. With the increased use of digital and social media, increasing numbers of alumni are locatable via this method. Additionally, transcript verification services and digital credentialing—especially when used in conjunction with social media platforms such as with LinkedIn's "direct-to-profile certifications"—may someday soon offer institutions another way of more easily finding their alumni and verifying their information. For some smaller programs, this method remains the most cost-effective way of keeping tabs on alumni.

However, using social media in this manner risks that the information contained in online profiles is not necessarily accurate or current (Patton, 2012). Locating the best information for thousands of alumni online is time-consuming and therefore requires staff resources that are not always readily available. Furthermore, the information collected is limited by what is publicly available and would not render complete or comparable data. This type of data mining also potentially raises privacy concerns.

Mining **public databases** such as state unemployment records has recently been gaining currency as a method of collecting employment outcomes. States can provide institutions with large datasets of unit records that can give a large picture of student employment rates and salary over time. Institutions such as the University of North Carolina system recently leveraged the North Carolina state records into a guide for current and prospective students about the value of their degrees with their "UNC Data Dashboard" (<http://www.northcarolina.edu/content/unc-data-dashboard>). Another example of this kind of tool is University of Texas's SeekUT database (<http://www.utsystem.edu/seekut/>). One main weakness of this approach is that it does not capture students who found employment out of state, but some

organizations—most notably the Western Interstate Commission for Higher Education—have been able to pilot data-sharing across state lines. To ensure that student-level data is handled responsibly, this effort employed “legally compliant data sharing agreements” that observe the requirements of the Family Educational Rights and Privacy Act (FERPA) (Prescott, 2014).

Each method therefore presents its own challenges of execution. One of the main issues with efforts to understand PhD career pathways is the lack of a national set of standards and instruments that programs, schools, or departments might use to collect, disseminate, and use this information. For example, studies may be longitudinal, cross-sectional, or retrospective cross-sectional. A longitudinal study, which follows an individual or group over time, may be used to establish causation, but can be costly and time-consuming. A cross-sectional study, capturing snapshots of groups, might be easier to operationalize, but cannot map career transitions. One challenge is to decide on the optimal mix of mechanisms for information gathering and structuring of that gathering over time.

Administrative Challenges

Maintaining accurate records of contact information, increasing response rates, managing expenses, and allocating staff time are just some of the barriers to comprehensive data collection. Data management considerations (e.g., data sources, ownership, security, etc.) can also prompt administrators to throw up their hands and decide this work is easier left undone. Understandably, administrators tasked with complying with state and federal outcomes reporting, alongside accreditation burdens and program review might be loath to add another data collection effort to their plates. The issue of accountability fatigue should not be taken lightly. If, however, institutions approach career outcomes reporting as an (internally-motivated) integral part of program improvement rather than an (externally-motivated) accountability measure, their efforts are more likely to succeed.

Internal Political Challenges

Many challenges confront campuses attempting to collect long-term PhD career pathways information, but the most immediate are sometimes political. Questions often exist about which institutional unit should collect this PhD career pathways information, maintain contact records, or analyze the resulting data. As outlined above, many different campus units might have some stake in the project of collecting PhD career pathways information. This may also result in ambiguity and disagreement about which factors to consider or methods to pursue. Considerations about the differences among disciplines may cause conflicts. An important aspect of this project is to build consensus, partnerships, and political will to prioritize this activity.

Administrators and faculty may also be wary of the potential indirect consequences of doing this project such as the use of the data to discredit or close programs. Institutions must be aware of and manage these consequences in any data collection effort, with the understanding that it is always better to know. The potential benefits obtained through a comprehensive PhD career pathways data collection effort may outweigh any negative considerations. A wide variety of constituencies could benefit from the collection of PhD career pathways data, including institutions, students, and society as a whole. In addition, the potential dangers of inaction render it absolutely essential to attempt to pursue the ambitious goals outlined in this project.

III. Next Steps in Understanding PhD Career Pathways

Summary of Workshop

The final component of this feasibility project was a two-day workshop held in September 2014 that convened a range of stakeholders to discuss issues concerning PhD career pathways. Participants included graduate deans whose institutions have initiated data collection efforts and those that have not; researchers from major studies on career tracking such as Sharon Brucker and Bruce Weinberg; representatives of disciplinary societies such as the Modern Language Association of America and the American Psychological Association; experts from federal agencies; and recent PhD graduates.

CGS structured the workshop to make maximum use of the range of expertise represented by the attendees. The first day featured short presentations (five-to-twenty minutes each) by participants from diverse backgrounds. After an introduction by CGS President Suzanne T. Ortega and the project funders, the CGS project team presented a summary of the white paper and their research questions. Then followed an exercise in which participants were encouraged to contribute their own ideas about what information would ideally be available to them, describe the current state of data collection and usage, and brainstorm how to bridge the gap between current realities and their aspirations. Presentations by researchers and methodologists, graduate deans, the National Science Foundation, and PhD candidates and recent PhDs completed the first day's program.

With these different perspectives in mind, participants separated into two groups for the second day of the workshop. Split into breakout groups by disciplinary affiliation (STEM or humanities/social science), workshop attendees tackled some of the most challenging questions related to the issue of tracking PhD career pathways, such as: Do any existing data sources already provide the necessary information? If not, who should be responsible for collecting, analyzing, and aggregating these data? What variations exist by discipline that might require different data collection mechanisms? Where do ABDs fit into this discussion? Finally, the full group reconvened to share perspectives and lessons from the broad disciplines as well as possible solutions to these questions. In this final session, the diverse groups in attendance reached consensus on a number of key points:

1

Gaps remain. Institutions and programs need information on the long-term career pathways of their own PhD alumni.

2

Common standards are needed. Narrowing these information gaps will require common definitions, processes, and a set of core questions for collecting program-level data.

3

National leadership is needed. A centralized national organization should take the lead in developing these standards for data collection and use.

4

Disciplinary diversity can be accommodated. The types of information collected need not require different instruments or standards for different disciplinary fields.

Gaps Remain

Although some PhD career pathways information is already collected, much of the conversation at the workshop focused on the current gaps in available data. The gaps seemed to fall into two broad categories: gaps in program- and institution-level data and gaps in national data. These categories were not seen to be mutually exclusive; rather, participants expressed an optimism that program-level numbers could feed into a national dataset if the common standards and procedures were developed.

Representatives of graduate schools at the workshop expressed the need to understand the long-term career pathways of their own PhD alumni. Graduate deans indicated that closing these gaps would enable them to more effectively change cultures, develop missions, improve programs, and advocate for the importance of graduate education. A barrier was identified in certain institutional and disciplinary cultures that value academic career outcomes over others or that resist data collection on career outcomes. In particular, workshop attendees called for a system that would disaggregate what has been traditionally treated as a broad “other” category—those careers that unfold beyond the academy. Participants felt this category was “just too big” to be useful, and needed to be dissected in a consistent, meaningful manner. Overall, graduate deans expressed a desire for a high level of detail about their graduate students—their career satisfaction and happiness, the nature of their support in graduate school, their rates of participation in certain programs, what alumni might still want from graduate schools, long-term salary data—but recognized that any program-level data would be preferable to none.

All participants agreed that a huge gap in knowledge exists about students who leave an institution completing “All [requirements for a PhD] But Dissertation” (ABD). The issue of ABDs elicited many strong opinions, ranging from those who felt that any accurate assessment of graduate education must necessarily include this population to those who believe that ABDs should not figure into a study of PhD career pathways because they did not complete the degree. The lack of information on ABDs was also linked to the lack of information about current students’ individual career decision-making processes and how graduate programs might be able to support them in their career planning.

Another major theme running throughout the conference was a desire to demonstrate graduate outcomes in relation to institutional missions, e.g., measuring graduates’ contributions to the “public good.” This was identified as one of the most glaring of information gaps, and one that was critical to fill in order to make the case for the strong intellectual and economic contributions of graduate students to local and national contexts. Questions remain as to how best to measure public good indicators. Would career pathways information be sufficient, or would subsequent projects be needed to capture such variables as research’s social impact, PhDs’ civic participation rates, or their contributions to job creation? Making the case for the public good of graduate education, while highly relevant in local contexts, was seen as a national goal.

Participants agreed that much is already known about STEM PhD careers at the national level, thanks in large part to the SDR. The exclusion of humanities fields from that survey, however, renders our understanding of career pathways incomplete. The humanities/social science breakout group emerged with a commitment to advocating for reinstating humanities fields into the SDR. Certain workshop participants indicated that no matter how good the data are at the national level, nothing will change unless faculty understand the status of their program’s own students, which requires data collection at the level of the institution.

Common Standards Needed

Narrowing these information gaps will require common definitions, processes, and a set of core variables for collecting program-level data that can be used to shift institutional cultures, inform programs, and demonstrate the value of graduate education. Echoing the findings from the survey of graduate deans, the workshop speakers lamented the reality that different data collection efforts serve different purposes, often resulting in overlapping, and sometimes duplicative efforts. Laboring in isolation causes institutions to grapple alone with challenges that affect everyone, resulting in inefficiencies.

Those institutions that have developed and sustained a survey of graduates are rare. Because of the large up-front costs of developing an instrument and collecting alumni contact information, many institutions have only been able to shepherd resources for a “one shot” picture of the careers of their alumni population. Michael Roach, the J. Thomas and Nancy W. Clark Assistant Professor of Entrepreneurship at Cornell University, suggested in his remarks that a common set of definitions developed by a central national unit would decrease costs. This idea was echoed by graduate deans, who indicated it would remove a major barrier for institutions that desire to collect these data. One participant suggested the creation of “a set of absolutely core questions, with the ability of institutions to modify and add on” to the survey their own questions to delve deeper into institution-specific contexts. The AAU and the NIH Broadening Experiences in Scientific Training (BEST) survey instruments and procedures were offered as models for what this might look like.

Workshop participants recommended that processes for data collection be built into an already-existing structure to increase faculty motivation, reduce administrative burden, and enhance cost-effectiveness. A few suggestions offered were graduate program review, alumni events, AAU data collection efforts, and institutional or program accreditation procedures. Attendees also expressed concern that any new strategies be integrated into existing data collection efforts so as not to “reinvent the wheel” or fatigue survey respondents.

One suggestion that emerged was to enhance the role of current students in institutions’ quest for better alumni data. Engaging students early and often in surveys designed to gauge their thinking about careers would send signals that:

- 1 Students should begin considering careers early in their doctoral programs;
- 2 The institution is concerned with students’ career development; and
- 3 Information about student career choice is valued information for the institution.

Particularly if students could see their responses being used and acted upon in concrete ways (e.g., letting students know that the results of the surveys inform professional development offerings), they are more likely to continue to remain engaged in this “conversation” with institutions after graduation.

An additional benefit to this early intervention is a database of information on the career considerations of ABDs and the ability to compare those to completers.

National Leadership Needed

Workshop participants strongly recommended a centralized national organization take the lead in developing these standards for data collection and use. It would be inappropriate for any single institution to develop standards for the rest of the country, but an independent organizational body with both the authority and the expertise to develop and promulgate the standards might appropriately provide leadership. A number of workshop participants viewed the Council of Graduate Schools’ position as a promising one to play this role. According to Melanie Sinche, Senior Research Associate in the Labor and Worklife Program at Harvard Law School, “[t]he Council of Graduate Schools seems uniquely poised at this moment to take a leadership role by developing a system to collect comprehensive data on Ph.D. career pathways. Given the overwhelming support that I observed [at the workshop], I am hopeful that CGS will initiate action around this endeavor” (2014). As the only national organization dedicated solely to the advancement of graduate education, CGS has the experience, networks, and authority to guide the development of Best Practice models in this area.

Disciplinary Diversity Can Be Accommodated

The different disciplinary sessions separately concluded that the types of information collected need not require different instruments or standards for different disciplinary fields in terms of placement and outcomes. Although the different disciplines tend to result in different career pathways, participants felt that the need for some baseline information superseded any disciplinary differences that might arise in an attempt to collect career pathways information. Discussions resulted rather in a recommendation that any survey instrument distributed to alumni by universities include many diverse options for describing positions beyond “faculty” and “non-faculty.” In other words, surveys should consider a wide range of possible career paths, including those in laboratories, in community colleges, nonprofits, government, military, etc. in order to provide a fuller picture of alumni careers across disciplines.

This recommendation was founded not only on a sense of the mutual need for basic alumni information across fields but also an understanding that different disciplinary training cannot predict a certain career pathway. For example, a growing number of PhDs in the social sciences and humanities accept postdoctoral appointments (National Science Foundation, 2012, p. 11). Jeff Groen, a research economist at the US Bureau of Labor Statistics, also presented some background for this recommendation. He made a strong case for the development of meaningful categories. His own research experience with the Mellon Foundation’s Graduate Education Improvement Initiative (GEI) found that options limited to academic versus nonacademic careers, for example, did not provide enough information. Not only that, but he found survey respondents to be sensitive to wording that seemed to distinguish different types of positions by their status (e.g., valuing the tenure-track). He cautioned that biased language can impact response rates. Groen suggested the development of a glossary of terms to standardize responses (e.g., does “faculty” include contingent appointments? Are you “unemployed” if you only work part-time?). Others supported this idea that any data collection effort should reject preexisting value judgments and focus rather on accuracy.

Possible Solutions

While the above three sections represent the main group recommendations of the workshop, a number of fresh ideas emerged from conversations that do not fit neatly into these categories, but should inform any future effort to collect PhD career pathways information. Participants advanced possible solutions for common challenges in collecting PhD career pathways information.

Building communications strategies. Broad consensus existed on the need to share PhD career pathways information with relevant stakeholders. The limits on resources and time, however, often prevent institutions from developing intentional strategies for communicating with key groups. Potential and current graduate students, faculty, provosts, employers, and policymakers—all these groups will benefit from different information presented in different ways. The need emerges, therefore, for institutions to develop a communications plan for disseminating any collected information. Should some information remain internal? What medium or media make(s) sense for communicating with a given group? What is the communications timeline? These questions and others should be answered by individual graduate schools before data collection efforts are finalized.

“The Council of Graduate Schools seems uniquely poised at this moment to take a leadership role by developing a system to collect comprehensive data on Ph.D. career pathways. Given the overwhelming support that I observed [at the workshop], I am hopeful that CGS will initiate action around this endeavor” (2014).

– Melanie Sinche

Improving response rates. Relatedly, one strain of conversation at the workshop treated the challenge of increasing response rates to alumni surveys. One participant shared that her institution has folded alumni career surveys into a larger strategy for increased alumni engagement (paired with bringing alumni to campus for special events). Another suggested that because PhD alumni are uniquely interested in the pursuit of new knowledge, they will be more likely to respond to surveys if they know the research question. In other words, doctoral degree holders are more likely to respond if they feel they are participating in a research project in collaboration with the university. Others made the point that survey response rates improve when PhD alumni understand how the data will be used. The negative impact of coupling alumni research with pleas for alumni giving was raised. Another related point mentioned was the need for special considerations when collecting data on underrepresented groups such as first-generation graduate students, ethnic and racial minorities, women, and students/graduates with disabilities.

Starting with students. As mentioned above, another potential solution proposes to begin data collection with current students—a “captive audience”—and continue to engage those students as alumni. When coupled with an alumni engagement strategy, this solution has some significant potential benefits. For one thing, a student survey itself could act as an intervention, alerting students to the need to consider their career development early and often. For another, the large student dataset would allow for longitudinal tracking over time as well as a comparative pool of information on noncompleters of the PhD (ABDs). Student polls might also provide space for students to reflect on the training they are receiving and allow programs to be more responsive to immediate feedback if certain program elements prove ineffective. They could also alert students to existing early career planning tools such as *My IDP* (Fuhrmann, Hobin, Lindstaedt, & Clifford, 2011, 2014).

Remaining Challenges

From the difficulties of true longitudinal tracking (perhaps requiring unique identifiers) to determining correlation between program elements and career success, tough intellectual questions abound. Efforts to identify, measure, and collect information on the public value of graduate education also remain elusive. Perhaps most difficult is the task of shifting institutional and departmental cultures to make career pathways data collection a priority. Notably, some participants cautioned that the National Research Council and ranking agencies’ reliance on tenure-track first-time placements in determining prestige have a chilling effect on efforts to value non-academic careers. These are challenges institutions will continue to face individually and collectively.

IV. Conclusion

Although demonstrating a desire to collect career outcomes at the graduate level over the long term, institutions face challenges that sometimes hinder the collection of longitudinal PhD career pathways information. However, similar barriers existed with the collection of PhD completion information. Before it became standard practice for graduate schools to collect statistics on completion, attrition, and time to degree of graduate students, institutions recognized the need but suffered from a lack of standard definitions and procedures. For example, when CGS began to address the problem of doctoral persistence and attrition, there were no set standards as to what constituted attrition, how to account for transfer students, or even what constituted an entering cohort. CGS-led initiatives reduced these barriers through the development of best practices for the collection of these data. After 10 years of projects to implement standard measures, not only do many graduate schools share a system of documenting completion and attrition across all fields, but CGS has identified specific practices such as offering summer support and hosting pre-enrollment campus visits that lead to increased completion at both the master's and doctoral levels.

The metrics for assessing PhD completion are also used by external organizations to measure the quality of doctoral programs. The National Research Council included completion measures in its large-scale assessment of PhD programs, and associations of institutional researchers continue to work on refining graduate completion measures. This record of success suggests that a similar outcome might be expected in a PhD career pathways project that seeks to: 1) change cultures of research universities to be more conducive to collecting systematic and complete career information on their students and alumni, 2) inform programs, and 3) demonstrate the value of doctoral education to the public at the local, state, and national levels as well as to individual careers.

Potential Value to Institutions

The collection of reliable, comparable, long-term PhD career pathways information could serve as an invaluable resource to institutions as a whole, and to graduate schools in particular. Ultimately, using career pathways information to improve programs has the potential to move the conversation away from the idea of the “overproduction” of PhDs to considering the degree a credential useful across job types and throughout a lifetime. This information could serve as a useful metric for benchmarking and assessment of PhD programs (Council of Graduate Schools, 2012; Davidson-Shivers, Inpornjivit, & Sellers, 2004; Gaebel, Hauschildt, Mühleck, & Smidt, 2012). While useful for informing professional development efforts, these data might also affect the way institutions structure dissertations (e.g., providing opportunities for collaborative or multimedia dissertations, which might have value in a range of contexts). While a question that remains is how public these data should be, one possible benefit to public data would be programs' ability to benchmark their career outcomes records alongside those of peer institutions. These numbers could be used in marketing individual programs or the graduate school as a whole to potential students. Programs may even discover that they serve a niche market of students entering certain types of careers, and thus be able to attract more of these promising students.

With better information available, prospective graduate students would have a better understanding of the potential fit between their career ambitions and programs they are considering, as well as a more comprehensive view of their career options after graduate school (CGS and ETS, 2012; National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, 1995; Sauermann and Roach, 2012). Students considering a doctoral program might view it as a valuable credential for a variety of sectors. Program choices would be better aligned with career goals, mutually benefiting student and program. Better fit, alongside better career information, has the potential to result in lower attrition rates, and possibly even reduced time to degree (Woodrow Wilson National Fellowship Foundation, 2005, p. 6). Current students would benefit from improved programs and mentorship, and hopefully be better prepared for the full range of professions they enter in the sector of their choice. Knowing that the PhD is a valuable credential in a variety of sectors, students also may be less reluctant to leave the “low but safe economic state” of graduate school for an uncertain job market (Woodrow Wilson National Fellowship Foundation, 2005, p. 6).

When faculty better understand the impacts and potential impacts of graduate programs on their students' career trajectories, they will be able to better mentor their students. This information is essential for building faculty support for initiatives such as professional development programs and broader skills training, which are often perceived to compete with the deep disciplinary training that characterizes the PhD. It is well documented that faculty usually most strongly encourage research faculty careers (Golde and Dore, 2001; Sauermann and Roach, 2012; Monk, Foote, & Schlemper, 2012; Wulff and Nerad, 2006). Making career pathways information available might begin to spur a culture change where faculty value success in a range of career paths, opening the door for students who desire the intense immersion in an academic subject without plans for pursuing a faculty career.

Potential Dangers of Inaction

Understanding the various career pathways taken by PhDs could help make the case for the importance of graduate education as a public good. It would remove the opacity now surrounding the diverse careers of PhDs, and enable policymakers and the public at large to recognize the contributions of PhDs in a wide variety of sectors.

Current state-level and national policy discussions generally distinguish between *placement*, usually the first job upon degree completion, and *careers* or *pathways*, which denote a longer-term view, as described above. Because first-time placement is easier to capture than career path information, higher education institutions—particularly at the undergraduate level—tend to favor this method of outcomes assessment. Conversations about how to collect, share, and disseminate placement information are taking place at the state and national levels, led much of the time by state education agencies (United States Government Accountability Office, 2010). The current discussion of career outcomes in the US policy context is driven by a variety of goals, including the desire to ensure that students can pay for their educations and successfully contribute to the economy.

Another major driver is the desire to ensure that students and governments are receiving an appropriate return on the substantial investments that they make in higher education. This goal has resulted in increased measures from federal and state governments aimed at increasing accountability and transparency at higher education institutions in the US, especially at the undergraduate level (for example, initiatives such as the President's scorecard and the Commission on the Future of Higher Education). The measurement of employment outcomes is included in this push for accountability since it is considered both a key measure of program quality and an indicator of the value of education to the economy. This push is more forceful for public institutions that receive funding from their states, since states are placing increasing pressure on institutions to demonstrate the value of their investments.

With the proposal of the White House's college rating system, the pressure on universities to collect career pathways information and to take the lead in interpreting that information is more urgent than ever. While these requirements have not yet been extended to graduate programs specifically, this extension remains a real possibility. This threat has been increasing alongside concern over growing student debt burdens, particularly for "graduate students," which in recent policy discussions is often used as a blanket term for all post-baccalaureate students, including professional students (Akers and Chingos, 2014; Delisle, 2014). Increased attention to the idea of a federal student record system and the possibility of linking state systems demonstrates the will on the part of lawmakers, certain nonprofit groups, and government agencies to provide transparency to students and citizens with regards to educational outcomes on a large scale (McCann and Laitnen, 2014; United States Department of Education, 2006; United States Government Accountability Office, 2010). Given this climate, it is essential that graduate schools and universities take the lead in developing their own modes of measurement and assessment, and understanding how resulting data can be most effectively used.

Graduate school leadership in this area is important for several reasons. First, graduate schools offer distinct expertise on the practical challenges of collecting data on the career pathways of PhD alumni. This expertise is critical for ensuring that the most useful data are being collected, that institutional resources are effectively marshalled in support of data collection efforts, and that the resulting data can

be meaningfully used to improve programs. A “one size fits all” approach to collecting career outcomes data, or one modeled on previous studies of undergraduate career outcomes, could result in costly investments of time and resources with little meaningful return for students and programs.

The second reason it is important for graduate schools to take the lead in this area is to support the engagement of their communities—including faculty, students, and the campus units that may ultimately be involved in the collection of data—in efforts to better understand PhD career pathways. Graduate deans are proven coalition builders who can reach across campus units to enact change. For a meaningful national conversation to take place on this topic, it will be critical to secure the input and involvement of the groups most directly concerned by new efforts to understand PhD career pathways. Deans have access to all of these groups, as well as the motivation to prioritize this issue so that it remains at the top of the list of competing priorities.

In conclusion, many questions remain unanswered with regard to the career pathways of PhD holders. Although a variety of challenges exist, the benefits of knowing more about the true career pathways of PhD holders may be worth the effort to collect that information. With such varied stakeholders, however, it is important that data collection efforts be clear about the purposes for which the data would be used, and reasonably sure that the chosen methods will yield data suited to these purposes.

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Appendix A.

Preliminary Gap Analysis

CGS reviewed over 100 existing domestic and international survey instruments to explore the state of data collection in this field, a foundational first step that can inform future efforts to develop common definitions, processes, and core questions in PhD career data collection. Six surveys in particular, which were frequently mentioned during the course of this project (Early Career Doctoral Survey, AAU Data Exchange, Humanities Indicators, Survey of Doctoral Recipients, Survey of Humanities Doctorates, and Survey of Earned Doctorates) are briefly summarized below to identify preliminary gaps in what is known nationally about the education and career pathways of PhD students.

	Early Career Doctoral Survey (NSF)	Data Exchange (AAU)	Humanities Indicators (AAAS)	Survey of Doctoral Recipients (NSF)	Survey of Humanities Doctorates (NEH)	Survey of Earned Doctorates (NSF)
Perspective	Alumni	New grads	New grads	Alumni	Alumni	New grads
Fields of study	All	All	Humanities	STEM	Humanities	All
Data source	Institution & individuals	Individuals	National data & institutions	Individuals	Individuals	Individuals
Most recent data available	pending	ongoing	2010–2012	2013	1995	2012
Variable Clusters						
General information. Variables include, but are not limited to, completion rates, median time-to-degree, department size, sources of financial support, etc.			✓			
Career. Variables include, but are not limited to, topics such as career development experiences, the relationship between doctoral training and current work, etc.	✓					
Degree. Variables include, but are not limited to, topics such as details about the degree, specific fields, cumulative debt, etc.	✓	✓		✓		✓
Demographics. Variables include, but are not limited to, topics such as citizenship, race, marital status, etc.	✓	✓		✓	✓	✓
Education. Variables include, but are not limited to, topics such as the student experience including level of educational preparation, obstacles to success, participation in professional development opportunities, etc.	✓	✓			✓	✓
Other. Variables include, but are not limited to, topics such as contact information for follow-up, preferred future survey mode, willingness to participate in future surveys, etc.	✓			✓		
Postgraduate plans. Variables include, but are not limited to, topics such as postgraduate plans, employment sector, etc.		✓				✓
Reflection. Variables include, but are not limited to, topics such as whether or not a student would follow the same path if they could do it over again.		✓				
Work. Variables include, but are not limited to, topics such as academic positions held, current employer information, salary, etc.	✓			✓	✓	✓
Work-life. Variables include, but are not limited to, topics such as activities completed between graduation and work, extended time off, feelings about current position, etc.	✓					

Appendix B.

Survey Instrument, CGS Survey of Graduate Deans

QUESTIONNAIRE

Welcome

The Council of Graduate Schools (CGS) is conducting a feasibility study to ascertain the viability of collecting career information about PhD graduates in humanities, social sciences, and STEM fields and using such information to inform program improvement. As a representative of a doctoral-granting CGS-member institution, you have important insights to contribute to this effort.

- Questions will inquire into current formal efforts to collect and use PhD career information
- You will also have an opportunity to describe PhD career information gathering efforts that are either exemplary or in the planning stages

Information collected by this survey will remain confidential. Data will be reported in aggregate in ways that do not attribute their origins to any contributing individual or institution.

Thank you in advance for your contribution to this important effort. Please click “NEXT” to begin the survey.

Background

Take a moment to think about CURRENT formally established standards, processes, and procedures for collecting PhD career information AT YOUR INSTITUTION, excluding the NSF Survey of Earned Doctorates (SED) or any other federal career information survey.

Examples of PhD career information might include employment status, salary and compensation, employer information, and/or career satisfaction, among many others.

- 1) Do you or does someone at your institution currently collect PhD career information using formally established standards, processes, and procedures?
 - ☐ Yes, PhD career information is collected using formally established standards, process, and procedures [Skip to Q2]
 - ☐ No. Although PhD career information is collected by the institution, it is collected INFORMALLY [Skip to Q18]
 - ☐ No, PhD career information is NOT collected at this institution [Skip to Q28]

Graduate School

Institutions may collect PhD career information using a centralized approach, a decentralized approach, or a combination of both centralized and decentralized approaches. The next series of questions will ask you to briefly describe some of the characteristics of formally established standards, processes, and procedures for collecting and using PhD career information using each of these approaches.

- 2) Does the graduate school coordinate a CENTRALIZED PhD career information data collection effort?
- ☐ Yes [Skip to Q3]
- ☐ No [Skip to Q9]

Career information is commonly gathered either immediately upon graduation (i.e., First-placement) using an exit survey, for example, or several years after graduation (i.e., subsequent-placement) using an alumni survey or other method.

- 3) Using the table below, indicate which TYPES of PhD career information are collected CENTRALLY by the graduate school as part of formally established standards, processes, and procedures for both first-placement and subsequent-placement domains. (Select all that apply.)

	First-placement	Subsequent-placement
Employer information (e.g., employer sector, name, location)		
Occupation information (e.g., title, roles, responsibilities, f/t, p/t)		
Compensation information (e.g., salary, benefits)		
Professional accomplishments (e.g., publications, awards, research)		
Satisfaction information (e.g., job, career, academic preparation)		
Personal information (e.g., demographics, goals)		
Unsure [ANCHOR TO BOTTOM OF THE LIST]		
Other (please specify)		

Graduate School

- 4) Which of the following METHODS are used CENTRALLY by the graduate school as part of formally established standards, processes, and procedures to collect PhD career information? (Select all that apply.) **[RANDOMIZE]**
- ☐ Surveys
 - ☐ Interviews
 - ☐ Student or alumni information management system/portal
 - ☐ Reports/data from alumni affairs or career services offices
 - ☐ Reports for program evaluations
 - ☐ Unsure **[ANCHOR TO BOTTOM OF THE LIST]**
 - ☐ Other (please specify)
- 5) From which of the following SOURCES are PhD career information collected CENTRALLY by the graduate school as part of formally established standards, processes, and procedures? (Select all that apply.) **[RANDOMIZE]**
- ☐ Students
 - ☐ Employers
 - ☐ Faculty (including program directors)
 - ☐ Institutional researchers
 - ☐ Departmental reports
 - ☐ Alumni affairs or career services offices
 - ☐ Online search of social media sources
 - ☐ Unsure **[ANCHOR TO BOTTOM OF THE LIST]**
 - ☐ Other (please specify)

Graduate School

- 6) Which of the following best describe the PURPOSES for which PhD career information, collected CENTRALLY by the graduate school as part of formally established standards, processes, and procedures, are used by the graduate school? (Select all that apply.) **[RANDOMIZE]**
- ☐ To inform program review, assessment
 - ☐ To inform and/or recruit prospective students
 - ☐ For accountability
 - ☐ To fulfill accreditation requirements
 - ☐ For general program improvement
 - ☐ To inform professional development offerings
 - ☐ To inform academic program content and quality
 - ☐ To provide information to faculty
 - ☐ For media, public information
 - ☐ To provide information to policymakers
 - ☐ Unsure **[ANCHOR TO BOTTOM OF THE LIST]**
 - ☐ Other (please specify)
- 7) Generally speaking, HOW SATISFIED ARE YOU with your ability to collect PhD career information, as collected CENTRALLY by the graduate school as part of formally established standards, processes, and procedures?
- ☐ Very satisfied
 - ☐ Generally satisfied
 - ☐ Somewhat dissatisfied
 - ☐ Very dissatisfied
- 8) Generally speaking, HOW SATISFIED ARE YOU with your ability to use PhD career information, as collected CENTRALLY by the graduate school as part of formally established standards, processes, and procedures?
- ☐ Very satisfied
 - ☐ Generally satisfied
 - ☐ Somewhat dissatisfied
 - ☐ Very dissatisfied

Another Central Office

- 9) Is there a CENTRALIZED PhD career information data collection effort coordinated by another central office that is NOT the graduate school (e.g., alumni affairs, etc.)?

☐ Yes [Skip to Q10]

☐ No [Skip to Q18]

- 10) What office leads this effort? Examples might include the Alumni Affairs Office, Provost's Office, etc. If there are multiple CENTRALIZED efforts to collect PhD career information at your institution, please identify the ONE effort that you feel is exemplary.

Please answer the following questions with this ONE particular centralized effort in mind.

- 11) Using the table below, indicate which TYPES of PhD career information are collected CENTRALLY by this office as part of formally established standards, processes, and procedures for both first-placement and subsequent-placement domains. (Select all that apply.) If you do not know what types of information are collected, check "unsure."

	First-placement	Subsequent-placement
Employer information (e.g., employer sector, name, location)		
Occupation information (e.g., title, roles, responsibilities, f/t, p/t)		
Compensation information (e.g., salary, benefits)		
Professional accomplishments (e.g., publications, awards, research)		
Satisfaction information (e.g., job, career, academic preparation)		
Personal information (e.g., demographics, goals)		
Unsure [ANCHOR TO BOTTOM OF THE LIST]		
Other (please specify)		

Another Central Office

- 12) Which of the following METHODS are used CENTRALLY by this office as part of formally established standards, processes, and procedures to collect PhD career information? (Select all that apply.) If you do not know what methods are used, check "unsure." **[RANDOMIZE]**
- ☐ Surveys
 - ☐ Interviews
 - ☐ Student or alumni information management system/portal
 - ☐ Reports/data from alumni affairs or career services offices
 - ☐ Reports for program evaluations
 - ☐ Unsure **[ANCHOR TO BOTTOM OF THE LIST]**
 - ☐ Other (please specify)
- 13) From which of the following SOURCES is PhD career information collected CENTRALLY by this office as part of formally established standards, processes, and procedures? (Select all that apply.) If you do not know the sources of information, check "unsure." **[RANDOMIZE]**
- ☐ Students
 - ☐ Employers
 - ☐ Faculty (including program directors)
 - ☐ Institutional researchers
 - ☐ Departmental reports
 - ☐ Alumni affairs or career services offices
 - ☐ Online search of social media sources
 - ☐ Unsure **[ANCHOR TO BOTTOM OF THE LIST]**
 - ☐ Other (please specify)
- 14) Are data generated by this office shared with the graduate school?
- ☐ Yes **[Skip to Q15]**
 - ☐ No **[Skip to Q18]**

Another Central Office

- 15) Which of the following best describe the PURPOSES for which PhD career information, collected CENTRALLY by this office as part of formally established standards, processes, and procedures, are used by the graduate school? (Select all that apply.) **[RANDOMIZE]**
- ☐ To inform program review, assessment
 - ☐ To inform and/or recruit prospective students
 - ☐ For accountability
 - ☐ To fulfill accreditation requirements
 - ☐ For general program improvement
 - ☐ To inform professional development offerings
 - ☐ To inform academic program content and quality
 - ☐ To provide information to faculty
 - ☐ For media, public information
 - ☐ To provide information to policymakers
 - ☐ Unsure **[ANCHOR TO BOTTOM OF THE LIST]**
 - ☐ Other (please specify)
- 16) Generally speaking, HOW SATISFIED ARE YOU with this office's ability to collect PhD career information?
- ☐ Very satisfied
 - ☐ Generally satisfied
 - ☐ Somewhat dissatisfied
 - ☐ Very dissatisfied
 - ☐ N/A
- 17) Generally speaking, HOW SATISFIED ARE YOU with your ability to use PhD career information collected by this central office?
- ☐ Very satisfied
 - ☐ Generally satisfied
 - ☐ Somewhat dissatisfied
 - ☐ Very dissatisfied
 - ☐ N/A

Individual PhD Program

18) Are there DECENTRALIZED PhD career information data collection efforts at your institution, such as those carried out by individual PhD programs?

- ☐ Yes [Skip to Q19]
- ☐ No [Skip to Q28]
- ☐ Unsure [Skip to Q28]

19) Using your best estimate, what percentage of PhD programs collect PhD career information? (Your best guess is fine.) _____%

Final Questions

[ALL RESPONDENTS WILL CONCLUDE WITH THE SAME FINAL 5 QUESTIONS]

20) Generally speaking, what are some BARRIERS TO COLLECTING PhD career information at your institution?

21) What are some CHALLENGES associated with using PhD career information at your institution?

Think for a moment about ONE exemplary PhD career information data collection effort conducted anywhere at your institution, regardless of whether or not it is a centralized activity, or a single effort conducted by a particular PhD program. It may have been one that you have already described in this survey.

22) What office leads this effort? Examples might include the graduate school, a particular college or department, etc.

23) What ATTRIBUTES make this particular PhD data collection effort exemplary?

24) What other information would you like to share with us regarding the collection of PhD career information at your institution? Please feel free to include information about efforts that are in the planning stages.

Final Questions

The NSF Survey of Earned Doctorates (SED) is a formally established census of all individuals receiving a research doctorate from an accredited U.S. institution every academic year.

25) Is the NSF Survey of Earned Doctorates (SED) administered at your institution?

- ☐ Yes, across all PhD programs
- ☐ Yes, across some PhD programs
- ☐ No
- ☐ Unsure

26) Does the graduate school use program placement data generated by the NSF Survey of Earned Doctorates (SED) to understand where graduate programs are placing students?

- ☐ Yes
- ☐ No
- ☐ Unsure

Thank you very much for participating in this survey.

The results will be analyzed this summer and incorporated into a report later this fall.

*** END SURVEY ***

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