



U.S. Department of Energy

Computational Science Graduate Fellowship: 1991–2016

A follow-up study of recipients and programmatic outcomes

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1. Introduction

This report is an update on a 2012 study, *The U.S. Department of Energy Computational Science Graduate Fellowship, 1991–2011: Programmatic Outcomes and Programmatic Impacts*.¹ This new study examines DOE CSGF recipients through an extended five-year period ending in 2016, and includes fellows’ outcomes and professional accomplishments, alumni’s employment locations and achievements, and recipients’ impact on national priorities through research and education.

As a nationally recognized program since 1991, the DOE CSGF is highly regarded for addressing the nation’s priorities by training the next generation of computational scientists. In particular, those priorities include expertise in high-quality computational skills to meet the increasingly complex challenges and demands of today’s innovation-driven knowledge society.

Krell Institute has administered the DOE CSGF on the DOE’s behalf since 1997. During its management tenure, Krell Institute has worked in concert with the DOE to navigate the changing science and technology landscape and address workforce needs. The DOE CSGF requires the talented students selected for the program to participate in multidisciplinary studies, at least one 12-week DOE laboratory research practicum, and an annual program review where fellows present their research for sponsor review.

In conducting this study, the following methods were used: (1) a survey of all DOE CSGF recipients, both current and past, dating back to the program’s inception in 1991; (2) interviews with a sample of alumni who completed the program between 2006 and 2013; and (3) an analysis of curricula vitae (CV) data collected from current fellows and alumni.

In this introductory chapter, we provide more background on the DOE CSGF program, its purpose, and its specific features. This is followed by a brief conceptual discussion of the field of computational science as a foundation for understanding the role and broader implications of the DOE CSGF relative to the purpose of this report and to the science, technology, engineering, and mathematics (STEM) workforce in general. The remainder of this chapter provides a brief overview of the methods and data sources used in conducting the study, followed by an outline of the contents of the report.

¹ https://www.krellinst.org/doecsgf/docs/DOE_CSGF_Longitudinal_Study_Final_2012.pdf

Background on the DOE CSGF Program

Sustaining national progress through scientific and technological discovery and innovation is paramount in preparing the country for challenges in scientific computing. Meeting these challenges requires a workforce with a range of expertise in applied sciences and computing. Accordingly, the DOE CSGF looks to develop the kinds of talent necessary to excel in this environment and further national needs.

More specifically, recruiting, developing, and sustaining a workforce with top-notch computational skills is a necessary goal for staffing and fulfilling the crucial roles of the national laboratories as well as for meeting increasing demands for such skills in other government agencies, academia, and in the private sector. In fact, there is a serious need for highly skilled and intellectually agile computational scientists who can support the fast-moving research environment the nation requires. To that end, the DOE has developed special initiatives aimed at keeping “a steady stream of bright and motivated new talent flowing into the DOE workforce” to ensure the scientific and technological success of the country.² Included among these initiatives is the DOE CSGF.

Established in 1991, the DOE CSGF program is in keeping with government recommendations for creating and maintaining a qualified and competitive STEM workforce as a national planning activity that is sustained, ongoing, and coordinated for continuing progress (Graham et al. 2004; Brody 2005; NAS 2005, 2010). In particular, the DOE CSGF supports doctoral students in the pursuit of “novel scientific or engineering discoveries” using high-performance computing (HPC) resources.³ It advocates taking advantage of innovations in emerging computing technologies to advance knowledge and practical applications. The DOE CSGF is especially on target since computational science has been described as essential to advances throughout society and deemed one of the most important technical fields of the 21st century.⁴

The DOE CSGF is defined within the Advanced Scientific Computing Research program’s mission “to discover, develop, and deploy computational and networking capabilities to analyze, model, simulate, and predict complex phenomena”⁵ Sponsored by two entities within the DOE, the Office of Science and the National Nuclear Security Administration, the fellowship is aimed at

² <https://energy.gov/jobs/services/students-recent-graduates>

³ From the DOE CSGF application.

⁴ https://www.nitrd.gov/pitac/reports/20050609_computational/computational.pdf

⁵ <http://science.energy.gov/ascr/about>

training scientists and engineers to meet U.S. workforce needs in computational science and engineering (CSE), and at building a larger CSE-based community across STEM fields.

The DOE CSGF is highly competitive, with qualified applicants far exceeding the number of available awards. (For example, in 2016, there were 364 applicants who vied for the 27 fellowship awards that were made that year.) As of 2013, eligibility is extended to senior undergraduate and first-year graduate students pursuing doctoral degrees in the physical, engineering, computer, mathematical, or life sciences.⁶ The DOE CSGF is open to U.S. citizens or permanent resident aliens who are planning full-time, uninterrupted study toward a Ph.D. at an accredited university in the United States. Selected doctoral students are provided support for up to four years of study. The fellowship screening and selection committees are composed of experts in related fields from academia, the DOE and other government agencies, and industry, and by former DOE CSGF recipients.

The DOE CSGF has four principal objectives:⁷

1. To help ensure an adequate supply of scientists and engineers appropriately trained to meet national workforce needs, including those of the DOE, in computational sciences.
2. To make national DOE laboratories available for practical work experiences for fellows ensuring cross-disciplinary experience in highly productive work teams.
3. To strengthen collaborative ties between the national academic community and DOE laboratories so that the multidisciplinary nature of the fellowship builds the national community of scientists.
4. To raise the visibility of careers in the computational sciences and to encourage talented students to pursue such careers, thus building the next generation of leaders in computational science.

The Field of Computational Science and Engineering

Computational science and engineering is an evolving field that entails “the innovative and essential use of high-performance computation, and/or the development of high-performance computational

⁶ Individuals who are employed may also apply for the fellowship, but they account for a very small percentage of applicants.

⁷ <http://www.krellinst.org/csgf/about-doe-csgf>

technologies, to advance knowledge or capabilities in a scientific or engineering discipline.”⁸ CSE is a multidisciplinary area with connections across many fields. It focuses on the development of problem-solving methodologies and robust tools for the solution of scientific and engineering problems and, arguably, will continue to play a dominating role for the future of the scientific discovery process and engineering design. CSE encompasses the systematic development and application of computing systems and computational solution techniques for modeling, simulation, and analysis of scientific and engineering phenomena. As HPC has emerged, CSE can be engaged to enable HPC applications and enhance science and engineering applications. Using HPC as an essential technology results in the nation’s need for further specialized workforce training.

To model complex systems, scientists and engineers develop computer programs and application software necessitating massive amounts of calculations, the execution of which are possible only via distributed computing platforms or on high-performance computers or supercomputers. As a multidisciplinary field, CSE can be engaged both to enable HPC applications to important domain-specific problems and to confront “grand-challenge” science and engineering applications. Accordingly, it can lead to insights that might not be possible if relying on more traditional theory or experimentation alone.

The role and purpose of CSE in this environment is one of next generation computing, supporting large-scale operations that cover “applications in science/engineering, applied mathematics, numerical analysis, and computer science. Computer models and computer simulations have become an important part of the research repertoire, supplementing (and in some cases replacing) experimentation. Going from application area to computational results requires domain expertise, mathematical modeling, numerical analysis, algorithm development, software implementation, program execution, analysis, validation, and visualization of results. CSE involves all of this.”⁹ More to the point, the DOE CSGF program was launched specifically to address the anticipated national demand for trained computational scientists.

Methods and Data Sources

In this section, we provide a brief overview of each of the data collection methods used in this study, which included a survey, interviews, and an analysis of CV data.

⁸ From the DOE CSGF application.

⁹ <https://www.siam.org/students/resources/report.php>

Surveys

In October through December 2016, a survey was administered to all 414 DOE CSGF recipients for whom contact information was available. (A total of 436 individuals have participated since the program's inception; five alumni are now deceased, and there was no valid contact information for 17 recipients.) A total of 278 surveys were received, for an overall response rate of 67 percent. The response rate among alumni was 61 percent, with 211 alumni out of 345 completing the survey. The response rate among current fellows was 97 percent, with 67 fellows out of 69 completing the survey.

Westat worked collaboratively with Krell Institute to update the single survey administered to DOE CSGF recipients in 2012, which resulted in two survey instruments — one for alumni and one for current fellows. Copies of the survey instruments administered as part of this study are included in Appendix A.

In this report, we present frequencies for all survey items. In analyzing the survey data, we found item-level analyses of aggregate responses to be most useful. However, we did explore the extent to which variations in responses could be explained by their program status (i.e., whether they were a current fellow or alumni). We also examined the degree to which respondents differed based on when they participated in the program. In doing so, we divided the entire set of 278 survey respondents into four distinct cohorts based on when they started the fellowship:

- Between 1991 and 2000
- Between 2001 and 2006
- Between 2007 and 2012
- Since 2013 (i.e., current fellows)¹⁰

For those items in which substantial differences in responses were observed based on those disaggregations, such differences are noted in the findings chapters.

¹⁰One respondent who began the fellowship since 2013 has since completed it and thus is an alumnus but was included in this group for the purpose of disaggregation.

Interviews

In November through December 2016, Westat conducted phone interviews with 18 DOE CSGF alumni who completed their fellowship between 2006 and 2013. Although the DOE CSGF program dates back to 1991, the guiding principle of our sampling approach was to include those recipients who have had enough time for the benefits of their participation in the fellowship to have accrued but would still be able to accurately reflect on and describe their experiences and activities since completing the program. In drawing a stratified sample of 40 interview candidates, we took into account several characteristics (e.g., gender, field of study, etc.) to ensure that the group reflected the overall makeup of those 138 individuals included in the sampling frame. Interviews were conducted using a standardized protocol, which is provided in Appendix B. In Chapters 3, 4, and 5, we report key themes and patterns in the responses of the alumni as well as illustrative examples and anonymous quotes from individual respondents.¹¹

Curriculum Vitae

Between October and December 2016, Krell Institute requested that all 414 DOE CSGF recipients for whom contact information was available provide an updated copy of their curricula vitae (CV). Seventy-five percent of the 414 recipients (309 individuals) provided an updated CV. For alumni, the response rate was 70 percent (243 CVs), and for current fellows the response rate was 96 percent (66 CVs).¹² The CVs were coded to capture recipients' productivity and accomplishments in the following areas:

- Publications, including:
 - Journal articles
 - Books and book chapters
 - Conference presentations, papers, and posters
 - Other presentations, including invited talks or lectures

¹¹Respondent quotes were edited for grammar and readability as needed, without modifying the participant's point of view.

¹²The majority of the 309 recipients who responded to the CV request provided a full CV; however, a small number sent a partial CV or LinkedIn profile page in lieu of a full CV.

- Awards or honors received
- Grants and/or contracts awarded
- Patents received

In order to capture accomplishments since receiving the fellowship, coding was limited to publications, awards, grants, and patents received beginning with the calendar year after recipients began the DOE CSGF (e.g., for a fellow beginning the program in 2010, only their work from 2011 and later was coded).¹³

In addition, there were 44 individuals who did not respond to the survey but did provide a CV, and some additional information that would have otherwise been obtained through the survey was coded from these 44 CVs. This included information about Ph.D. completion, employment, other fellowships awarded, and membership in professional organizations or societies. These additional data are provided where relevant in the findings chapters to supplement information gathered through the survey.

The CV data for alumni and current fellows were analyzed separately due to the fact that only a limited number of current fellows included data that could be coded from their CVs because of the limited amount of time they have had to publish, receive awards, etc. In providing results from the CV analysis, which are included in Chapter 5 of this report, the main focus was on descriptive summaries of recipients' professional accomplishments, including the total number and average number of publications, awards, grants, and patents. However, in addition to analyzing levels of productivity, we examined the quality of journals in which DOE CSGF recipients published their work. In doing so, Westat used data from the Eigenfactor Project, which measures how influential a journal is in a given year, as determined in part by how frequently articles from that journal are cited.

A copy of the coding protocol used as part of this study is included in Appendix C.

¹³Presentations made by recipients at the DOE CSGF annual program review during their fellowship were excluded, since this work is required of all recipients.

Outline of This Report

This report comprises four substantive chapters, each pertaining to a specific theme addressed in the study. Specifically, Chapter 2 presents information on the characteristics of all DOE CSGF recipients. Chapter 3 presents findings on recipients' application and entry into the fellowship. Chapter 4 presents findings on fellows' and alumni's experiences in the program. Chapter 5 presents findings on alumni's career activities and accomplishments since participating in the program. Chapter 6 summarizes findings around the main themes in each chapter and provides conclusions.

Appendix A includes the two survey instruments administered to alumni and current fellows. The interview protocols can be found in Appendix B, and the protocol used in coding CVs is provided in Appendix C.

2. Characteristics of DOE CSGF Recipients

This chapter presents information on the characteristics of all 436 recipients — 69 current fellows¹⁴ and 367 alumni¹⁵ — of the DOE CSGF since the program began in 1991. The information in this chapter is based on administrative data maintained by Krell Institute and describes the complete set of DOE CSGF recipients, including those now deceased and those for whom updated contact information was not available.

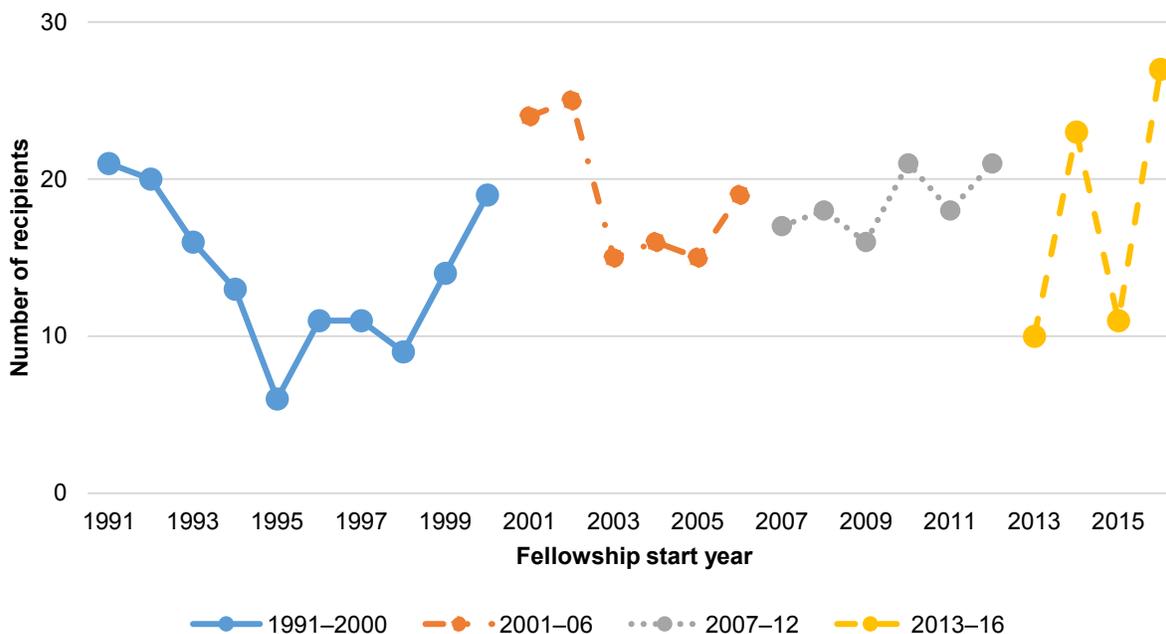
Number of DOE CSGF Recipients

Figure 2-1 shows the number of DOE CSGF recipients for each year since 1991. The number of recipients in any given year has varied by year from a minimum of 6 to a maximum of 27 recipients, with an average of approximately 12 fellows per year. This fluctuation is a direct reflection of available funding during each fellowship year and not on the number of qualified applicants.

¹⁴Two fellows that began the program between 2013 and 2016 have since completed it and are counted as alumni for the purposes of this study.

¹⁵This number includes five alumni who are deceased.

Figure 2-1. Number of DOE CSGF recipients, by year and cohort



In order to examine any changes in the characteristics of DOE CSGF recipients over time, the total of 436 recipients were divided into four cohorts for the purposes of this study. While these cohorts are also included in Figure 2-1 above, Table 2-1 below shows the total number of recipients within each of the groups. In the remainder of this chapter, we use these four cohorts to examine the extent to which the characteristics of DOE CSGF recipients have varied over time.¹⁶

Table 2-1. Number of DOE CSGF recipients, by cohort

	1991-2000	2001-06	2007-12	2013-16
Total recipients	140	114	111	71

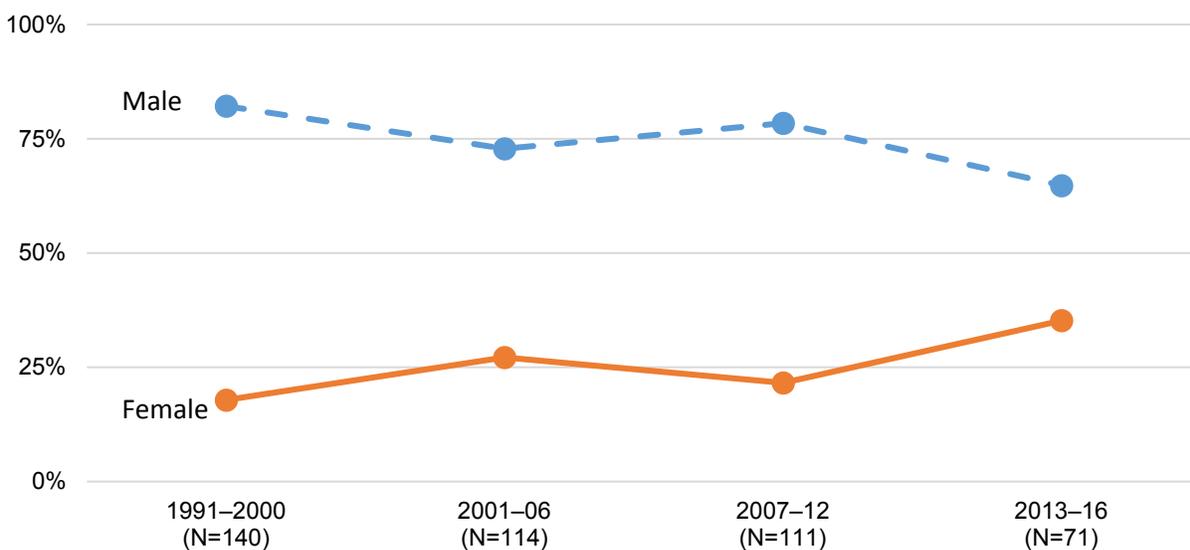
NOTE: The 2013-16 cohort consists of current fellows, with the exception of two recipients who have since left DOE CSGF. These two recipients are considered alumni for the purposes of this study.

¹⁶As indicated in Chapter 1, we also use these four cohorts in subsequent chapters of this report to examine the degree to which DOE CSGF recipients differed in their survey responses based on when they participated in the program.

Gender

Overall, 76 percent of DOE CSGF recipients have been male, and 24 percent have been female. As Figure 2-2 shows, the gender makeup of DOE CSGF recipients has changed over time. In the earliest years of the program, less than 20 percent of recipients were women. The proportion of women has increased to 35 percent for those who entered the program between 2013 and 2016.

Figure 2-2. Gender makeup of DOE CSGF recipients, by cohort



Field of Study

DOE CSGF recipients have pursued degrees in a wide variety of subject areas. For the purposes of this study, we categorized the specific degree field of all individual recipients into four main field categories: biology/bioengineering, (applications-driven) computer science/applied mathematics, engineering, and physical science.¹⁷ Table 2-2 shows the percentage of recipients within these four category groupings. Overall, engineering has been the most common degree field among DOE CSGF recipients (37 percent), followed by physical science (31 percent). The fields of computer science/applied mathematics and biology/bioengineering make up 18 percent and 15 percent overall, respectively.

¹⁷These include the recipients' degree field at the time of their entry into the program and does not account for any changes in individual recipients' degree field after entering the program.

Table 2-2. Percent of DOE CSGF recipients, by field category

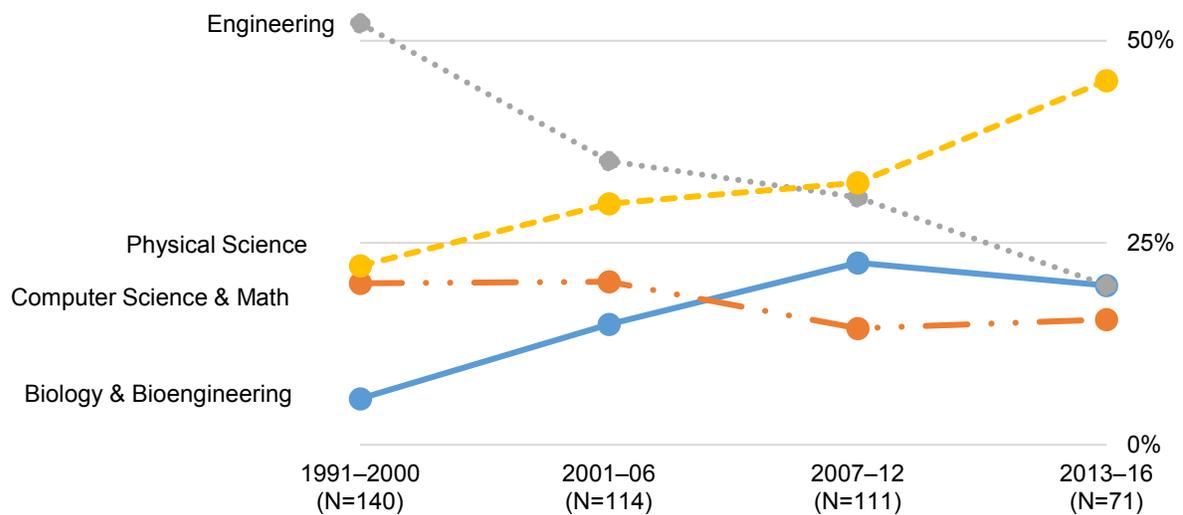
Field category	Percent of recipients (N=436)
Engineering	37
Physical science	31
Computer science/applied mathematics	18
Biology/bioengineering	15

NOTE: Percents may not sum to 100 because of rounding.

SOURCE: Administrative data maintained by Krell Institute and provided to Westat for inclusion in this study.

Figure 2-3 shows how the proportion of recipients within each of the four field categories has shifted over time. More than 50 percent of recipients in the earliest cohort were in engineering, while 20 percent of those in the most recent cohort were in this field. For recipients starting the DOE CSGF between 2013 and 2016, physical science was the most common field (45 percent).

Figure 2-3. Percent of recipients in each field category, by cohort

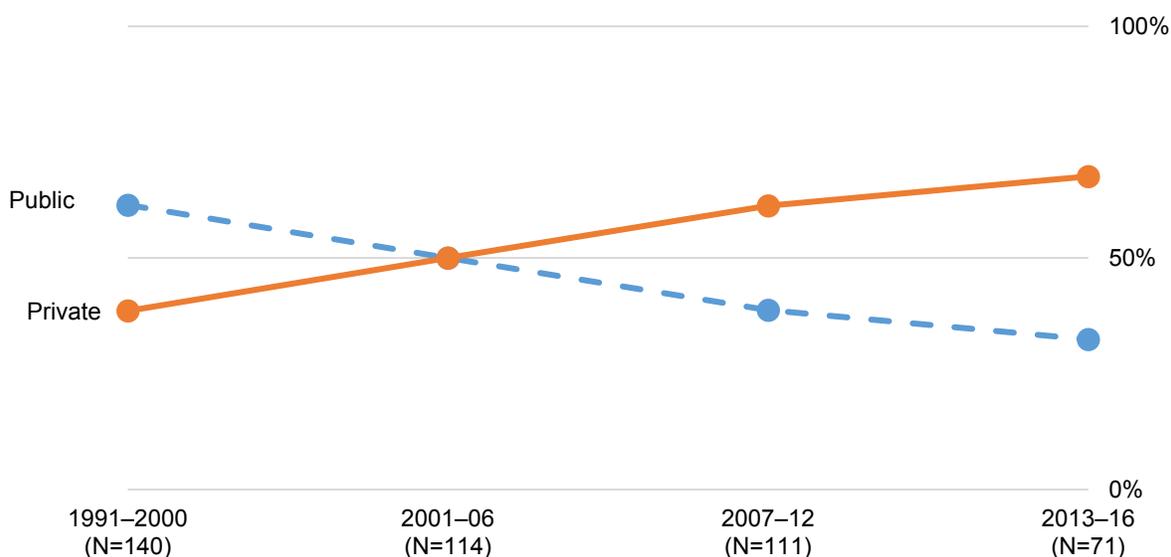


Institution Type

Overall, DOE CSGF recipients have attended 64 universities representing 30 states. Over 98 percent of recipients have been enrolled in R1 doctoral universities, according to the Carnegie Classification of Institutions of Higher Education.¹⁸ Under the Carnegie Classification, R1 institutions are those with the highest level of research activity.

Across all years, just over half of DOE CSGF recipients (52 percent) attended private universities, while the remaining 48 percent studied at public institutions. As shown in Figure 2-4, in the earliest cohort, a larger proportion of recipients pursued doctoral degrees at public institutions; however, the proportion of public institutions to private institutions has reversed in the more recent cohorts.

Figure 2-4. Percent of recipients attending a public or private institution, by cohort

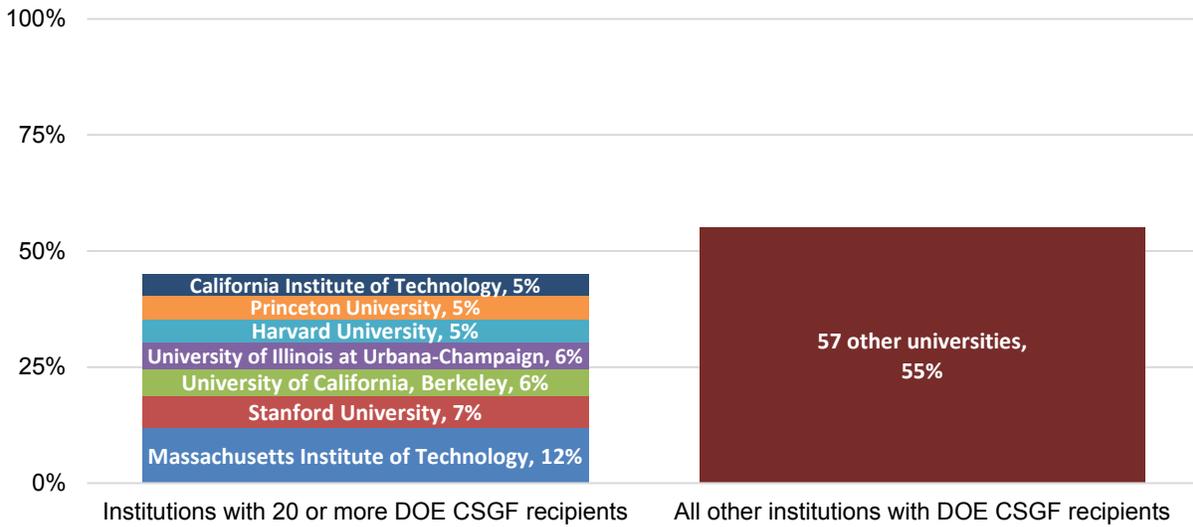


While a total of 64 institutions (20 private and 44 public) are represented by the 436 DOE CSGF recipients, seven institutions account for nearly half of all recipients. As Figure 2-5 shows, nearly 12 percent of fellowship recipients have pursued doctoral studies at Massachusetts Institute of Technology (MIT), with the next most commonly represented institution being Stanford University. Five other institutions are also heavily represented, including the University of California at Berkeley, the University of Illinois at Urbana-Champaign, Harvard University, Princeton University, and California Institute of Technology. Each of these five universities account for at least 20 (or

¹⁸For more information on the Carnegie Classification of Institutions of Higher Education, see http://carnegieclassifications.iu.edu/classification_descriptions/basic.php.

5 percent) of the total number of recipients. In addition, across all 64 institutions represented by all fellows and alumni, the average number of recipients per institution is just under seven and ranges from a single fellow to as many as 52 per institution.

Figure 2-5. Percent of recipients attending specific institutions



NOTE: Percents may not sum to 100 because of rounding.

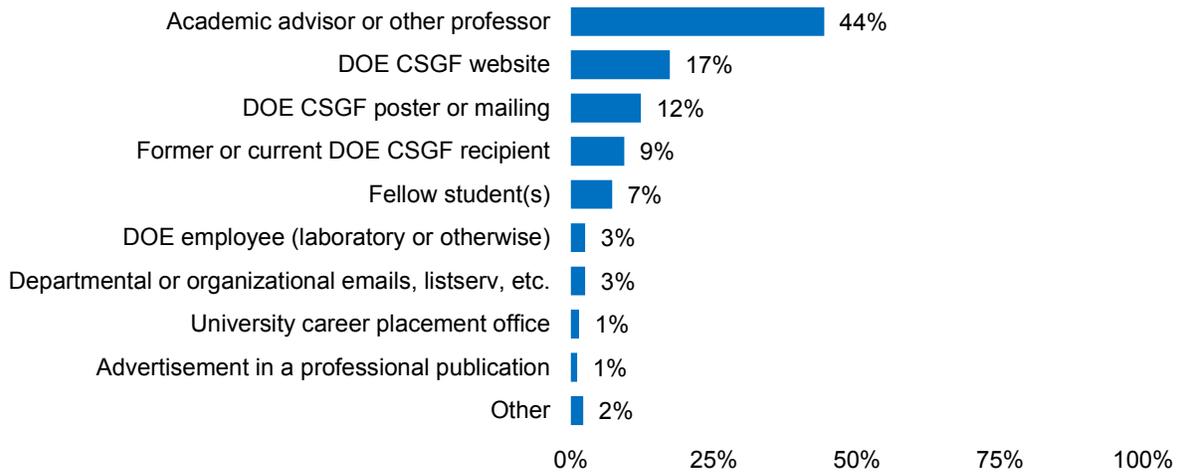
3. Findings on Recipients' Recruitment and Entry Into the DOE CSGF Program

This chapter presents findings on recipients' recruitment and entry into the DOE CSGF program. The findings included in this chapter are based on survey data collected from both current DOE CSGF fellows and alumni as well as interview data from a sample of alumni in select areas. Topics that are discussed first include the sources of information most important in recipients' decision to apply for the DOE CSGF as well as suggestions on which sources should be emphasized in future recruitment efforts. This is followed by findings on the extent to which DOE CSGF recipients applied to other fellowship programs and what types of fellowship they pursued. The last section includes findings on recipients' reasons for accepting the DOE CSGF.

Sources of Information About the DOE CSGF Program

In the survey, respondents were asked their opinions about which sources of information were most important in their decision to apply for the DOE CSGF. As Figure 3-1 shows, the most frequent source of information for recipients was an academic advisor or other professor, with nearly half of all survey respondents selecting this option. The next most common sources were the DOE CSGF website and program posters or mailings, which were cited by 17 percent and 12 percent of survey respondents, respectively. All other options included in the survey were cited by less than 10 percent of respondents.

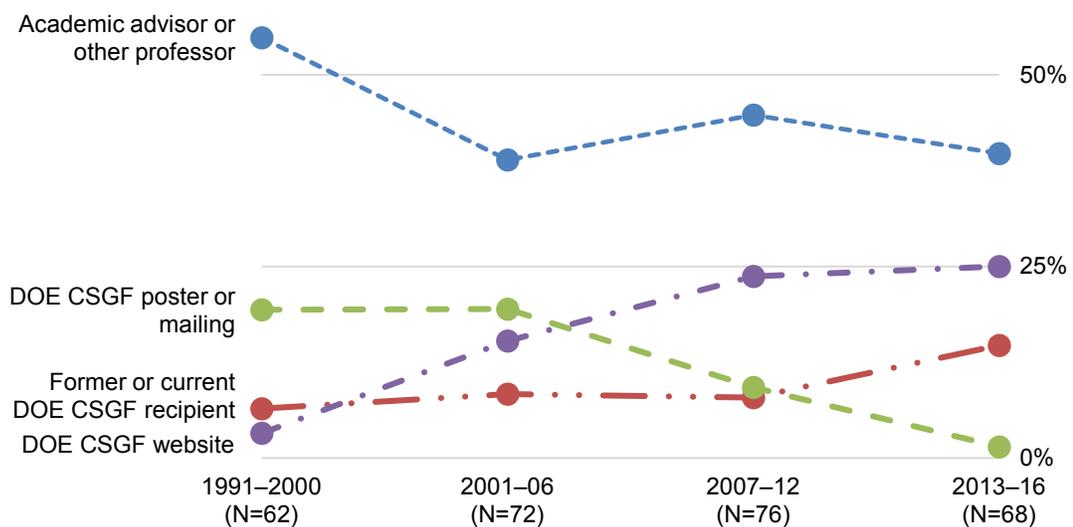
Figure 3-1. Percent of recipients reporting the sources of information that were most important in their decision to apply for the DOE CSGF program (n=278)



NOTE: Percents may not sum to 100 because of rounding.

Figure 3-1a shows how the most frequent sources of information have changed over time. Recipients from the earliest years of the program were most likely to cite an academic advisor or other professor as being most important in their decision to apply for the fellowship, with 55 percent of recipients in the earliest cohort citing this as most important, compared to 40 percent of recipients in the latest cohort. In contrast, the DOE CSGF website has become an increasingly important factor in recipients' interest in the program, with the percentage citing this source increasing from 3 percent for recipients between 1991 and 2000 to 25 percent for current fellows. In addition, DOE CSGF posters and mailings have become less important over time, decreasing steadily from 19 percent for recipients between 1991 and 2000 to only 1 percent for current fellows.

Figure 3-1a. Percent of recipients reporting the sources of information that were most important in their decision to apply for the DOE CSGF program, by cohort

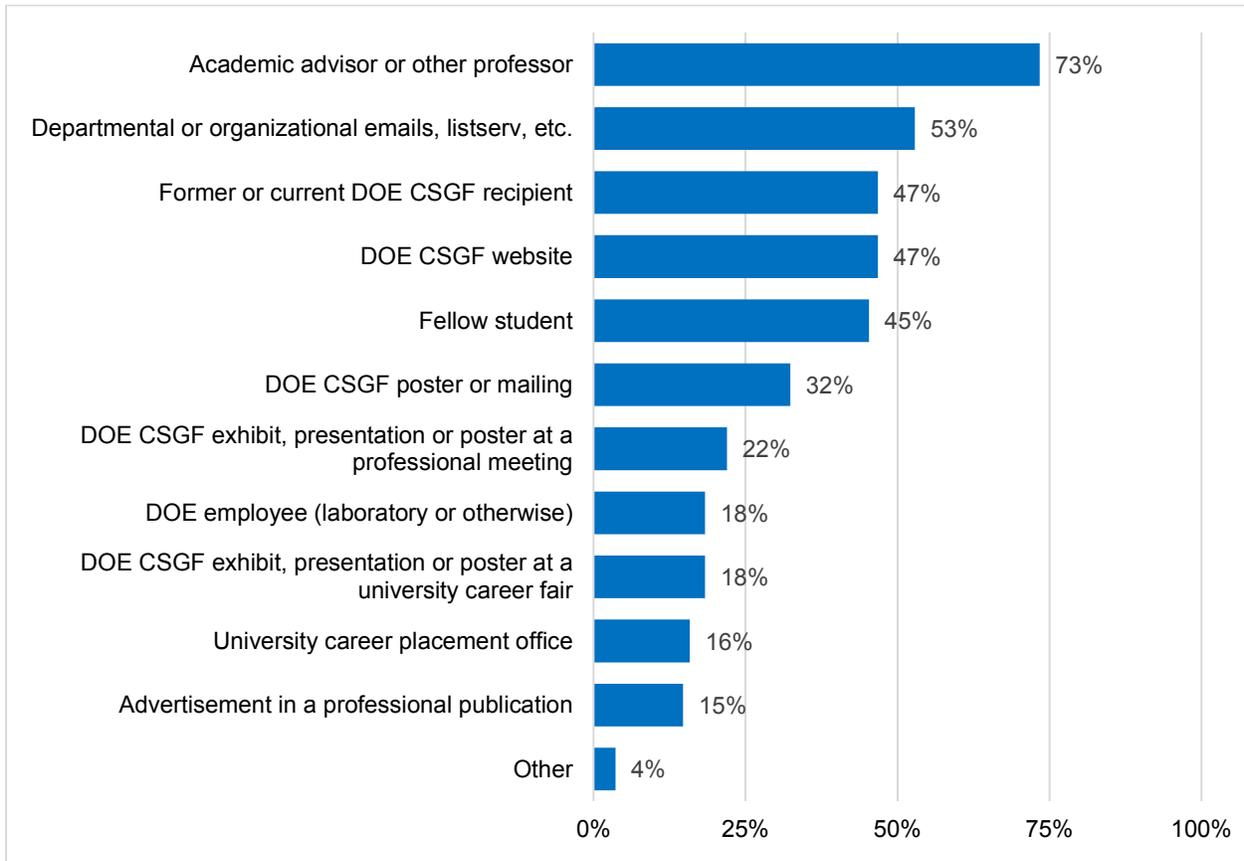


When asked in the interviews about which sources of information were most important, about half of the respondents reported that someone had recommended the DOE CSGF to them. Some alumni stated that their professors had recommended that they apply, and this is consistent with the results in Figure 3-1, which show that an academic advisor or professor was an important source of information for nearly half of survey respondents. As one alumnus who was interviewed said, “My advisor previously had a student that had received one, and he recommended during my first year of grad school that I apply as well because he thought I would be a good fit for it and be competitive.” Meanwhile, other alumni indicated in the interviews that they learned about the DOE CSGF from other individuals, such as colleagues or fellow graduate students. For example, one fellow stated, “... another one of my lab mates was already a fellow at the program ... he was a year ahead of me in graduate school and obviously someone I looked up to. And so, he told me about the program and encouraged me to apply.”

In the survey, respondents were also asked their opinions on which sources of information should be emphasized in the future for the purpose of recruiting applicants to the DOE CSGF program. As Figure 3-2 shows, nearly three-quarters of recipients (73 percent) felt that academic advisors or other professors should be emphasized. The next most common source suggested by survey respondents was departmental or organizational emails, listserv, etc., which was cited by 53 percent. Three sources of information were cited by nearly half of survey respondents, including former or current DOE CSGF recipients (47 percent), the DOE CSGF website (47 percent), and fellow students (45

percent). All other sources of information included in the survey were cited by less than a third of the respondents.

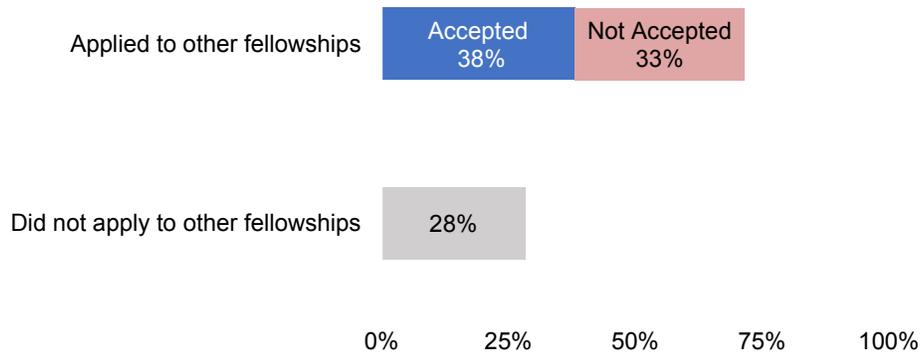
Figure 3-2. Percent of recipients reporting the sources of information that should be emphasized in the future (n=278)



Other Fellowship Programs Pursued by DOE CSGF Recipients

When asked in the survey about whether they had applied to any other fellowship programs in addition to the DOE CSGF, 72 percent indicated that they had, while 28 percent applied only to the DOE CSGF, as shown in Figure 3-3. As Figure 3-3 also shows, 38 percent of all 278 survey respondents applied to and were accepted by at least one other fellowship program, while 33 percent of all 278 respondents applied to at least one other fellowship but were not accepted.

Figure 3-3. Percent of recipients who applied to other fellowship programs

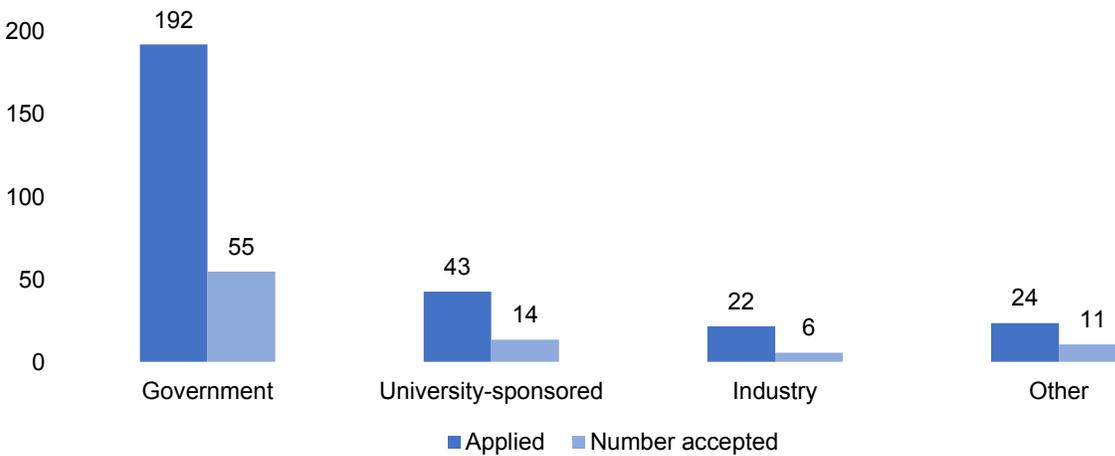


NOTE: Percents may not sum to 100 because of rounding.

Of the 199 survey respondents who indicated they had applied to at least one other program, 10 percent of these respondents indicated that they initially applied only for the DOE CSGF. Eighty percent indicated that they applied for other programs at the same time that they applied for the DOE CSGF, while 10 percent reported that they initially applied for other programs first and applied for the DOE CSGF later.

The survey respondents who indicated that they had applied for fellowships other than the DOE CSGF were also asked about the specific category (or categories) in which they pursued a fellowship. As Figure 3-4 shows, 192 of the subset of 199 who had applied to at least one other program pursued a government-sponsored fellowship, while 43 respondents in that same group pursued a university-sponsored fellowship. In addition, 22 respondents indicated they pursued an industry-sponsored fellowship program, and 24 pursued a fellowship in a category other than government, university, or industry (e.g., foundations, nonprofit organizations, etc.).

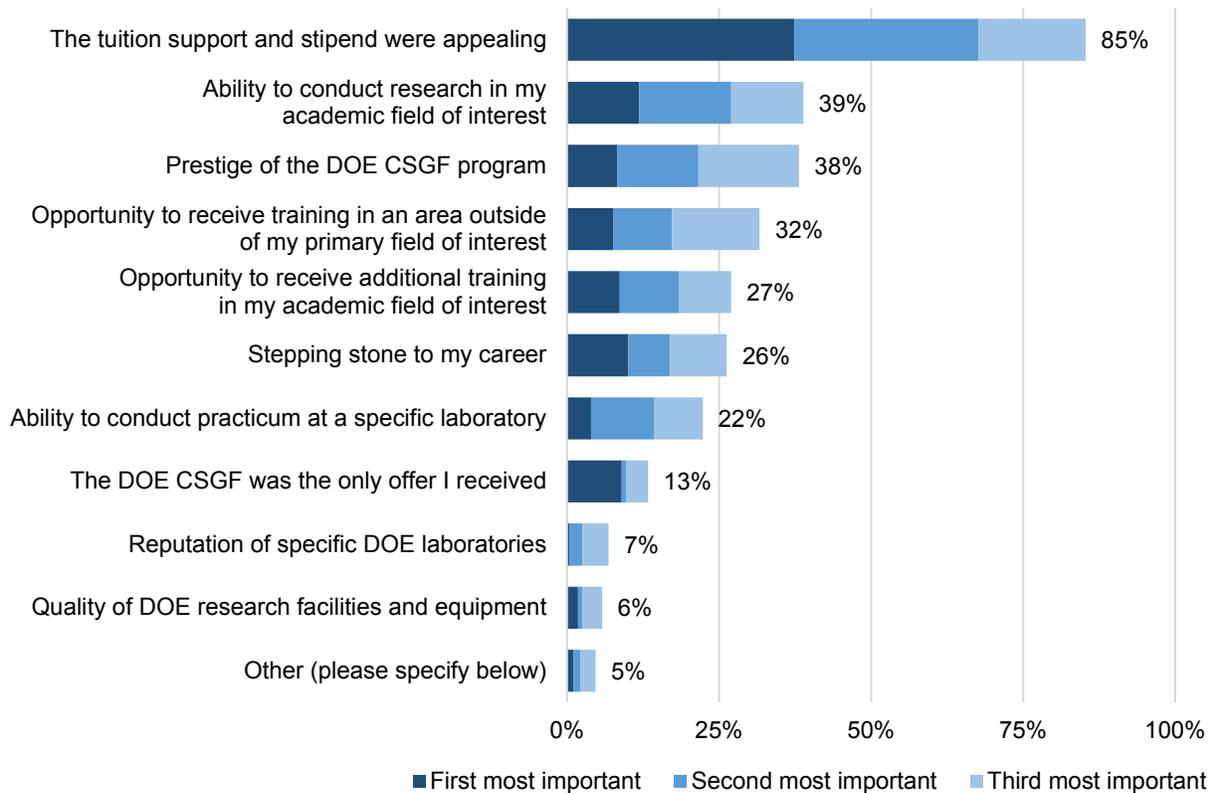
Figure 3-4. Of the respondents who indicated they had applied for programs other than the DOE CSGF, number reporting the categories in which they pursued a fellowship, by number of applicants and number accepted into program (n=199)



Reasons for Accepting the DOE CSGF

All survey respondents were asked to provide the three most important reasons for accepting the DOE CSGF. As Figure 3-5 shows, the most frequently cited reason was that the tuition support and stipend were appealing. This reason was cited by 85 percent of respondents and was more than twice as likely to be cited than any other single reason. Two other reasons were cited by more than one-third of respondents: 39 percent cited the ability to conduct research in their academic field of interest, and 38 percent cited the prestige of the DOE CSGF program. Each of the other reasons provided as options in the survey were cited by less than a third of the respondents.

Figure 3-5. Percent of recipients reporting the reasons that were most important in their decision to accept the DOE CSGF (n=278)



With regard to why recipients decided to accept the DOE CSGF, alumni interview data were consistent with the survey findings. The alumni most commonly responded with one of three reasons: (1) that the program offered generous financial benefits, (2) that it was consistent with their academic and/or professional interests, and (3) that it was prestigious. About half of the alumni interviewed mentioned financial considerations, with some noting that the DOE CSGF offered more financial support than other similar fellowships at the time. A few alumni also mentioned the four full years of funding as an advantage, as opposed to three years of funding offered by other fellowships.

As for the program’s consistency with their interests, the majority of the alumni interviewed described the fit of the fellowship with their interest in computational science or working on a supercomputer. For example, as one alumnus stated, “the mixture of math and computer science and science and engineering applications were exactly the type of graduate studies I wanted to pursue” In addition, some alumni indicated in the interviews that the DOE CSGF allowed for

flexibility in research topics or said that having a source of independent funding generally permitted flexibility in their research.

Lastly, several alumni who were interviewed cited the prestige of the DOE CSGF, and some described how a combination of these three factors drew them to the program. For example, according to one alumnus, “I viewed it as something very prestigious ... when I applied for [DOE] CSGF, I actually had another federal fellowship ... it was worth all the extra effort to apply for this ... this was better funding, more prestigious, and much more aligned with my interests.”

4. Findings on Recipients' Experiences in the DOE CSGF Program

This chapter presents findings on recipients' DOE CSGF experiences. The findings included in this chapter are based on survey data collected from both current DOE CSGF fellows and alumni as well as interview data from a sample of program alumni. Topics that are discussed first include the key components of the DOE CSGF (i.e., research practicum, program review meetings, high-performance computing (HPC), and mentoring) as well as whether recipients have contributed to the development of specific aspects of computing (i.e., scientific codes or software) and whether they took advantage of dedicated computing time on DOE supercomputers. These discussions are followed by findings on recipients' satisfaction with the program and the perceived benefits and impacts of their DOE CSGF participation. This chapter concludes with findings pertaining to the DOE CSGF community and fellows' plans after completing the program.

Research Practicum

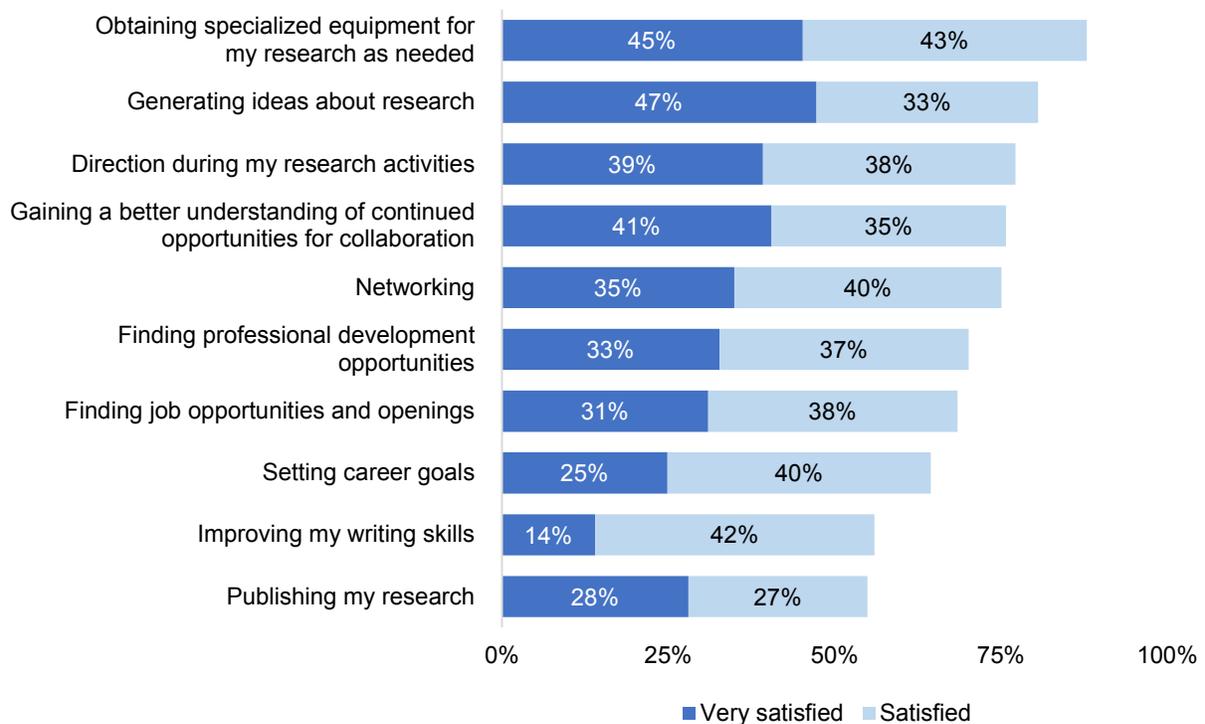
The research practicum offers fellows an opportunity to experience the breadth, quality, and excitement of the country's DOE National Laboratories. This experience is designed to offer insight to fellows into how their scientific interests can translate to research areas important to the nation. With one 12-week DOE laboratory experience required of each fellow — and with 20 approved sites to choose from — the practicum is intended to be an intellectually broadening experience which enables fellowship recipients to learn about computation from some of the nation's top practitioners. The DOE CSGF's combination of graduate study, academic research, and practical experience at DOE facilities aims to produce individuals capable of significantly contributing to research and development in computational science, an increasingly important component of our nation's economic health and security.

The practicum process consists of four main activities: identifying a laboratory site, supervisor and project; proposing a practicum; preparing for the experience; and completing the practicum. The survey asked fellows and alumni the extent to which they were satisfied with the support they

received from their practicum supervisor and other staff at their practicum laboratory in a variety of areas.¹⁹ As shown in Figure 4-1, the majority of recipients for which each item was applicable reported that they were satisfied or very satisfied with the assistance they had received. At least 80 percent of recipients indicated that they were satisfied or very satisfied with the following types of support received from staff at their practicum site:

- Obtaining specialized equipment for research (88 percent)
- Generating ideas about research (81 percent)

Figure 4-1. Percent of recipients reporting levels of satisfaction with support received from practicum site supervisor and laboratory staff



NOTE: Figure excludes those who have not completed a practicum or who indicated an item was not relevant to them. Therefore, Ns for individual items included in the figure range from 150 to 237. Each item was included on both surveys (i.e., current fellows and alumni) with slight variations in the wording of some questions. Percentages do not sum to total because of rounding.

In the interviews conducted with DOE CSGF alumni, the majority reported that their research practicum experience was positive. Alumni most commonly cited the opportunity to collaborate with seasoned researchers and scientists as a positive feature of their practicum. As one alumnus noted, “it was a particularly great advantage for me to interact with some of the DOE-affiliated

¹⁹At the time of the survey, 30 of the 67 fellows who completed the survey had completed their practicum requirement.

researchers in the lab to learn the fundamentals of the high-performance computing and getting used to just computing on my laptop and . . . for the first time taking advantage of these much larger machines to answer questions I couldn't otherwise get at." Another alumnus felt, "there's a huge freedom to seek out someone with whom you specifically wanted to work" during the practicum. Other positive comments included the opportunity to learn new content and writing (and in some cases, publishing) papers. In addition, a few respondents offered that they appreciated the opportunity to experience a laboratory environment.

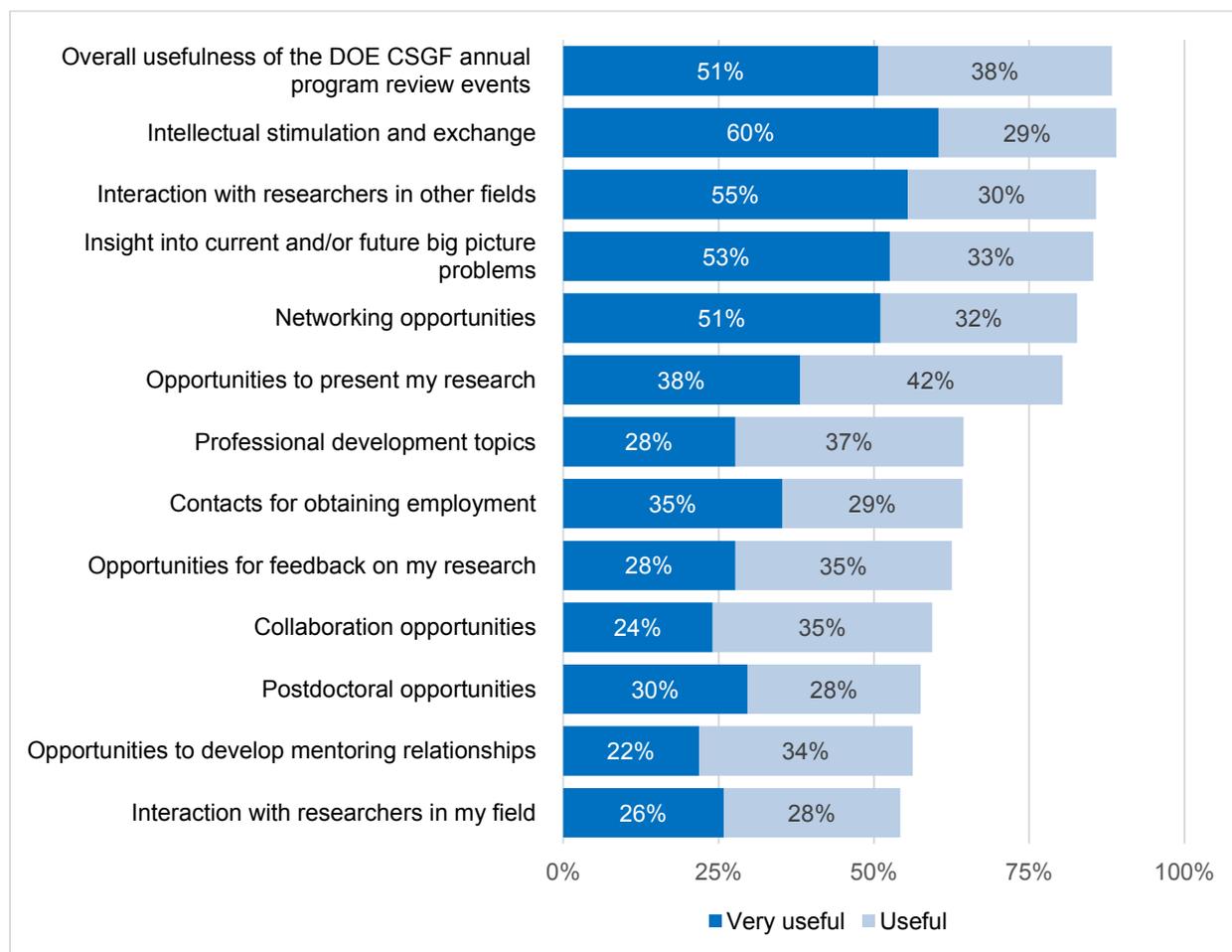
Program Review Meetings

Annual program review attendance is both a benefit and requirement of the DOE CSGF. The program review provides a forum for fourth-year and any other departing fellows to present plenary lectures on their research. Beyond that, the meeting is also structured to acquaint fellows with the DOE laboratories and practicum opportunities, and to allow first- through third-year fellows the opportunity to present their research in a poster forum. By holding the review in Washington, D.C. each summer, program sponsors also have an opportunity to meet the fellows and learn about their work and to evaluate the program. The meeting also encourages fellows to meet informally with one another and with DOE CSGF alumni attendees.

In the survey, both current fellows and alumni were asked about the extent to which they found various elements of the program review meetings useful. As Figure 4-2 shows, 88 percent of recipients indicated that overall they found the program review meetings useful or very useful to them. In addition, at least 80 percent also found each of the following elements useful or very useful:

- Intellectual stimulation and exchange (89 percent)
- Interaction with researchers in other fields (86 percent)
- Insight into current and/or future big picture problems (85 percent)
- Networking opportunities (83 percent)
- Opportunities to present research (80 percent)

Figure 4-2. Percent of recipients reporting on the usefulness of the elements of the annual program review meetings



NOTE: Figure excludes those who indicated an item was not relevant to them. Therefore, Ns range from 219 to 274. Each item was included on both surveys (i.e., current fellows and alumni) with slight variations in the wording of some questions. Percentages do not sum to total because of rounding

In addition, while program review attendance is required of current fellows, some alumni indicated in the survey that they continued to participate, with 43 percent indicating that they had attended at least one such meeting since completing their fellowship.

The interview data show that the program review is an overwhelmingly well-received element of the DOE CSGF. Nearly all alumni had a positive experience at the annual meetings, with most mentioning the opportunity to network with current fellows, alumni, and professionals, and become part of the DOE CSGF community, as the event’s most useful features. One alumnus stated the following:

[The] conference is where you build that network. That’s where you actually get to meet all of the people and talk with them one on one or three on one or whatever the case may

be. You get to see who are the other fellows and what are they doing, you get to ask them for advice.

Others mentioned that the sense of community among fellows is established and developed at the program review meetings, stating, “because of the annual meetings there’s this community which is much more powerful.”

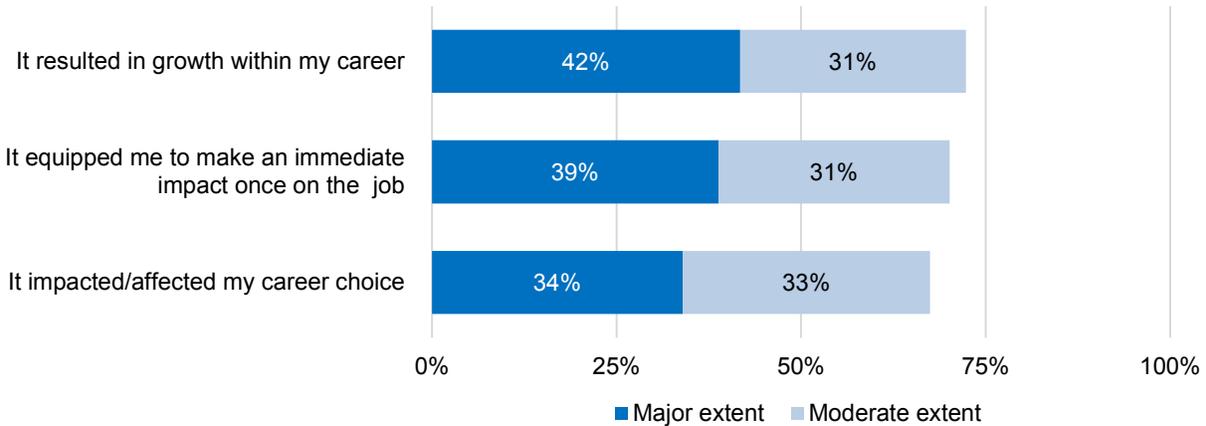
Many of the alumni interviewed said they appreciated the exposure to new research and sciences that the program review meetings offered; for example, one alumnus said the meeting was “a good opportunity for me to see what people worked on in a lot of other areas of science, and engineering, and math that I definitely would not have been seeing just in my own department or in my own university.” Some mentioned that the meetings allowed them to learn about career opportunities, especially at the DOE National Laboratories. One alumnus noted that “they bring in all of the DOE lab staff and you can meet them and talk about what is it like to work at the national lab, what is it like to do the practicum there, what are interesting things going on there. And that more than anything else has really helped me.” Some alumni also enjoyed presenting their own work as well as meeting others with similar interests, while some complimented the content and organization of the meetings.

High-Performance Computing

The DOE CSGF is a primary workforce development program for HPC. The evolution and broader availability of high-end computational resources — and the important scientific and engineering opportunities these machines and software provide — present a major challenge for the DOE CSGF. On one hand, requiring real knowledge and experience in high-performance computing as criteria for acceptance into the program would be overly restrictive. On the other, assuming fellows will get sufficient exposure in their diverse academic environments has proven to be unrealistic. For these reasons, the DOE CSGF has taken proactive steps to assist fellows in getting on the path to using HPC productively.

Both alumni and current fellows were asked in their surveys about their exposure to HPC during their fellowship. Alumni were also asked about the impact such exposure had on their career, and fellows were asked about the impact such exposure had on their career plans and research pursuits. Figure 4-3 shows the results for the alumni items; the majority of alumni felt they had benefited from their experiences with HPC.

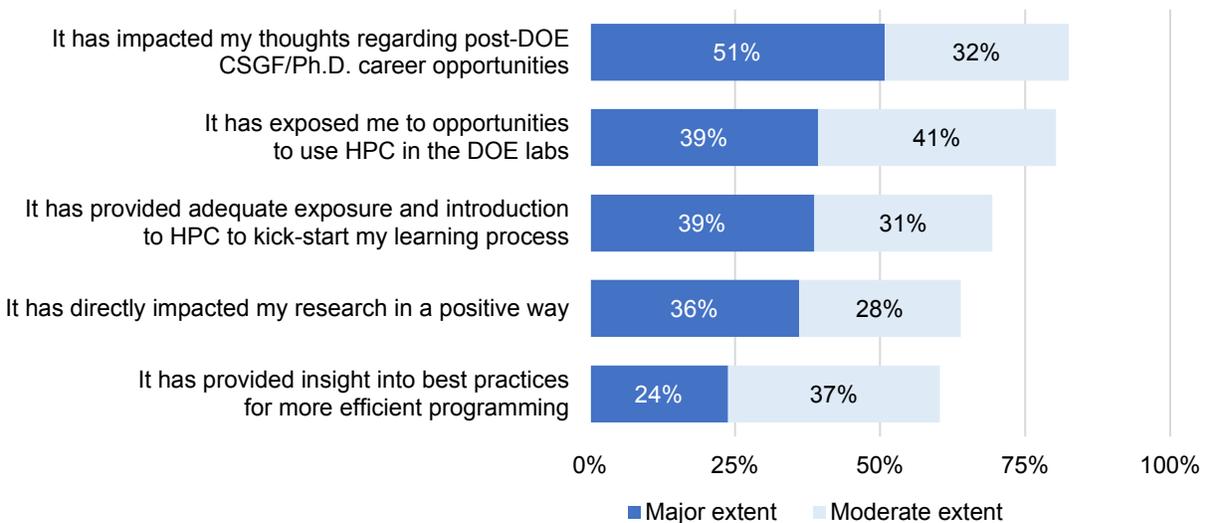
Figure 4-3. Percent of alumni reporting the extent to which exposure to HPC has had an impact on their career



NOTE: Question appeared only on alumni survey. Figure excludes those who indicated an item was not applicable for them. The Ns for this figure range from 201 to 206.

Figure 4-4 illustrates that the majority of fellows indicated their exposure to HPC through the program benefited them to a moderate or major extent across all five items. More than 80 percent agreed that it has had an impact either to a major extent or to a moderate extent on their thoughts regarding post-DOE CSGF opportunities and exposed them to opportunities to use HPC in DOE laboratories.

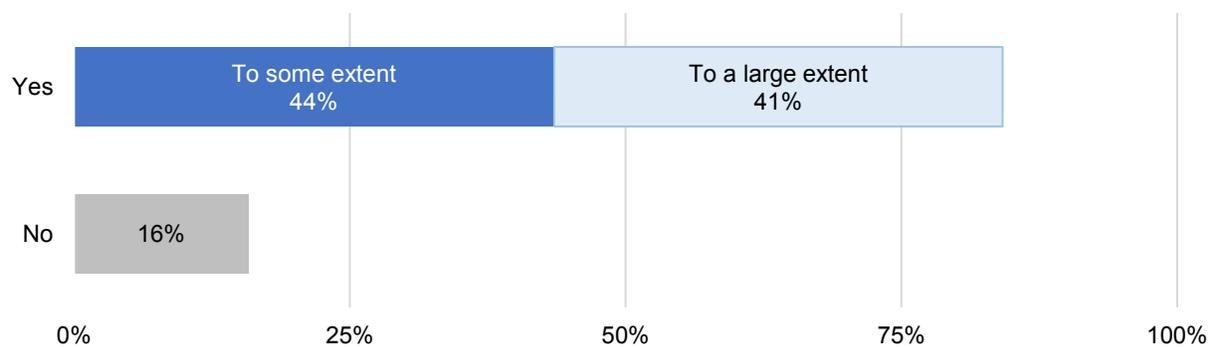
Figure 4-4. Percent of current fellows reporting the extent to which exposure to HPC has had an impact on their career plans and research pursuits



NOTE: Question appeared only on fellows survey. Figure excludes those who indicated an item was not applicable for them. The Ns for this figure range from 61 to 63.

Both surveys also asked recipients whether they had used HPC in their own research during their fellowship. Approximately 85 percent of recipients indicated using HPC either to some extent or to a large extent in their own research while a fellow (Figure 4-5).

Figure 4-5. Percent of recipients reporting levels of use of HPC in research while a fellow (N=278)



NOTE: Question was included on both surveys with slight variation in the wording of the question. Percents may not sum to 100 because of rounding.

Most of the alumni interviewed indicated they had used HPC during their time as a fellow, which is consistent with the survey findings above. In the interviews, alumni were also asked about the ways in which HPC influenced their work during their fellowship tenure, and most indicated that this had occurred while they were completing their practicum. Some of the ways in which HPC influenced their work as a fellow included allowing them exposure to a new tool, expanding their research capabilities, helping them appreciate and factor in the challenges or limitations in their work, and influencing the development of their methods. One alumnus stated the following:

I always thought computation was kind of second-class results of what you couldn't solve. If you were clever enough, you could solve it on the blackboard, you could solve it on pencil and paper and you could use computations to check your result. That's kind of how I came into grad school, thinking ... of what we'd consider pure theory in ecology, sort of a mathematician's approach to things. And it really opened doors for me to realize, well, there's actually a whole world of interesting questions that are simply inaccessible to that kind of approach, and suddenly I have the tool to start tackling them, and that sort of drew me in.

Another alumnus said that the exposure to HPC “mainly educated me on the availability of HPC and how it can be used and the pitfalls thereof, in that if you really want to go high performance then you really have to make sure that what you're putting on there is worth running.”

Moreover, a few alumni mentioned that they learned about HPC while attending workshops at the program review meetings and this in turn had influenced their research. One respondent said the workshop was “very, very useful because I was pretty unfamiliar with a lot of the basic concepts and terms [around HPC].”

Mentoring

The DOE CSGF recognizes the importance of reciprocal mentoring relationships among alumni and current fellows, and this kind of community building is considered by the program as critical for knowledge sharing towards progress and innovation.

The alumni and fellows surveys included questions on mentoring, including the extent to which they received mentoring from supervisors or others affiliated with the DOE CSGF, the usefulness of the mentoring they received, and the types of mentoring they have provided to other recipients.

The alumni survey asked respondents to indicate whether they had received various types of mentoring, guidance, or support from members of the scientific community, including other DOE CSGF recipients during and/or since their fellowship. Figure 4-6 shows the percentage of alumni who reported they had received various types of mentoring since they first began the DOE CSGF. For all but three of the specific types of mentoring, more than 50 percent of alumni reported receiving several types of mentoring support, with the largest percentages of alumni indicating they had received the following types of mentoring:

- Opportunities to collaborate on research in fields related to computational science and engineering (CSE) (87 percent)
- Opportunities to network with other scholars, publishers, editors, etc., in fields related to CSE (83 percent)
- Opportunities to present research in fields related to CSE (79 percent)

Figure 4-6. Percent of alumni reporting the types of mentoring they received during and/or since their fellowship (N=211)

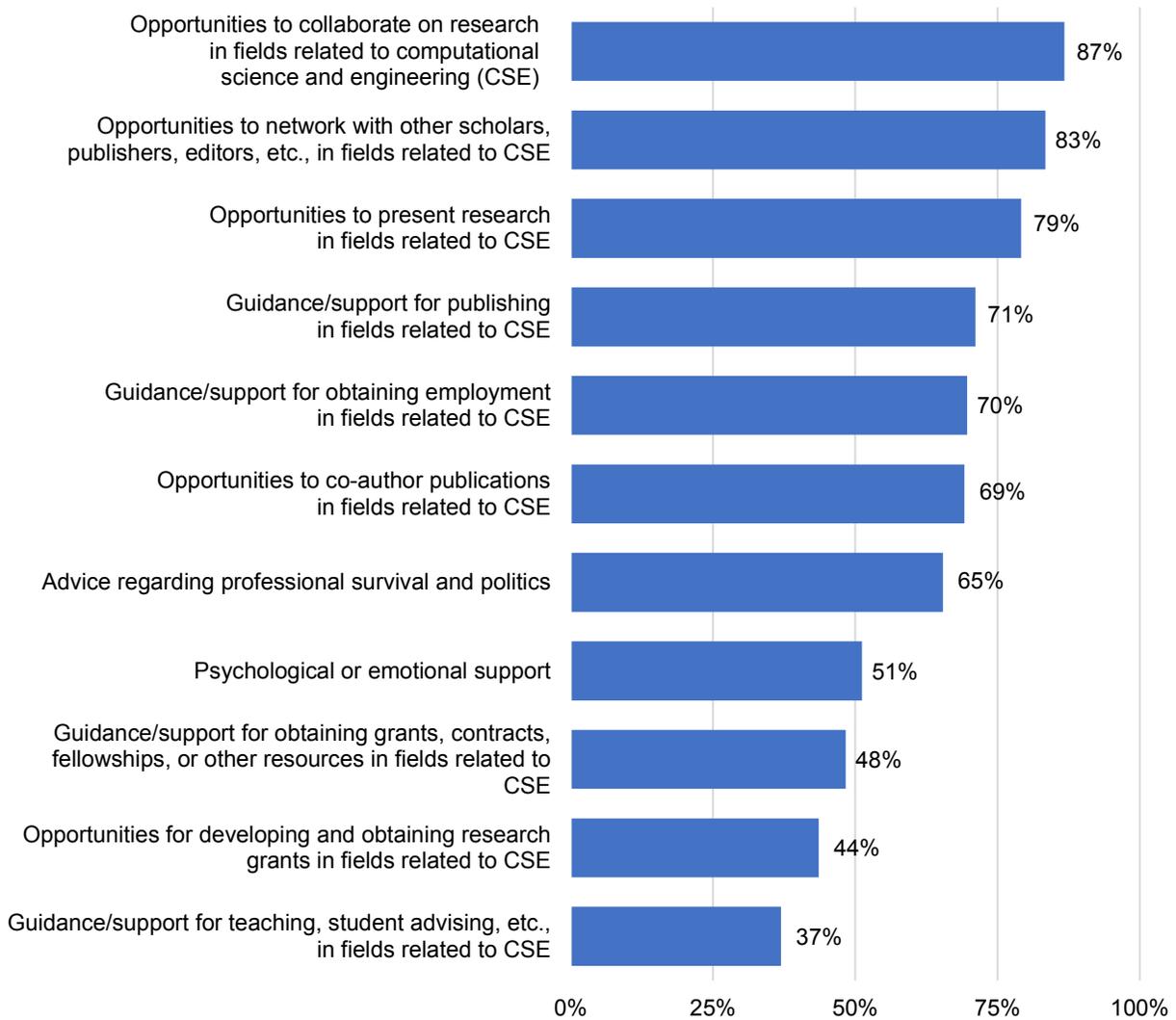


Figure 4-7 shows alumni responses to questions about the usefulness of each type of mentoring included in Figure 4-6 above. Overall, alumni had very favorable perceptions of the mentoring they received, with between 72 percent and 87 percent of recipients describing each of the specific types of mentoring as useful or very useful.

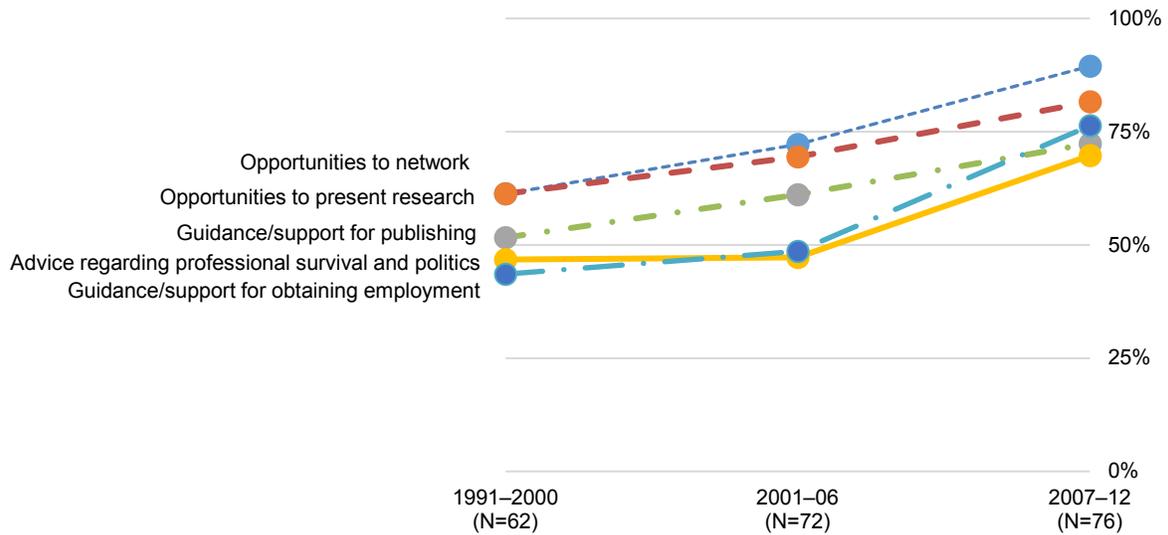
Figure 4-7. Percent of alumni reporting on the usefulness of mentoring they received during and/or since their fellowship



NOTE: Figure is limited to those who indicated they had received each type of mentoring during or since their fellowship. Ns for this figure range from 78 to 183.

Figure 4-8 shows how the types of mentoring received by alumni have changed over time. For alumni in more recent years, the proportion reporting that they received five of the types of mentoring included in Figure 4-7 during their fellowship was at least 20 percentage points higher than the proportion in the earliest cohort. For example, for alumni beginning the fellowship between 1991 and 2000, 61 percent indicated they have had opportunities to network with other scholars, publishers, editors, etc., in fields related to CSE during their fellowship, compared to 89 percent of alumni starting the program between 2007 and 2012.

Figure 4-8. Percent of alumni receiving specific types of mentoring during their fellowship, by cohort (N=211)



NOTE: Figure is limited to alumni beginning the program between 1991 and 2012.

Current fellows were also asked to indicate whether they had yet received various types of mentoring since the start of their fellowship. As Figure 4-9 shows, more than half of the fellows indicated they had received the following four types of mentorship and guidance:

- Opportunities to collaborate on research in fields related to CSE (78 percent)
- Opportunities to network with other scholars, publishers, editors, etc., in fields related to CSE (75 percent)
- Advice regarding professional survival and politics (66 percent)
- Guidance/support for obtaining employment in fields related to CSE (55 percent)

Between 22 percent and 49 percent of fellows reported they had received the other types of support listed in Figure 4-9; however, it should be noted that several fellows had only been in the program for a short time at the time they completed the survey.

Figure 4-9. Percent of current fellows receiving specific types of mentoring (N=67)



Similar to alumni, among those fellows that had received each type of mentoring within the DOE CSGF, the majority indicated that it was helpful to them. As Figure 4-10 shows, between 78 percent and 93 percent of those receiving each type of support reported it was useful or very useful.

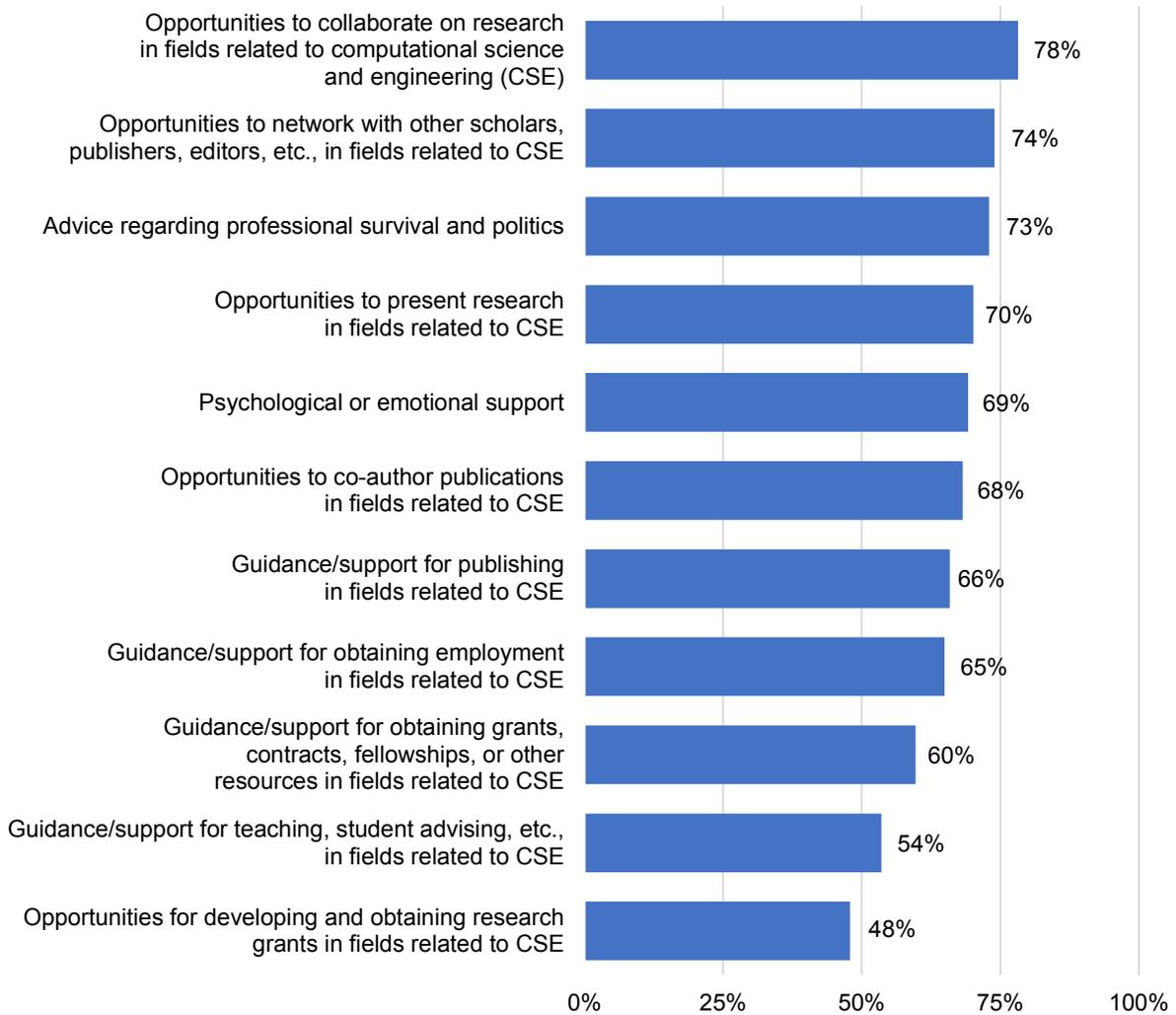
Figure 4-10. Percent of current fellows reporting on the usefulness of mentoring they received (N=67)



NOTE: Figure is limited to fellows indicating that they had received each type of mentoring. Ns range from 15 to 52.

In addition to being asked about the mentoring they received, the surveys also asked recipients to indicate whether they had provided these various types of mentoring support to members of the scientific community, including other DOE CSGF recipients. Alumni were asked to indicate whether they had provided the mentoring during and/or since their fellowship, while current fellows were asked to indicate whether they had provided each type of support so far. Figure 4-11 shows that more than half of alumni had provided all but one type of mentoring since the start of their fellowship.

Figure 4-11. Percent of alumni reporting the types of mentoring they provided during and/or since their fellowship (N=211)



As shown in Figure 4-12, the percentages of current fellows that had provided mentoring was generally lower, with less than half indicating they had provided each of the mentoring types so far. As is the case with the responses above by current fellows on the mentoring they had received, it is important to note that several respondents had only just started the program. Interestingly, the most common type of support current fellows had provided to one another or other members of the community is psychological or emotional support (49 percent).

Figure 4-12. Percent of current fellows reporting the types of mentoring they provided (N=67)



During the interviews, almost all of the alumni reported positive and useful mentoring experiences during their time in the program. They most often reported being mentored on their careers, technical content or expertise, and the DOE CSGF elements (for example, on the program of study or where to complete a practicum). One respondent described the mentoring he received during his practicum as “just getting general advice on what to do post Ph.D., what the opportunities were and things like that, talking with lab folks and getting an idea of that.” Another discussed mentoring by DOE CSGF alumni, stating that “[the alumni] were able to mentor me and help me learn a lot of these techniques but then see what people from very different areas are doing with them, what that common language is, and it helps me become a much broader researcher, a much better communicator . . .” The mentoring that alumni received often covered several areas; for example, one alumnus said, “I would meet with my professors oftentimes multiple times a week or sometimes

multiple times a day for help, or for advice, or for whatever. That mentorship included everything from career advice to scientific mentoring.”

Many alumni reported receiving mentoring from their practicum advisors or other staff at the practicum sites as well as from other recipients. Many alumni reported multiple sources of mentoring, with one respondent noting, “it was nice to have additional people to talk to outside of my university about career stuff or research stuff sometimes.” One alumnus described mentoring during his practicum, and then went on to discuss mentoring from alumni, stating, “another source of mentoring was just being linked up with the older graduate students that are part of the DOE CSGF program. I would get all sorts of valuable insights from them on how to progress with the Ph.D., what opportunities were afterwards.”

In addition, about half of the alumni interviewed reported that after their fellowship ended, they provided mentoring, formally or informally, to other DOE CSGF recipients (i.e., current fellows or alumni), colleagues, or other students. The ways in which these alumni had mentored others were similar to how they themselves were mentored during their time in the program, including making themselves available as a resource for current fellows, providing information on the DOE CSGF, providing career advice, working closely with students at their universities, and assisting colleagues.

Contribution to Aspects of Computing

The DOE CSGF provides education and training with the aim of making recipients uniquely positioned to contribute to the advancement of computing activities. The survey asked recipients to indicate whether they had contributed to and/or led work in the development of three specific aspects of computing, including development of scientific codes, scientific software suites, and open source scientific software. Both alumni and current fellows were asked to indicate whether they had contributed to and/or led such work both prior to and during their fellowships. Alumni were also asked to indicate their involvement in such aspects of computing since completing their fellowship.

Figures 4-13 and 4-14 show the percentages of alumni and current fellows, respectively, indicating they had contributed to and/or led each type of work at each relevant time period. For both alumni and fellows, the development of scientific codes was the most common type of work in which they were involved at all time periods. With regard to scientific software suites and open source software, less than 25 percent of alumni had participated in their development prior to the start of their

fellowship, but more than 50 percent indicated they had worked on such products since completing the DOE CSGF.

Figure 4-13. Percent of alumni who have contributed and/or led development of each type of product (N=211)

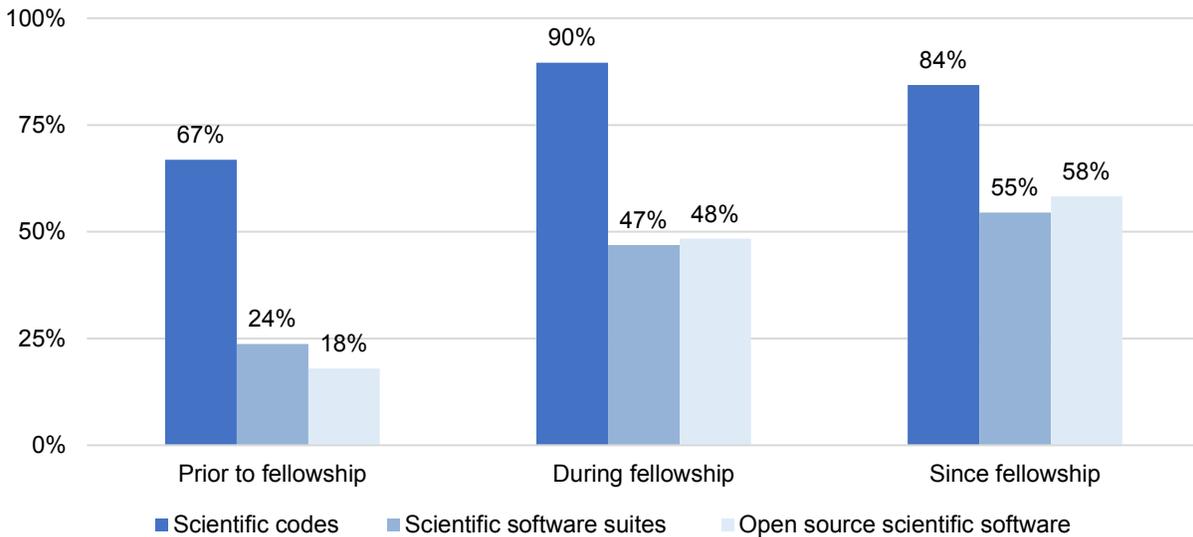
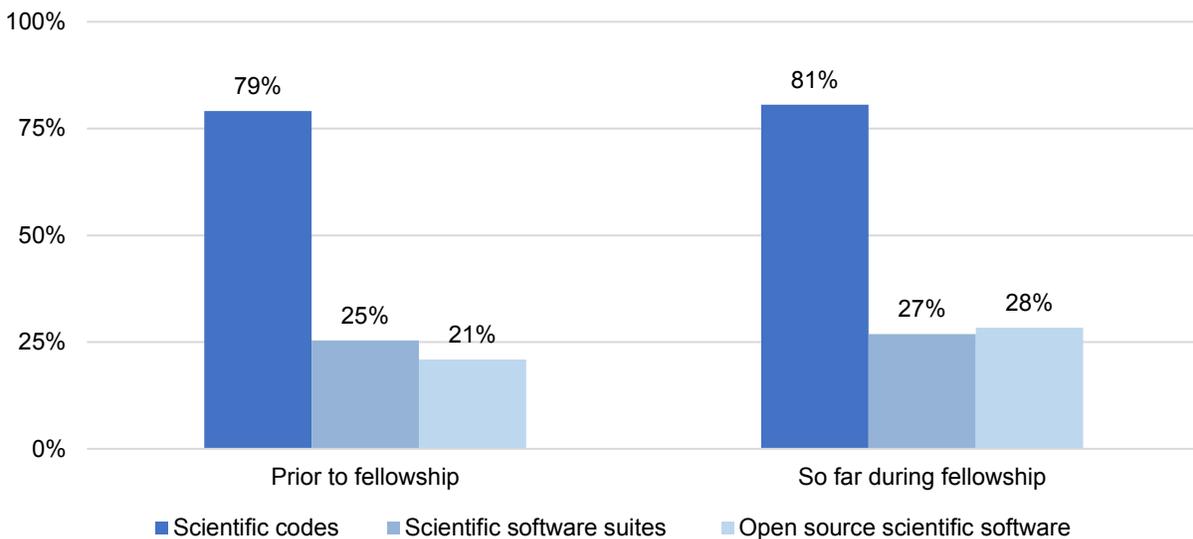


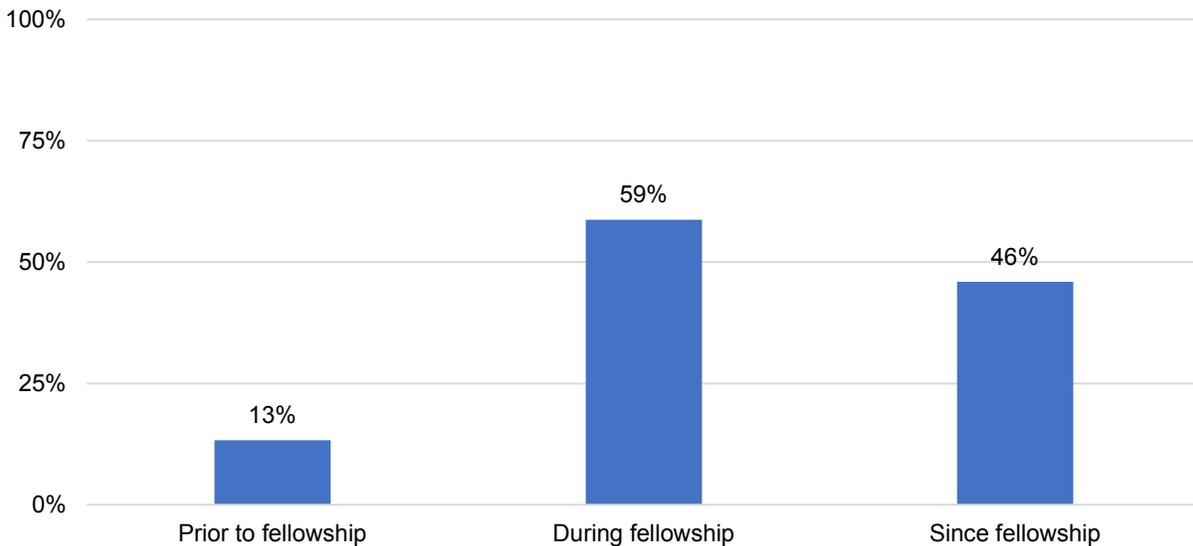
Figure 4-14. Percent of current fellows who have contributed and/or led development of each type of product (N=67)



Supercomputers

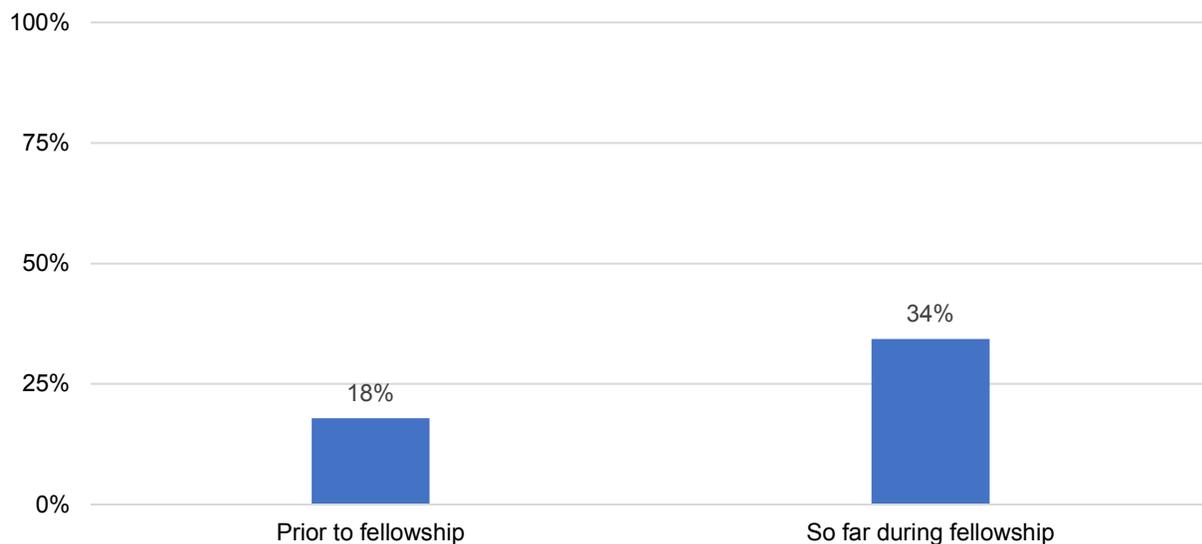
In addition to HPC generally, the survey asked recipients to indicate whether they had taken advantage of dedicated computing time on DOE supercomputers. Alumni were asked to report on their use of such resources before, during, and since their fellowship, while current fellows were asked to report whether they had used the resource prior to and so far in their DOE CSGF tenure. As show in Figure 4-15, while only a small percentage had done so prior to the fellowship, more than half of alumni reported that they had dedicated computing time on a DOE supercomputer at some point during their fellowship. In addition, just under half have utilized these resources since completing the program.

Figure 4-15. Percent of alumni who have taken advantage of dedicated computing time on DOE supercomputers (N=211)



For current fellows, 18 percent had utilized dedicated computing time prior to the start of their fellowship, while 34 percent had taken advantage of this while in their fellowship (Figure 4-16). For this survey question, we found a relationship between the amount of time spent in the program and utilization of computing time. Specifically, 18 percent of fellows who are in their first or second year of the program (N=38) reported having dedicated computing time, compared to 55 percent of those in their third or fourth year (N=29) (not shown in figure).

Figure 4-16. Percent of current fellows who have taken advantage of dedicated computing time on DOE supercomputers (N=67)



Overall DOE CSGF Satisfaction

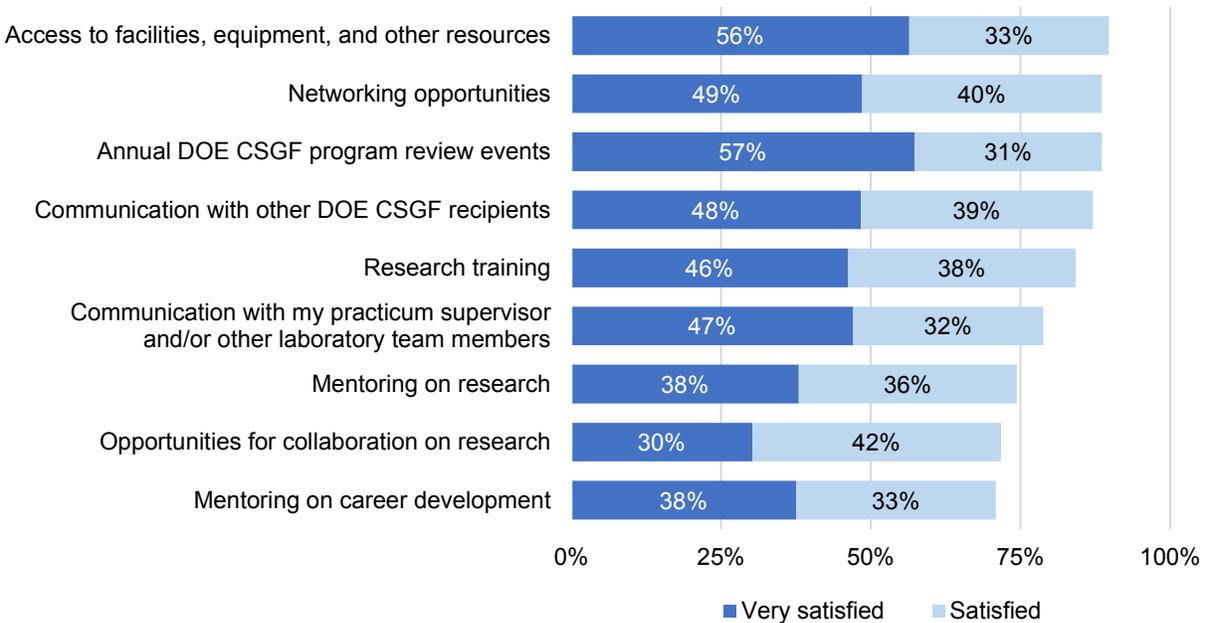
Both alumni and current fellows were asked in the survey about the extent to which they were satisfied with various aspects of the DOE CSGF.²⁰ As Figure 4-17 shows, the majority of recipients (between 71 percent and 90 percent) indicated they were satisfied or very satisfied with all the aspects of the DOE CSGF asked about in the survey. More than 80 percent indicated satisfaction with the following elements:

- Access to facilities, equipment, and other resources (90 percent)
- Networking opportunities (89 percent)

²⁰For current fellows, the question was worded to ask how satisfied they had been so far with the program; however, despite this slight difference in wording, the results for both groups are combined in Figure 4-17.

- Annual DOE CSGF program review events (89 percent)
- Communication with other DOE CSGF recipients (87 percent)
- Research training (84 percent)

Figure 4-17. Percent of recipients reporting levels of satisfaction with specific elements of the DOE CSGF program (N=278)



NOTE: Figure excludes those indicating an item was not applicable to them. Therefore, Ns range from 255 to 272. Percentages may not sum to totals because of rounding.

The surveys also asked alumni and current fellows to select up to three aspects of the DOE CSGF that were the most important to their overall satisfaction with the fellowship. As

Figure 4-18 shows, the following three elements were most commonly identified and were each cited by over 40 percent of recipients as one of their top three:

- Annual DOE CSGF program review events (49 percent)
- Communication with other DOE CSGF recipients (44 percent)
- Research training (44 percent)

Figure 4-18. Percent of recipients reporting on aspects of the program that were most important to their satisfaction with the DOE CSGF program (N=278)



NOTE: Recipients could select up to three responses.

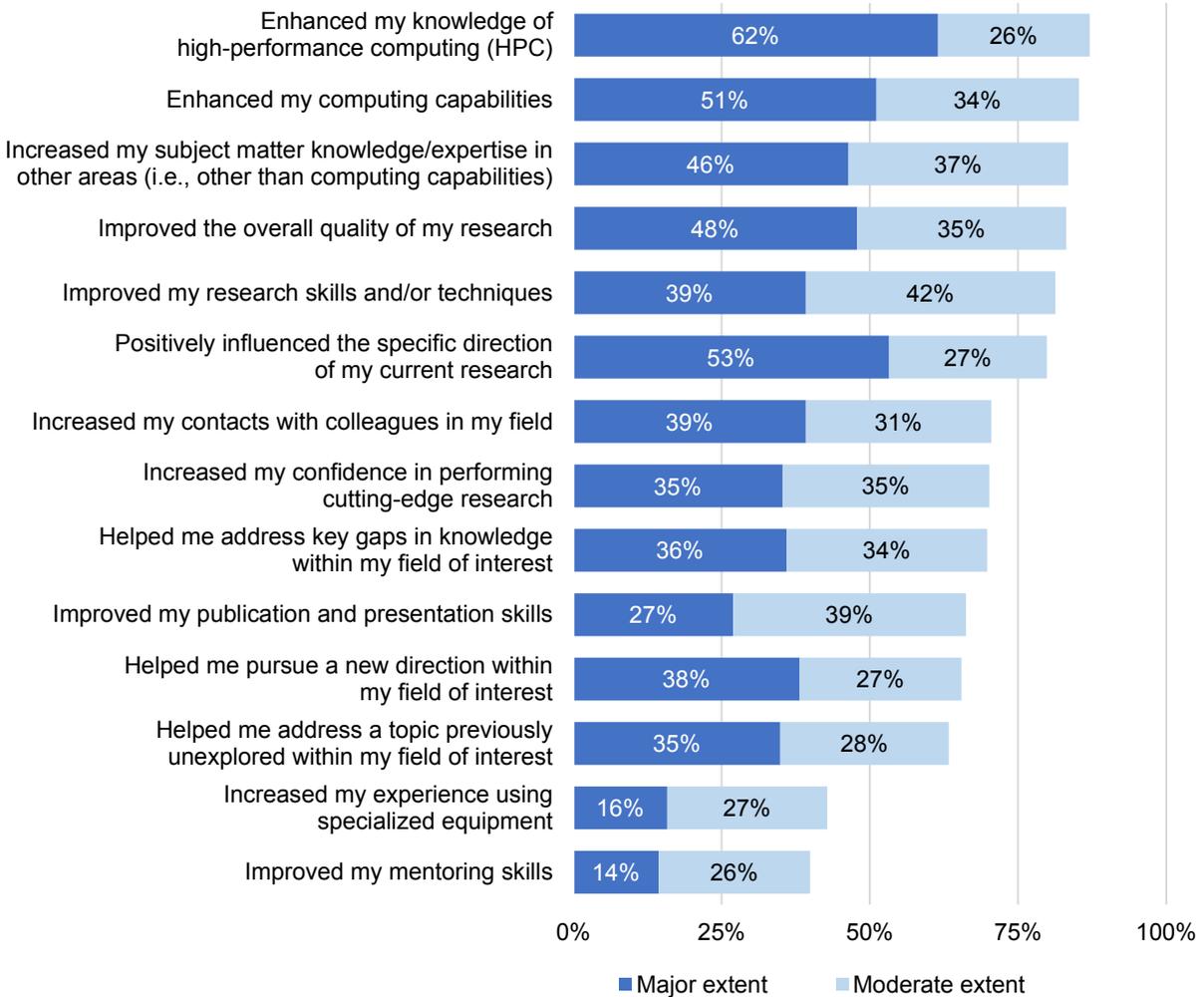
Perceived Benefits and Impacts

The survey asked recipients (i.e., both current fellows and alumni) to indicate the extent to which they felt DOE CSGF participation had benefited them in a variety of ways. Figure 4-19 shows the percentage of recipients reporting the ways in which the DOE CSGF had benefited them to a moderate or major extent. Across almost all items, the majority of recipients indicated their participation has had a moderate or major impact on them. At least 80 percent of recipients reported they had moderately or majorly benefited in the following ways:

- Enhanced my knowledge of HPC (87 percent)
- Enhanced my computing capabilities (85 percent)
- Increased my subject matter knowledge/expertise in other areas (i.e., other than computing capabilities) (83 percent)
- Improved the overall quality of my research (83 percent)

- Improved my research skills and/or techniques (81 percent)
- Positively influenced the specific direction of my current research (80 percent)

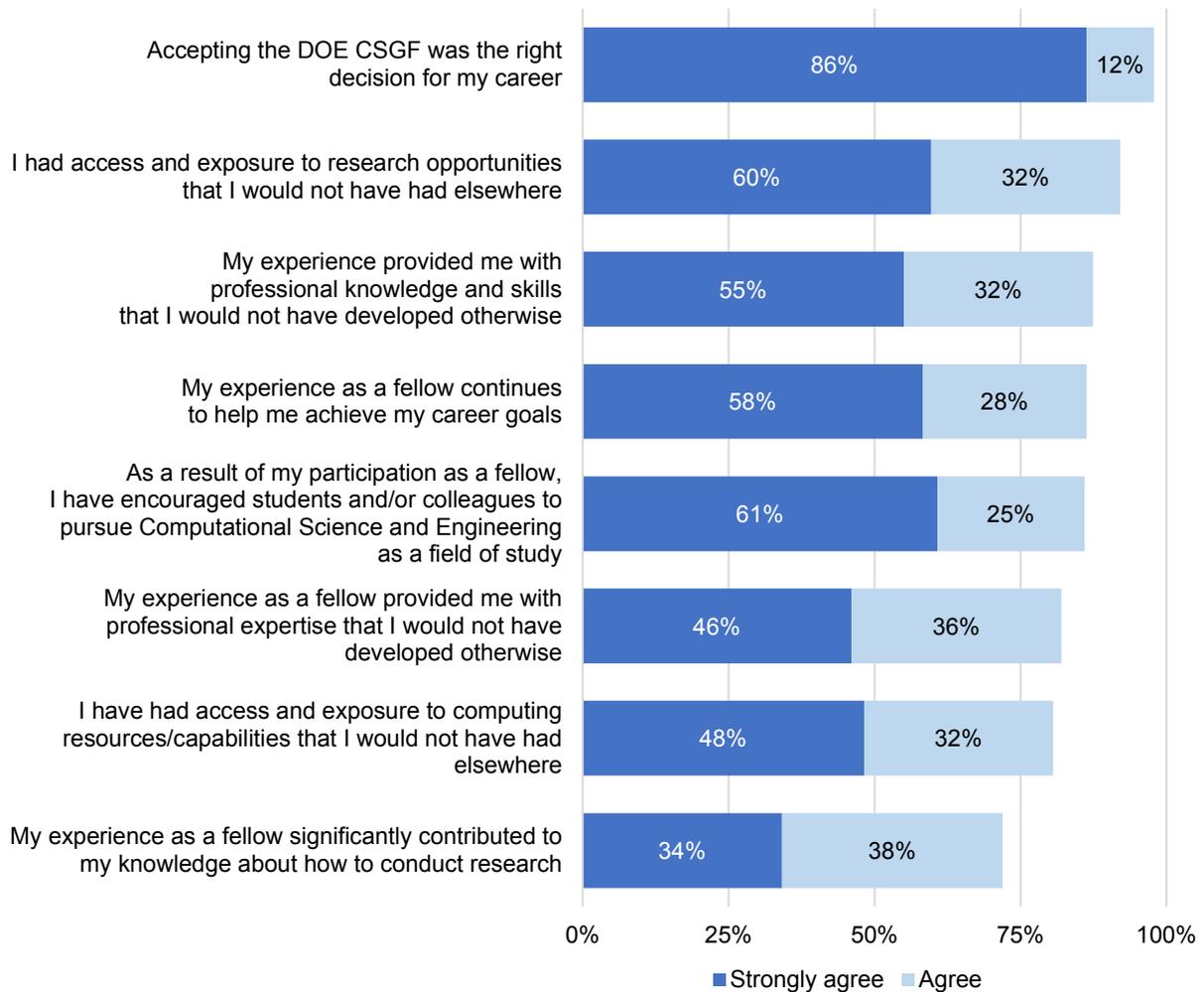
Figure 4-19. Percent of recipients reporting benefits from participation in the DOE CSGF program (N=278)



NOTE: Percentages may not sum to totals because of rounding.

The survey also asked alumni and fellows about the extent to which they agreed with various statements regarding the ways DOE CSGF participation has impacted them. As shown in Figure 4-20, a clear majority of recipients agreed or strongly agreed with all of the statements regarding the impacts of their fellowship involvement.

Figure 4-20. Percent of recipients reporting on the impacts of their participation in the DOE CSGF program (N=278)



When asked in the interviews about impacts, some of the alumni spoke generally about the overall impacts of their DOE CSGF participation, while others offered more specific examples. With regard to the former, the following four quotes (from four different respondents) are reflective of the overall sentiments expressed:

[The DOE CSGF] was just an incredible opportunity. I'm very, very happy with what the program did for my career both during my Ph.D. studies, opening up a job opportunity for a really great postdoc and preparing me too even if it's a totally different realm of a [FIELD]. So I really couldn't be any more happy with the fellowship or any of its management structure or allocation of resources.

I just want to be clear that I've been on a number of fellowships over the years and I can certainly say this is the best graduate research fellowship that I've been on again because of the small cohort, because of its organization, because of the opportunities it gives.

I would just generally say that I think it's a wonderful program ... I have a hard time finding legitimate critiques because I think this runs so well, and I believe it's extremely impactful and beneficial for the recipients. I mean it's sought after. It's very hard to get for a reason. I think the benefits, both immediate as a graduate student and long term, as far as career trajectory and career building goes are second to none and as far as other fellowships are concerned.

It was an outstanding experience. It continues to impact my career, and I think it will continue to impact my career for my entire career. Because the people that I came into contact with, people that continue to influence me, who I continue to cooperate with and work with.

With regard to more specific impacts described by alumni, these individuals cited impacts on the following areas:

- Career goals or direction
- Skills and content expertise (i.e., in computing and related areas)
- Flexibility in pursuing research
- Communication skills, management skills, and self-confidence in their professional field

Impact on Career Goals or Direction

As for the impact on their career goals or direction, some alumni reported that they were uncertain about their career goals at the beginning of graduate school and that their DOE CSGF experience helped them decide on a path. In some cases, these undecided then-fellows decided to go into academia after graduate school, and others decided to work at DOE laboratories. A few continued to evolve their career goals after graduation (e.g., they initially took positions at the DOE but then switched to academia later on). Despite not having specific plans at the beginning of their Ph.D.,

generally speaking, they anticipated going into some type of related research field. As one such alumnus stated:

I'm not sure what my expectations or my goals were [when starting the fellowship] ... Most people in the Ph.D. programs, I guess they're probably going to be research of some kind whether it's at an academic institution or a national lab or they get an industrial job and I don't think I was far out of that realm. I mean I didn't go do a Ph.D. in [FIELD] so that I could open a restaurant ... during the course of my graduate studies, especially with the practicum, I had decided that I really wanted to go to the [DOE] national lab when I finished graduate school and certainly the fellowships helped me do that.

Some alumni reported in the interviews that the DOE CSGF experience had a direct impact on their career goals. One alumnus, who is currently a DOE employee, had originally intended to go into academia after completing the program but changed his or her mind because of their experience in the fellowship and decided to work at a DOE laboratory instead:

I would attribute 75 percent [of the decision to work for DOE] to the [DOE] CSGF. Probably the freedom I had from the fellowship to do the research I wanted to do was substantial and helped me to decide naturally the route I wanted to take. The other large component ... [was] the [research] practicum that I did, which put me in direct contact with laboratory employees in a laboratory environment. I guess the third part was, I do recall a particular annual review where there was a panel of [DOE] CSGF alumni that came from various backgrounds—two laboratory employees, a couple of professors, and a couple in industry. I do remember that the lifestyle/work environment portrayed by the lab employees seemed to be more attractive than that of the professor or the industry alumni. I believe there were several other interactions that helped me decide. One was a panel organized by [DOE] CSGF at the annual [program] review, and I found those extremely helpful in making the decision to pursue my career path.

A few alumni who were interviewed shifted their career focus from academic to industry positions. One of them stated that because of the breadth of the DOE CSGF experience, he or she became a more competitive job candidate in the industry:

I think supply and demand in academics, there's plenty of supply right now, and you really have to just be sure you want to be there, to stay there. I wasn't particularly interested in that business model so I decided to give industry a chance and enjoyed it ... what [the DOE] CSGF did was it certainly gave me the confidence to know that I can be a competitive applicant in this field. And then I knew that with the particular skills that I have been trained with in graduate school, by virtue of [the DOE] CSGF, that if I went to some place and didn't like it, that I knew there'd be other positions available that were similar that I can also work at.

Some alumni reported that the DOE CSGF experience did not change their career goals but instead confirmed the career plans that they had determined prior to receiving the fellowship. In some cases, these recipients already knew that they wanted to work in a particular setting, and the DOE CSGF experience did not change this goal. As one alumna stated, “It was a plan from pretty early on. I wanted to be a faculty member.” Others already knew that they wanted to work in a DOE laboratory. One of these alumni said,

I always wanted to go and work at a DOE national laboratory ... In my particular field of [FIELD], that is just where the most interesting work is happening ... I had chosen this field before I became a fellow. I guess you could argue that my experience as a [DOE] CSGF fellow just confirmed me in my choice, but I kind of knew what course I wanted my career to take even before I got the fellowship.

Similarly, another alumna stated,

[The DOE] is just where the most interesting work is happening. I could have become a professor, but I really actually think the most interesting work is at the national laboratories. I just knew that's where the big machines are, right? ... The universities are doing a lot of interesting computational science research, but it's more the type of research I did at graduate school where you're working at basic fundamentals. You're not putting together large scale simulation codes to do large scale problems and so do large scale realistic science and engineering problems, and that's what I wanted to do. I didn't want to fiddle around with idealized problems. I wanted to solve real engineering problems that are useful to the real world, and the place to do that is the national laboratory.

Lastly, some alumni reported that it was always their intention to work in a setting other than a DOE laboratory, such as academia or industry. One of these individuals did not currently work for DOE but gained a positive impression of it through the DOE CSGF:

One comment that I also want to make [is] just about the difference between the DOE Complex and academia. Being a woman, the statement I want to make is that as a theorist in academia, it is rough being a woman, and I never felt that in the DOE Complex. This is not something that you can put on the brochure but you're actually paid attention to because you're valuable and people didn't care what gender you were or what race you're from [at the DOE] and I think that's definitely not the case in academia. Even though I was producing the most in almost all the groups that I worked in, because I was a woman I was automatically at the bottom no matter what [in academia], and that doesn't happen in the DOE Complex. So, that's also something that's just useful to know. That they actually do care about diversity and people actually try to respect equality.

Impact on Skills and Content Expertise

Most of the alumni interviewed reported learning new skills or content expertise during the fellowship that positively influenced their careers. Many stated that they developed expertise in specific content areas related to the fellowship, such as computing. Although some of these skillsets were developed over the course of their general doctoral work, other skills were directly attributed to specific structural components of the DOE CSGF (e.g., the practicum or DOE CSGF course requirements). As one alumnus stated,

... the requirements from the fellowship that I take ... classes including math applications, computer science ... really gave me a bigger set of tools so that I could attack much different problems that I would have been able to attack, based on what I would probably have taken if I hadn't had the fellowship.

Similarly, another alumnus said, “[the DOE CSGF] helped me to learn computational research in a way that I would not have otherwise because it provided a more formal venue for somebody who’s not a computer scientist or applied mathematics student to learn the core parts of computational science.”

Impact on Flexibility in Pursuing Research

Some alumni stated that the DOE CSGF allowed them flexibility to pursue various topics, which was helpful for their careers. A few noted that, generally, having funding for graduate study provided them with freedom to pursue topics of interest to them, rather than being restricted to topics chosen by their advisor. One alumnus stated that in order to succeed in computational science, you needed to be an expert in your own domain, as well as in math and computer science, and that the DOE CSGF encouraged the development of these interdisciplinary skills. Another alumnus also valued the interdisciplinary nature of the DOE CSGF, saying,

[DOE] CSGF gives you a slightly larger view into the research domain that exists in our country. Academia can be very isolating at time ... one of the biggest effects is just opening your eyes to what else is going on in computational science around the country in different fields by different people. That made the groundwork, I think, for future leaders of both their domains and this cross-domain collaboration. So I think that's one of the biggest impacts, if not the biggest.

Impact on Communication Skills, Management Skills, and Self-Confidence in Their Professional Field

Some alumni stated that the DOE CSGF provided them with communication skills, particularly in the realm of communicating complex ideas to a lay audience. For example, according to one respondent,

I would say that the biggest thing that the [DOE CSGF] fellowship has done for me is probably, like I said, the communication aspect of it. I think that was extremely valuable. I don't think I could have learned that anywhere else and I don't think I could acquire ... doing the work that I do today. But I think a lot of my work, a lot of my success today is probably attributed to the fact that I could not only do the computation but also explain it to a layman and to people who don't have the background.

Two alumni interviewed said that the program provided them with management skills that were useful in their career. These individuals said that the DOE CSGF gave them skills in areas such as managing a team and writing grants. For example, as one of the alumni said,

[The DOE CSGF Practicum] had some team building people from professional management team building come and run us through an activity that's something completely unlike what we would have had anywhere else, but as you start moving up and taking on a faculty position or role with more managerial duties, you just realize how crucial that stuff is. Like DOE's on it again, thinking outside the box, thinking ahead of the rest of us. So, it's great to see that.

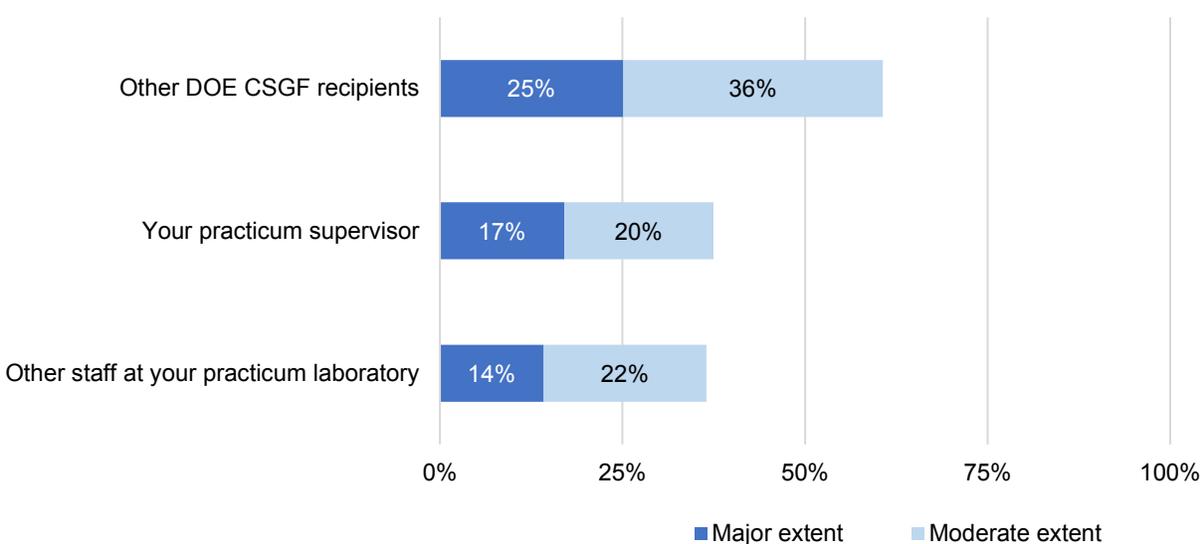
Along the same lines, some alumni stated that the DOE CSGF gave them confidence and a sense of authority or legitimacy in their field. As one alumna stated,

[Through the DOE CSGF] I have been able to listen to technical talks on just about everything and so I'm not really intimidated by new areas. If you looked at me 10 years ago, I was the one at an internship nervous to call a supervisor or to call a technician or an operator. Now I can talk to just about anyone because we did have to ... you start to talk to all kinds of people, and you meet Nobel Laureates, and the Secretary of Energy, and these people who are high up in leadership in national laboratories. So it becomes a lot less intimidating. So it's just that confidence in being able to communicate with others, and also be able to listen to broad talks, and be able to engage and ask questions of people in all these different domains and gain from them I think was very unique to the fellowship but also helpful in transforming me from a secretly introverted person to where I'm at now.

Community

With regard to community, alumni were asked to report the extent to which they had stayed in touch with others affiliated with the DOE CSGF since completing the program. As shown in Figure 4-21, over 50 percent indicated that they had stayed in touch with other DOE CSGF recipients, while about one-third reported staying in touch with their practicum supervisor, and one-third also reporting they stayed in touch with other staff at their practicum laboratory.

Figure 4-21. Percent of alumni reporting the extent to which they have stayed in touch with other DOE CSGF affiliates (N=211)



NOTE: Item only appeared on alumni survey.

The issue of community was also addressed in the interviews, and alumni often cited the DOE CSGF community as one of the best aspects of the fellowship. For example, as one alumnus stated,

I can't harp on the community aspect enough. I've been on many fellowships over the years and the ones that are most useful are those that actually maintained a community of alumni and then also have a small enough cohort so that people actually know other people within a few years of them ... that cohort allows you to develop connections throughout your research career that you otherwise wouldn't have.

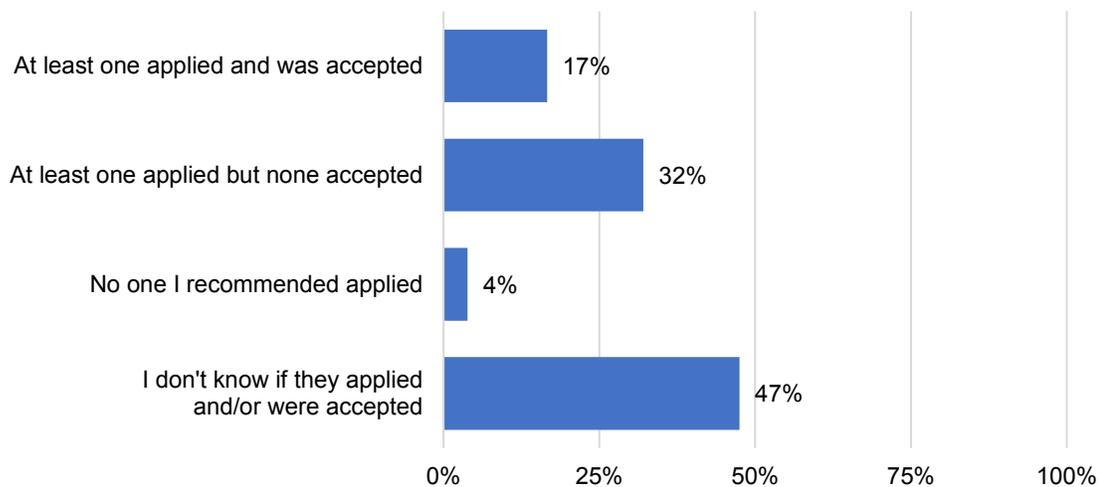
Most alumni also stated that the fellowship allowed them to make connections with others in the field, develop personal relationships, learn from role models, or collaborate with others. The impact of these personal connections on alumni's careers varied. Some simply enjoyed developing

friendships with like-minded individuals. Others stated that these connections had a wide-ranging impact on their careers. As one noted,

Sometimes little things or particular things have a huge impact on your career, like my interaction with [NAME] through the [DOE] CSGF program had a huge impact on my career [due to getting me a job]. But also interactions during the fellowship and even more as an alumnus of the fellowship with other fellows and former fellows has had a huge impact on my career. So I've collaborated with and mentored and been mentored by other fellows and former fellows and current fellows. That's influenced the way I think about things, the kind of work that I do.

Both alumni and current fellows were asked in the survey about whether they had ever recommended that someone else apply for the DOE CSGF. Ninety-three percent of recipients indicated they had recommended at least one person to apply to the fellowship. While many recipients did not know the outcome of the applications that had occurred as a result of their recommendation, at least 17 percent of recipients recommended at least one applicant who was accepted to the DOE CSGF (Figure 4-22).

Figure 4-22. Percent of recipients reporting the status of potential applicants to whom they had recommended the DOE CSGF program (N=259)

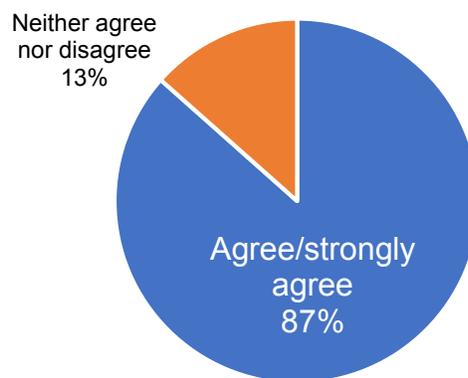


NOTE: Figure is limited to recipients indicating they had recommended the program to at least one potential applicant.

Current Fellows' Plans After DOE CSGF Completion

Current fellows were asked several questions in the survey about their plans after completing the DOE CSGF and the role the fellowship might play in those plans. First, they were asked to predict the extent to which their status as a DOE CSGF recipient would be beneficial when it came to securing their first post-DOE CSGF position, and 87 percent agreed that this status would likely give them an advantage over others with similar qualifications (Figure 4-23).

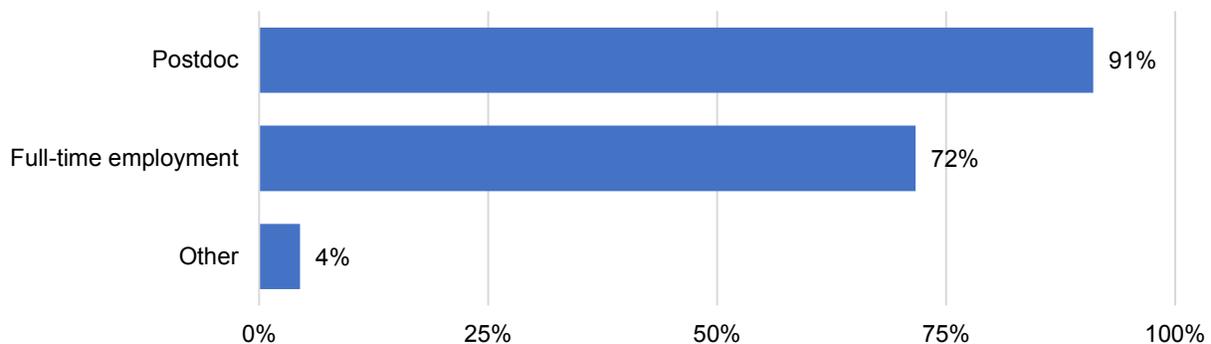
Figure 4-23. Percent of current fellows agreeing that participation in DOE CSGF would help them secure their first position (N=67)



NOTE: Item only appeared on current fellows survey.

Next, fellows were asked to select the types of employment and the setting in which they planned to apply after completing their fellowship. As Figure 4-24 shows, the majority of fellows planned to apply for both postdoc(s) and full-time employment after their fellowship.

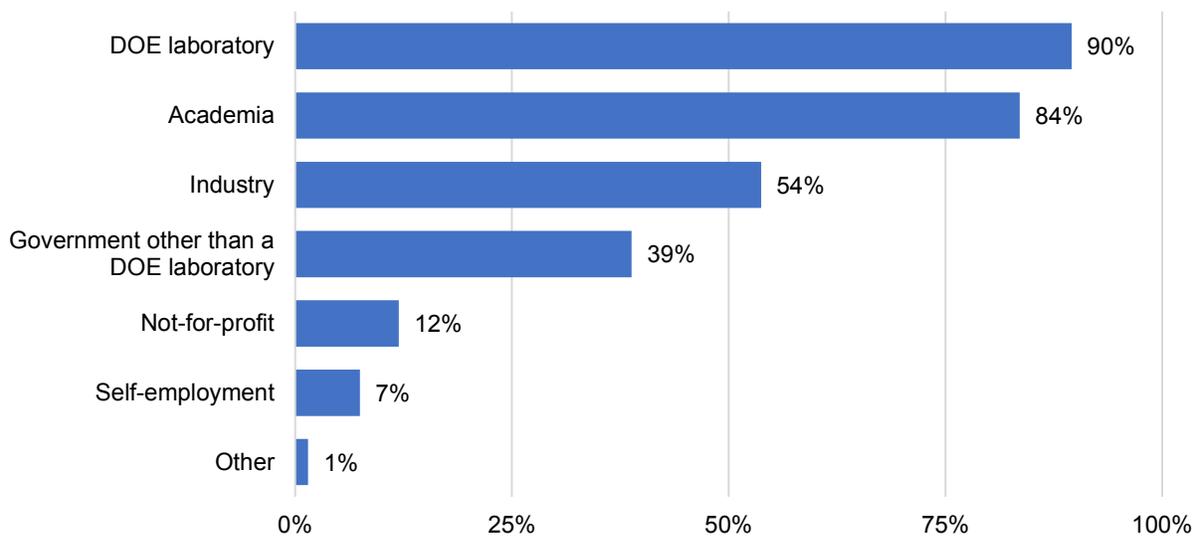
Figure 4-24. Percent of current fellows reporting the types of employment they planned to pursue after completing the DOE CSGF program (N=67)



NOTE: Fellows could select multiple responses.

When asked to indicate the settings in which they planned to seek employment or postdoc positions after their fellowship, DOE laboratories and academia were most common. Ninety percent of fellows said they were planning to apply to a DOE laboratory after their fellowship, while 84 percent were planning to apply to a position in academia. Just over half of the fellows indicated they were planning to apply to positions in industry (Figure 4-25).

Figure 4-25. Percent of fellows reporting the professional settings in which they planned to apply for employment after completing the DOE CSGF program (N=67)



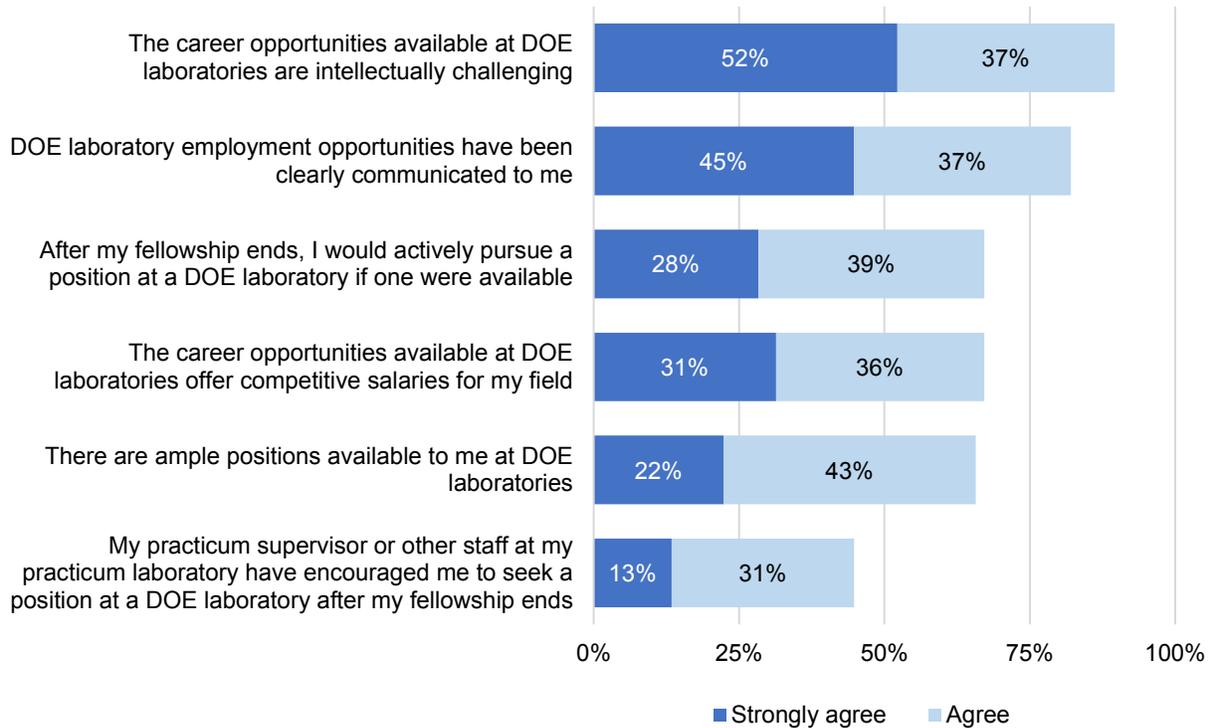
NOTE: Fellows could select multiple responses.

Finally, fellows were asked to report the extent to which they agreed with various statements regarding the DOE laboratory opportunities they felt were available to them after DOE CSGF completion. As shown in Figure 4-26, a clear majority of fellows agreed or strongly agreed with the following statements regarding employment at a DOE laboratory:

- The career opportunities available at DOE laboratories are intellectually challenging (90 percent)
- DOE laboratory employment opportunities have been clearly communicated to me (82 percent)
- After my fellowship ends, I would actively pursue a position at a DOE laboratory if one were available (67 percent)
- The career opportunities available at DOE laboratories offer competitive salaries for my field (67 percent)

- There are ample positions available to me at DOE laboratories (66 percent)

Figure 4-26. Percent of fellows reporting on their perceptions of the opportunities available at DOE laboratories (N=67)



NOTE: Item only appeared on current fellows survey. Percentages may not sum to totals because of rounding.

5. Findings on Recipients' Career Activities and Accomplishments Since Participating in the DOE CSGF Program

This chapter presents findings on recipients' career activities and accomplishments since participating in the DOE CSGF. The findings included in this chapter are based on survey data collected from alumni, interview data from a sample of alumni, and curricula vitae (CV) data collected from alumni. The first part of this chapter presents findings on alumni activities and accomplishments reported by recipients. It draws on survey and interview data around the topics of degree completion, recipients' employment since completing the DOE CSGF program, and the specific types of professional activities and accomplishments reported by alumni. The second part of this chapter presents findings on alumni activities and accomplishments based exclusively on information reported in CVs. It includes results on the number of awards, grants, and patents received by alumni and the number of publications produced by alumni. Also included in this section are results from the bibliometric analysis we conducted, which provide information on the level of prestige and influence of the journals in which DOE CSGF alumni have published.

Degree Completion

Survey respondents were asked if they had completed their Ph.D. Of the 211 alumni who responded to the survey, 89 percent indicated they had earned their Ph.D., while another 8 percent reported they were still working toward completion. Four percent indicated they were no longer pursuing a doctoral degree.²¹

About half (49 percent) of the 203 recipients who reported they had completed or anticipated completing their Ph.D. indicated that they had finished (or would finish) their degree within the

²¹Percentages do not sum to 100 because of rounding.

same calendar year that their fellowship ended.²² An additional 31 percent earned their degree in the next calendar year after completing the fellowship. Twenty percent reported finishing (or anticipated finishing) their degree between two and seven years after the end of the fellowship.

In addition, 44 alumni submitted a CV but did not respond to the survey. All but four of these alumni reported that they had completed their Ph.D., while the remaining four indicated that they anticipated earning their doctoral degree in 2016 or 2017.

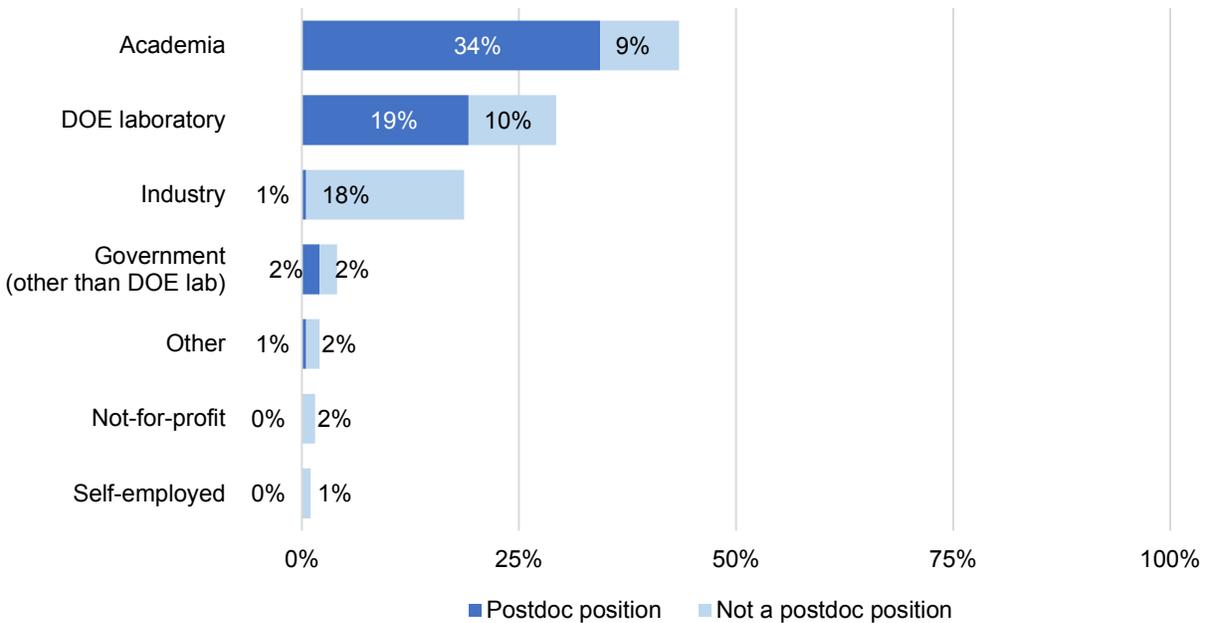
Employment Since Completing the DOE CSGF

The survey asked alumni if they had been employed since completing their Ph.D. and in what type of professional setting (e.g., DOE laboratory, industry, academia, etc.). Of the 211 alumni who completed a survey, 198 reported they had been employed since completing their fellowship, including postdoc positions. The vast majority (89 percent) of those 198 indicated that their first employment was a full-time position.

As shown in Figure 5-1, the majority of DOE CSGF alumni indicated that their first position was either in academia (43 percent) or at a DOE laboratory (29 percent), many of which were postdoc positions. Thirty-four percent reported their first position was an academic postdoc, while an additional 9 percent reported starting their careers in a non-postdoc academic position. Similarly, 19 percent of alumni indicated that their first position was a DOE laboratory postdoc, while an additional 10 percent took a different position at a DOE laboratory.

²²This includes three recipients who indicated they completed their degree in the year before they completed the DOE CSGF program.

Figure 5-1. Percent of alumni reporting the professional setting of their initial employment (N=198)



In addition, of the 44 alumni who submitted a CV but did not complete a survey, information about initial employment was available for 34 alumni. Nineteen of these 34 alumni were first employed in academia, while 10 were first employed in industry, four at a DOE laboratory, and one in a not-for-profit organization.²³

Influence of DOE CSGF on Obtaining Initial Employment

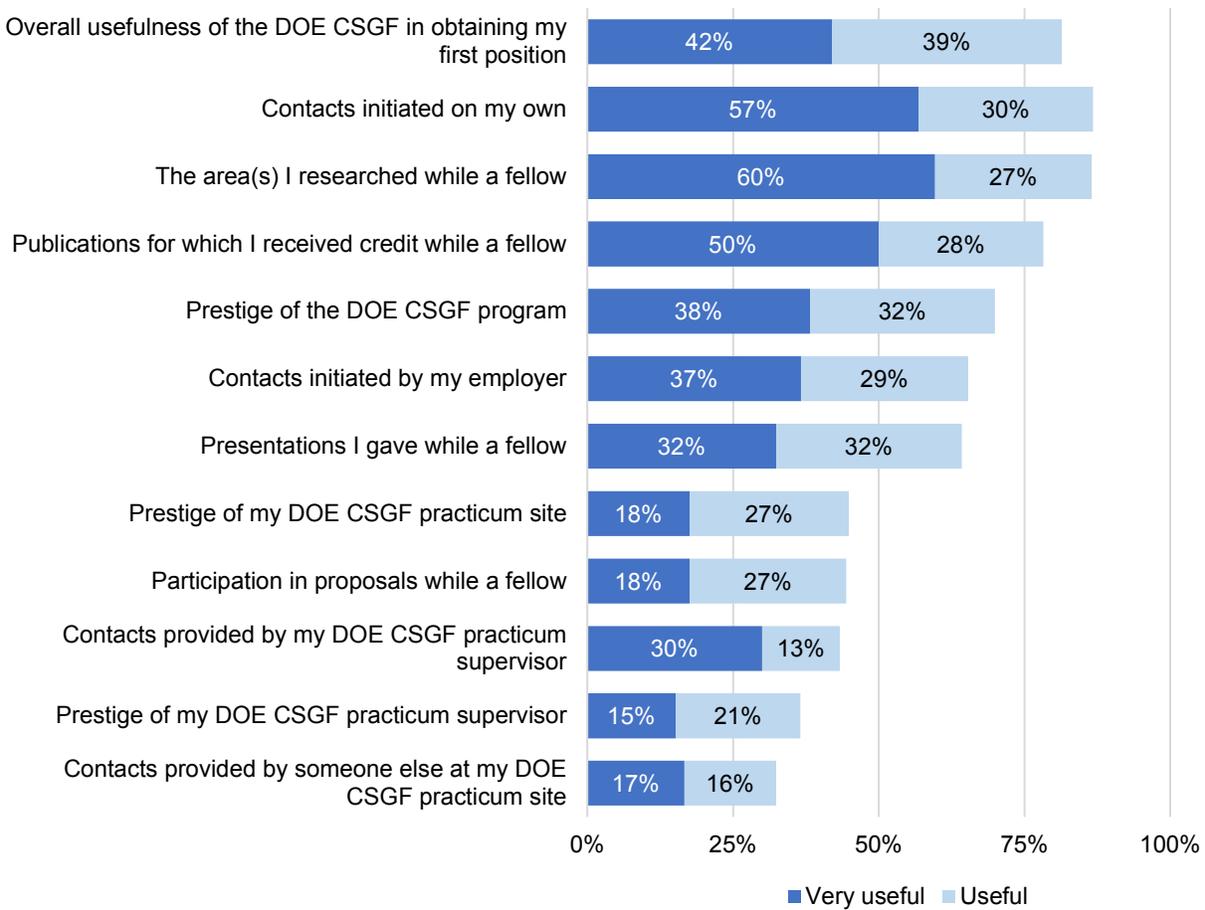
The survey asked alumni about the extent to which being a DOE CSGF recipient influenced their employment following the fellowship. First, alumni were asked about the extent to which they agreed with the statement, “When it came to securing my first post-DOE CSGF position, my experience in the program gave me an advantage over others with similar qualifications.” Of the 198 alumni who indicated they had been employed since completing the fellowship, 78 percent agreed or strongly agreed with this statement.

²³We purposefully did not combine information about employment that was obtained from CVs with similar information obtained through the survey; our rationale is that while the survey asked recipients directly and thus reflects precise counts, using CVs as a source of information may result in undercounting if individuals excluded this information from their CV.

The survey also measured the extent to which alumni found the DOE CSGF useful (overall) in obtaining their first post-fellowship position, as well as the extent to which they found specific program elements useful in obtaining that position. As shown in Figure 5-2, more than 80 percent indicated they found the DOE CSGF overall to be useful or very useful in securing their first position. A clear majority of respondents reported the following elements to be useful or very useful in obtaining their first position:

- Contacts initiated on my own (87 percent)
- The area(s) I researched while a fellow (87 percent)
- Publications for which I received credit while a fellow (78 percent)
- Prestige of the DOE CSGF program (70 percent)
- Contacts initiated by my employer (65 percent)
- Presentations I gave while a fellow (64 percent)

Figure 5-2. Percent of alumni reporting on the usefulness of program elements in obtaining initial employment after completing the DOE CSGF



NOTE: The percentages shown for the specific items in Figure 5-2 reflect the responses of those alumni who indicated they had been employed since completing the fellowship and exclude those who selected not applicable to the specific item. The Ns for the specific items in the figure ranged from 108 to 188. Percentages may not sum to totals because of rounding.

During the interviews, alumni elaborated on how the DOE CSGF helped them obtain their first position, with most indicating that the program helped with networking, resume building, or developing new skills. For example, some alumni said that their first jobs came from networking and connections made through the fellowship, with one alumna stating specifically that the program review poster sessions led directly to his or her first job. Also, a handful of alumni stated that the prestige of the DOE CSGF helped when applying for their first job. One alumna who obtained a job at a DOE laboratory said that candidates with prestigious fellowships were considered for staff positions coming directly out of graduate school, as opposed to coming out of postdoc positions. A few alumni also said that developing new skills during their time as a fellow led to jobs after the fellowship ended. For example, one alumna who described developing new skills as a result of

DOE CSGF stated, "... basically every job I've had since graduating I can trace back to my time in the [DOE] CSGF."

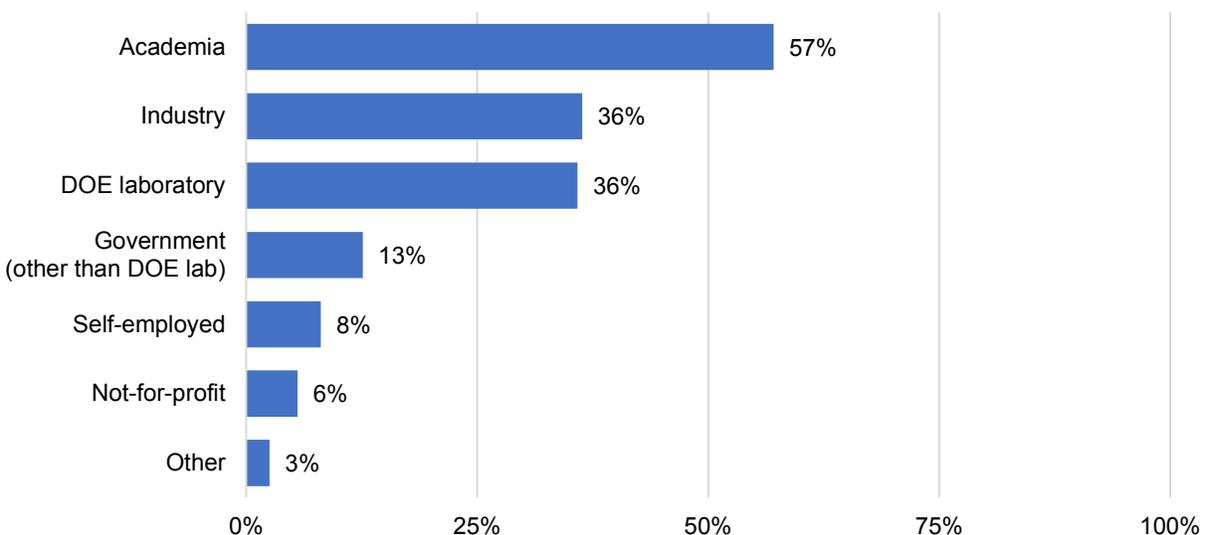
Additionally, one alumnus volunteered information about how receiving the DOE CSGF improved his or her job prospects not only after completing the fellowship but even before he or she began pursuing a position. This respondent indicated turning down job offers while still a fellow:

I got several unsolicited job offers to go into industries while I was a ... fellow and having since graduated because they said, 'We recognize the people that come out of this fellowship program are sort of uniquely trained in all of these areas to be successful, and that's exactly who we're looking to hire.'

Professional Settings in Which Alumni Have Been Employed

Alumni who indicated that they had been employed since completing the fellowship were asked in the survey to report all the professional settings in which they had worked. As Figure 5-3 shows, the most common setting in which DOE CSGF alumni (i.e., those who responded to the survey) had worked is academia (57 percent), followed by industry and DOE laboratories (36 percent each).

Figure 5-3. Percent of alumni reporting the professional settings in which they had worked since completing the DOE CSGF (N=198)

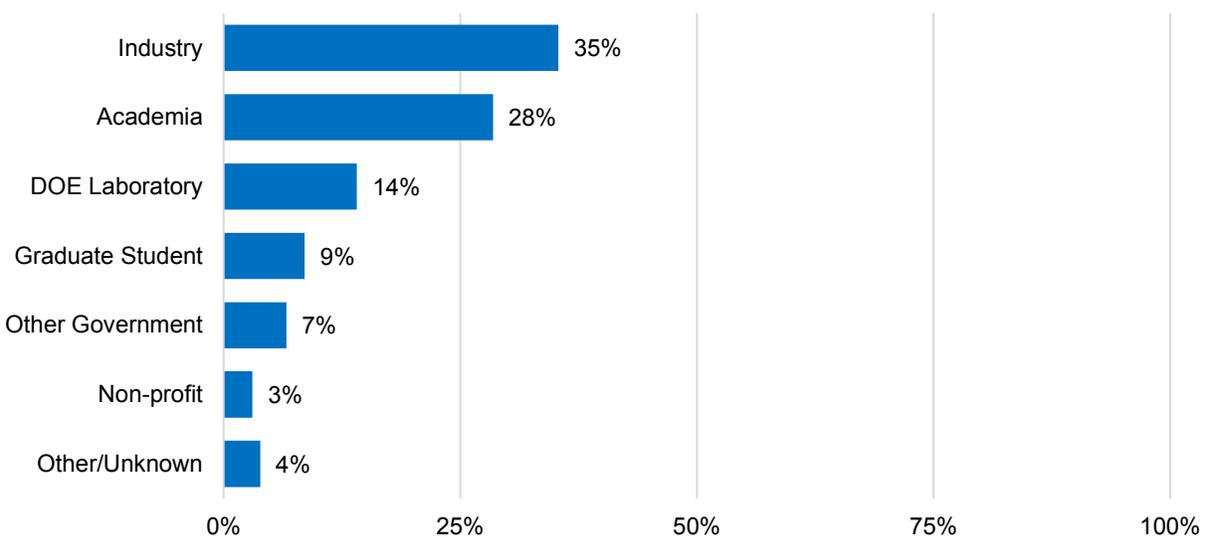


NOTE: Respondents could select multiple sectors.

Professional Settings in Which Alumni Are Currently Employed

Krell Institute maintains current employment data for all 362 alumni (i.e., excluding five individuals who are deceased), and this information is presented below in Figure 5-4. As shown, when including all alumni, industry is the most common setting in which alumni are currently employed (35 percent), followed by academia (28 percent) and DOE laboratory (14 percent). The remaining categories each make up less than 10 percent.

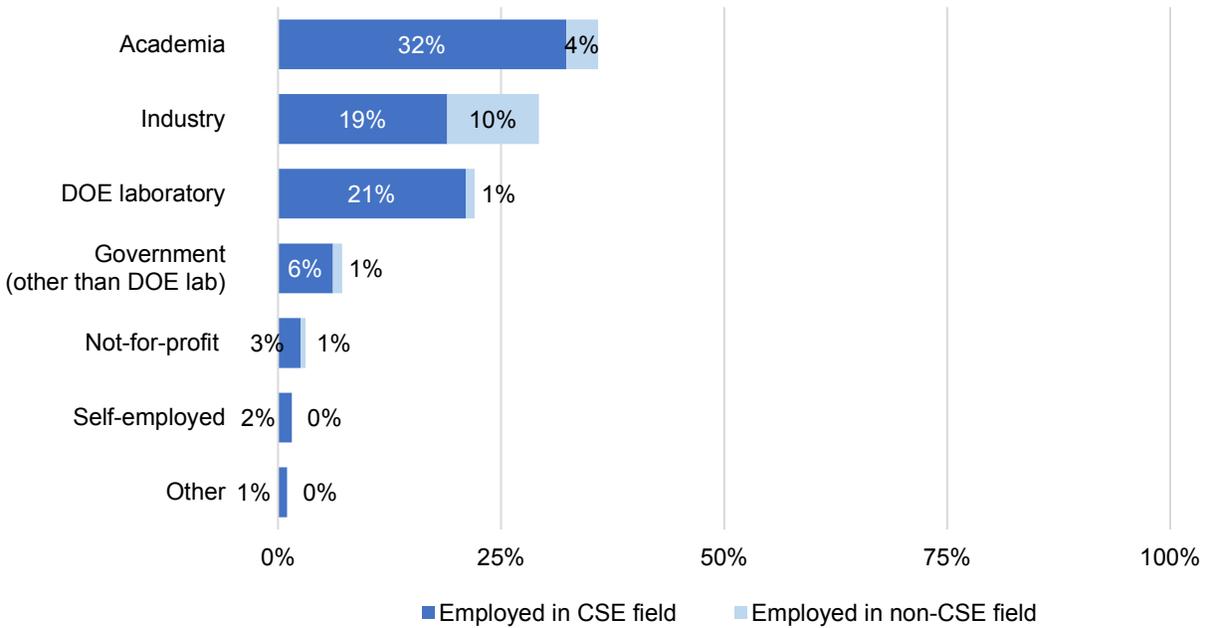
Figure 5-4. Percent of alumni currently employed in each professional setting (N=362)



NOTE: Categories differ slightly from those in the survey-based employment figures in this chapter since the source is Krell administrative data.

Overall, 84 percent of alumni who responded to the survey reported that their current position was in a computational science and engineering (CSE) field. As also shown in Figure 5-5, many of those in non-CSE fields were clustered in a private industry setting.

Figure 5-5. Percent of alumni employed in a CSE field, by professional setting (N=195)

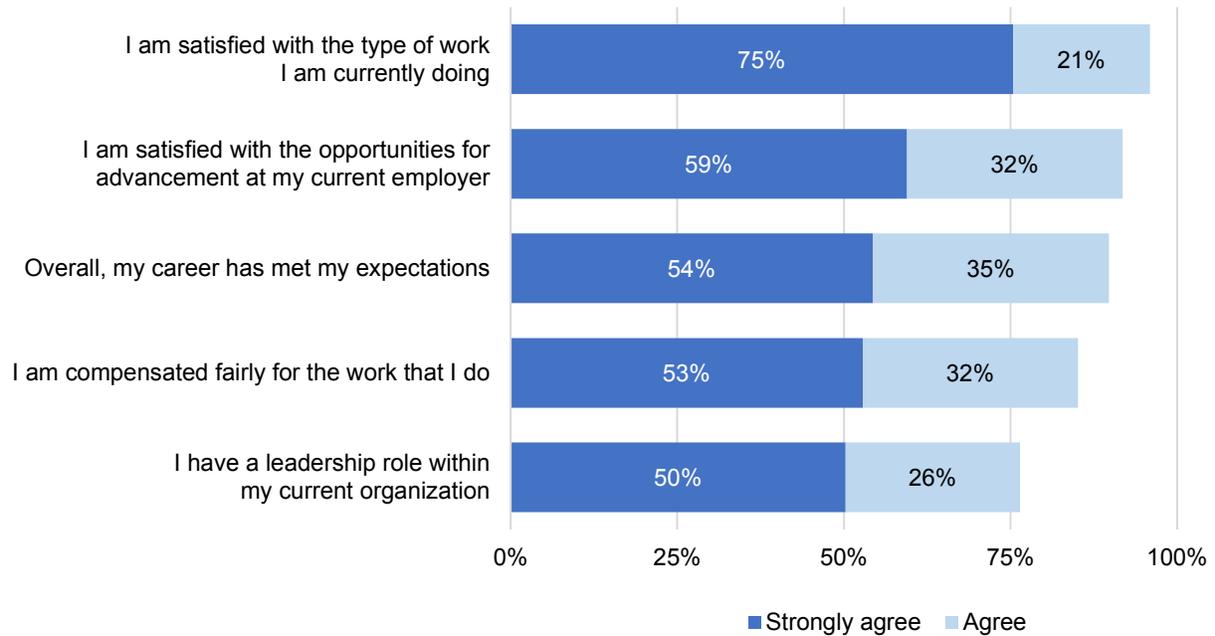


NOTE: Figure is limited to alumni indicating that they were currently employed.

Level of Satisfaction in Current Position

Next, the survey asked alumni about the level of satisfaction with their current position and about whether they occupied a leadership role within their current organization. Figure 5-6 shows that more than three-quarters of DOE CSGF alumni agreed or strongly agreed with the statements regarding their satisfaction with current employment, and approximately three-quarters of respondents had a leadership role within their current organization.

Figure 5-6. Percent of alumni reporting level of satisfaction with their job (N=195)



NOTE: Figure is limited to alumni indicating that they were currently employed.

Professional Activities and Accomplishments

The survey asked alumni to reflect on the extent to which they had engaged in specific professional activities and the frequency with which they had made various professional accomplishments. With regard to activities, as shown in Figure 5-7, the majority of alumni indicated they had engaged in all of the professional activities they were asked about. Most notably, more than 80 percent indicated that they had engaged in the following activities to a moderate extent or to a major extent since completing their fellowship:

- Engaged in interdisciplinary research (88 percent);
- Achieved their overall career goals (87 percent); and
- Contributed to innovative ideas in their field (82 percent).

Figure 5-7. Percent of alumni reporting the extent to which they engaged in professional activities (N=211)



With regard to accomplishments, the survey asked alumni to report how often (if at all) they had made specific professional accomplishments in the last five years (or since completing their fellowship if less than five years out). Figure 5-8 shows that more than half of alumni had participated in each of several types of presentations or invited talks at least once in the past five years or since completing their fellowship.

Figure 5-8. Percent of alumni reporting how often they had made professional accomplishments (N=211)

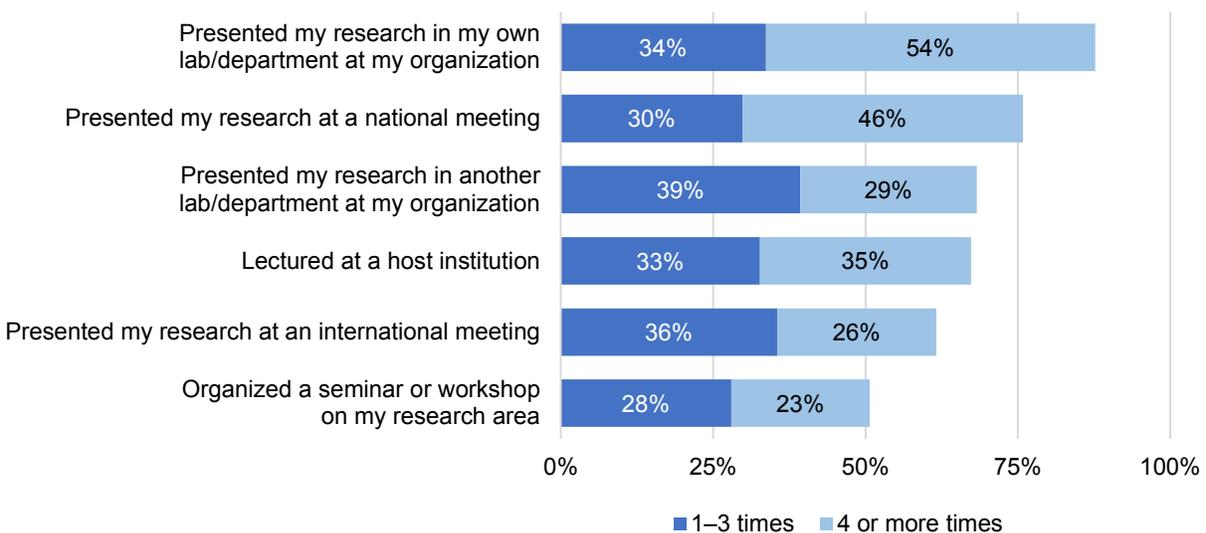
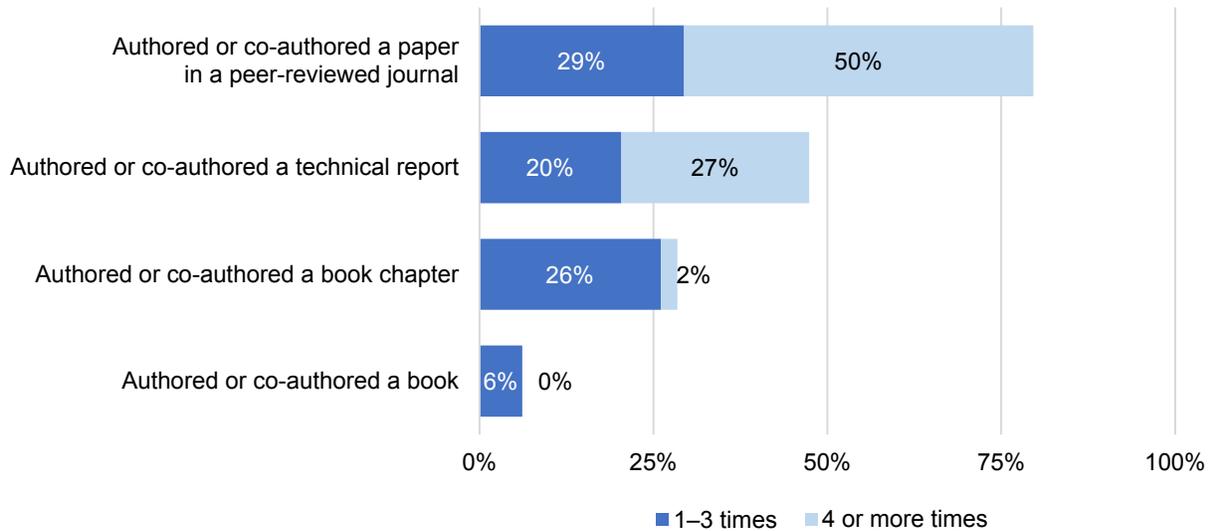


Figure 5-9 shows how often alumni had authored various types of publications in the last five years (or since completing their fellowship if less than five years). Eighty percent had authored or co-authored at least one peer-reviewed journal article within that timeframe. Somewhat smaller percentages of alumni had authored or co-authored at least one technical report (47 percent) or book chapter (28 percent), while 6 percent had authored or co-authored a book.

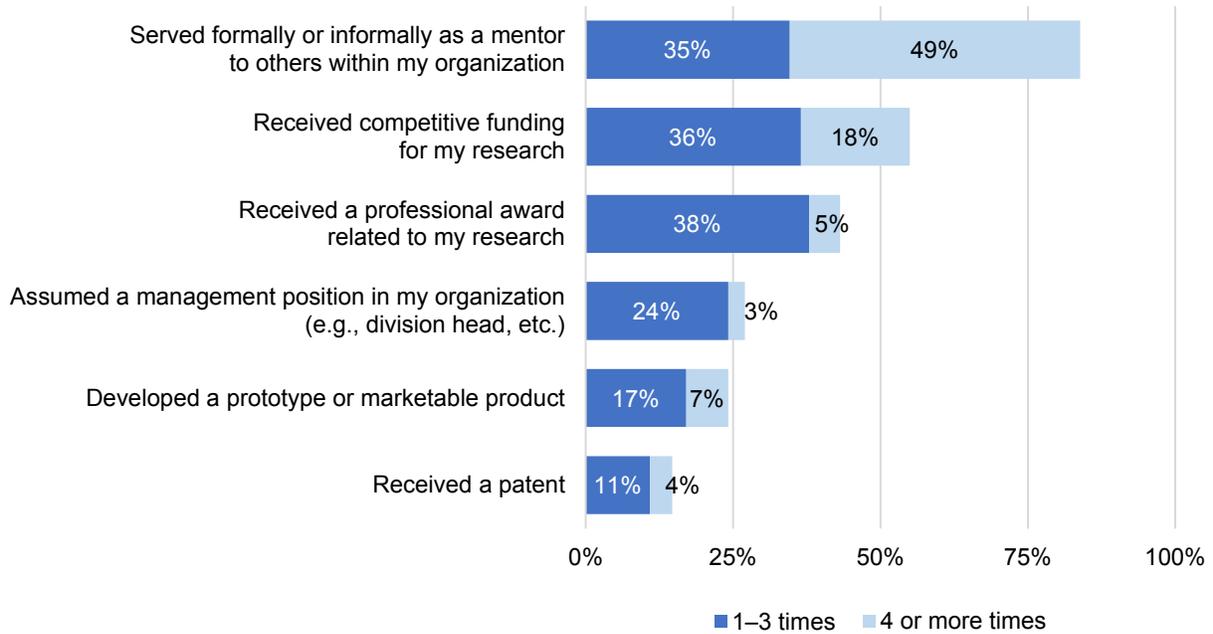
Figure 5-9. Percent of alumni reporting how often they had authored publications (N=211)



NOTE: Percentages may not sum to the totals referenced in the text because of rounding.

Alumni were also asked in the survey about the frequency with which they had made various other professional accomplishments. As shown in Figure 5-10, 84 percent of alumni had served as a mentor to others at least once in the last five years or since completing their fellowship. Similarly, 55 percent had received competitive funding for their research at least once. Other types of professional accomplishments that were reported less frequently by alumni included developing or prototyping a marketable product (24 percent) and receiving a patent (15 percent).

Figure 5-10. Percent of alumni reporting how often they had made other professional accomplishments (N=211)

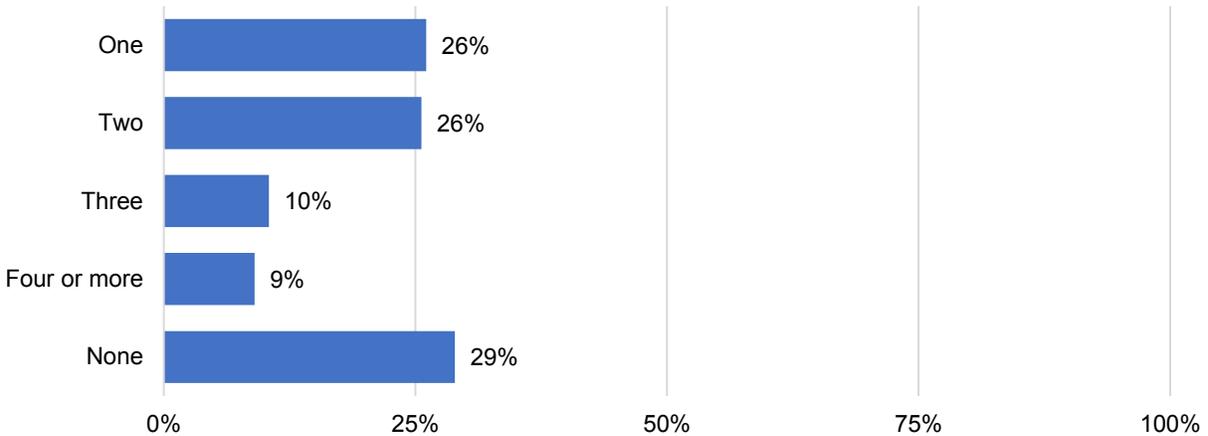


NOTE: Percentages may not sum to the totals referenced in the text because of rounding.

Membership in Professional Associations

Alumni were asked to report the number of professional organizations or societies to which they currently belonged. Seventy-one percent of all 211 alumni who completed the survey indicated they belonged to at least one professional organization. As Figure 5-11 shows, 26 percent of alumni reported membership in a single professional organization, while 45 percent were members of multiple organizations.

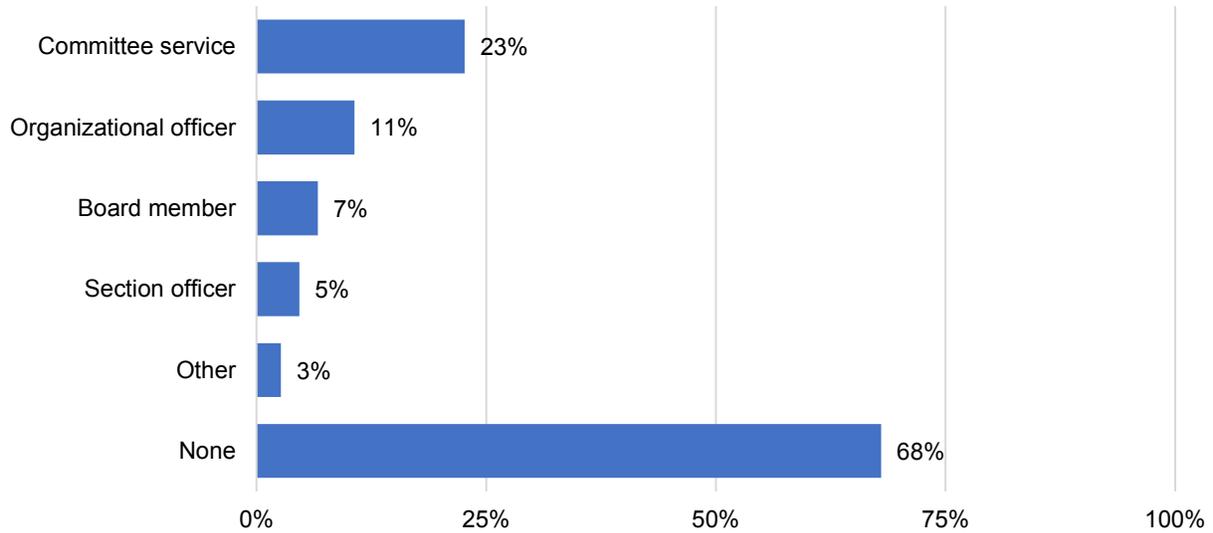
Figure 5-11. Percent of alumni reporting the number of professional organizations to which they belonged (N=211)



In addition, of the 44 alumni who submitted a CV but did not complete the survey, 14 of the 44 CVs listed membership in professional organizations. These 14 alumni listed a total of 47 organizations to which they belong, with this group reporting between a minimum of one and a maximum of seven memberships. All 14 of the alumni who listed membership in at least one professional organization in their CV also listed a leadership role in at least one of these organizations.

DOE CSGF alumni who reported membership in at least one professional organization or society were also asked about the leadership positions they had held within those organizations. Thirty-two percent of alumni surveyed indicated they had held at least one leadership position, with the most common roles being committee service (23 percent) and organizational officer (11 percent).

Figure 5-12. Percent of alumni reporting the leadership positions they held in professional societies or organizations (N=150)



NOTE: Figure limited to respondents indicating membership in at least one professional organization. Respondents could select multiple leadership positions.

Alumni Activities and Accomplishments Reported in CVs

In addition to collecting information about professional activities and accomplishments through the survey and interviews, we analyzed both the publication output of the 243 alumni who submitted CVs (or similar documentation) as well as the extent to which alumni received awards, grants, or patents.²⁴

²⁴We also examined the same information for current fellows, of whom a total of 66 provided a CV. Of these, 34 included information relevant to this study. Given the limited number of current fellows for whom this type of information was available, and the relatively limited timeframe in which current fellows have had to publish or receive awards, grants, or patents, we did not combine the professional output of the two groups. While the findings in this chapter focus on alumni, the results for the 34 current fellows are as follows: Seven fellows listed awards received since beginning their fellowship, while two listed grants/contracts, and one fellow listed a patent. With regard to publications among the 34 current fellows, 33 listed at least one article published since beginning their fellowship, and the number of articles per fellow ranged from 1 to 29, with an average of 5 articles per fellow.

Awards, Grants, and Patents Received by DOE CSGF Alumni

With regard to the extent to which alumni received awards, grants, or patents, we found the following:

- Among those alumni who submitted CVs, 165 listed at least one award received since the start of their fellowship.²⁵ The average number of awards listed was 3.6 per alumnus, with a median of 3, and the number of awards listed by individual alumni ranged from 1 to 33.
- Fifty-one alumni listed one or more grants or contracts awarded to them since the start of their fellowship. The average number of grants/contracts listed was 6.5 per alumnus, with a median of 4, while the number of grants/contracts listed by individual alumni was between 1 and 29.
- Thirty-five alumni listed a total of 211 patents; however, it should be noted that nearly half of these (96) were listed on a single CV. Excluding this outlier, the average number of pending and/or issued patents per researcher was 3.4, with the number of patents listed on individual CVs ranging from 1 to 15. In addition, for the 206 patents for which issuer information was available, all but four were granted in the United States. The majority of patents listed on alumni CVs had been granted at the time of coding (182 of 206 for which information was available), while the remaining 24 were still pending.

Publications Produced by DOE CSGF Alumni

Alumni CVs included a substantial number of journal publications and similar productivity. Of the 243 alumni submitting their CV, 217 listed at least one publication, including journal articles, books, book chapters, journals, presentations such as lectures and invited talks, and conference presentations, papers, or proceedings. As Table 5-1 shows, journal articles were the most common type of publication listed, followed by conference presentations, papers, or proceedings. The vast majority of products alumni included in their CVs were unique. In other words, while these may have been collaborative works, they did not collaborate on such publications with other DOE CSGF alumni who submitted a CV. However, there was a small number of products that appeared in more than one CV.

²⁵Coding was limited to any awards received in the next calendar year after the start of the fellowship. For example, for a fellow beginning the DOE CSGF program in the fall of 2005, only awards received in 2006 or later were included in the analysis.

Table 5-1. Number of publications produced, by type

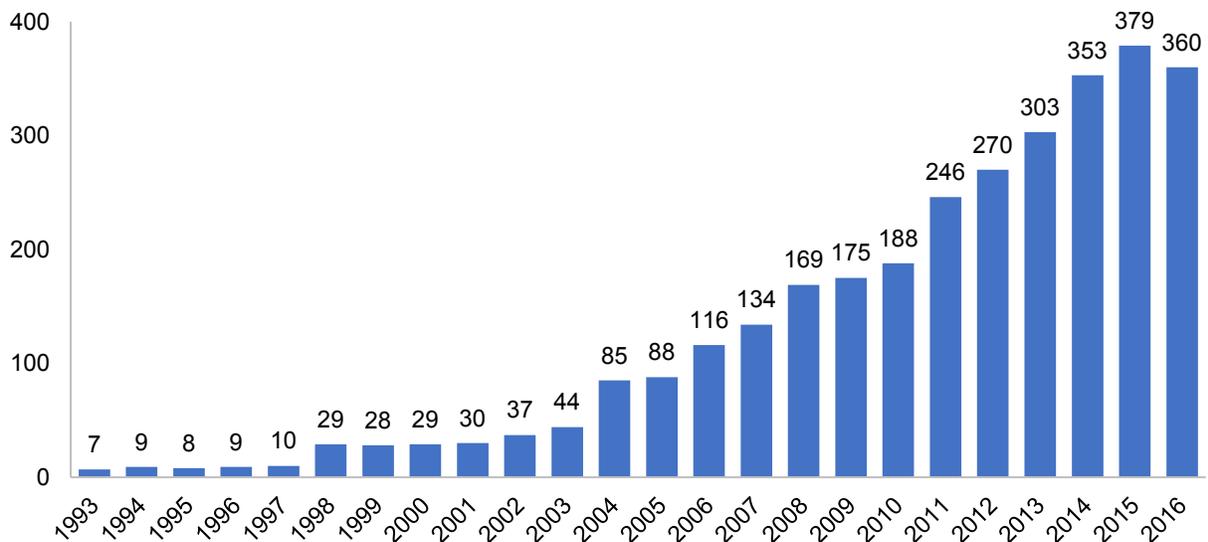
Product type	All listed in all curricula vitae	Unique products
Journal article	3,283	3,252
Conference presentations, papers, or proceedings	1,820	1,808
Presentation (e.g., invited talk, lecture, or keynote) ¹	981	981
Book chapter	113	112
Book	13	13
Other	209	206
Total	6,419	6,372

¹While some alumni included multiple instances of presentations with the same title, the count of presentations refers to unique presentations listed in a given CV. Unique presentations appeared in CVs between one and 41 times. Of the 981 presentations, 60 percent were listed three or fewer times.

Journal Articles

Journal articles were the most common type of publication or product listed by DOE CSGF alumni, making up more than half of all publications. Of the 243 alumni who submitted a CV, 202 included at least one journal article for which they were the sole author or co-author, for a total of 3,252 unique articles. Figure 5-13 shows the number of unique articles authored by one or more DOE CSGF alumni in each year. Unsurprisingly, the number of articles generally increased year to year as the cumulative pool of DOE CSGF recipients grew over time.

Figure 5-13. Number of unique journal articles published by DOE CSGF alumni, by year (N=3,106)



NOTE: Figure is limited to unique articles for which publication date information was listed in the CV. Data in this figure are based on information collected through 12/2/16.

Table 5-2 shows the number of journal articles published by each of the three cohorts of alumni (i.e., 1991–2000; 2001–06; 2007–12). Overall, each DOE CSGF alumnus had an average of 16.3 contributions to journal articles. This includes duplicate instances where two or more DOE CSGF alumni collaborated on a single article. However, given that only articles published in the calendar year following the start of their fellowship were coded, it is important to consider production of fellows by their year of entry into the program. As would be expected, fellows in earlier cohorts had higher average production than those who received their fellowship in more recent years.

Table 5-2. Number of journal articles published by alumni, by cohort

Fellowship start years	Number of DOE CSGF recipients	Average number of journal articles
1991–2000	52	26.4
2001–06	68	18.0
2007–13	82	8.4
Overall	202	16.3

Journal Influence

In examining the research productivity of DOE CSGF alumni, we looked not only at how many publications were produced and how often alumni published, but where they had published their work. More specifically, we examined the extent to which alumni published their research in journals considered to be influential, based in part by how frequently articles in those journals are cited by other researchers.

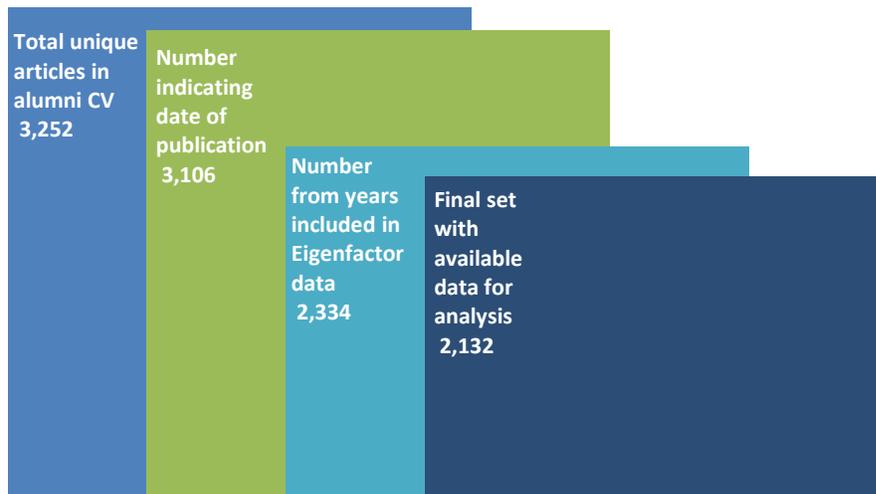
In conducting this bibliometric analysis, we used two types of publicly available measures obtained from the Eigenfactor Project. These two journal-level measures, the Eigenfactor score (EF) and the Article Influence score (AI) provided insight into the prestige and influence of the journals in which DOE CSGF alumni had published since beginning their fellowship.²⁶ The EF score quantifies the influence of a given journal in a given year, while the AI score provides the average per-article influence for a journal in a given year. In other words, each of these scores provides a measure that,

²⁶In bibliometric analysis, impacts can be measured at the level of an individual author, article, or journal based on citations. Thus, we use the term journal-level measure here to distinguish from author- or article-level measures. In short, journal-level measures indicate the influence of the *journal* in which an article is published, as opposed to the influence of the *article* itself. While the author- and article-level measures provide more precise estimates of impact, they are typically not publicly available.

while controlling for other factors, indicate the extent to which articles published in that journal are cited.²⁷

EF and AI data were publicly available only for the period of 1997–2014 and were limited to journals in Thomson Reuters’ Journal Citation Reports (JCR) for each year. Therefore, not all journal articles listed in the CVs provided by the 202 DOE CSGF alumni with at least one journal article listed were included in our analysis. Figure 5-14 outlines how the complete citation dataset generated from the CV coding was reduced to arrive at the final dataset for our analysis of journal influence. Alumni listed a total of 3,252 unique journal articles in CVs (this number excludes duplicate entries in CVs where multiple alumni co-authored a single product). Of the total 3,252 articles, we identified those that (1) indicated the specific date (i.e., year) of publication, and (2) were published between 1997 and 2014 (since, as indicated above, EF and AI data are not publicly available for articles published in other years). These steps reduced the number of articles included in our dataset to 2,132.

Figure 5-14. Final dataset for analysis of journal influence



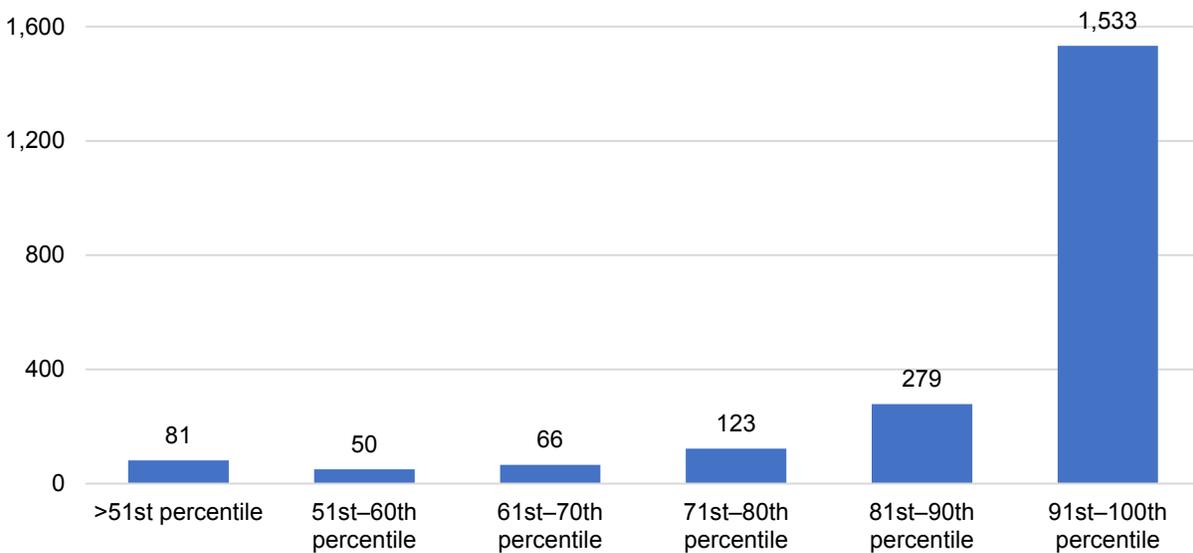
Both the EF score and the AI score are scaled such that the average score for any given journal is 1. Therefore, a journal with an EF of 5 is considered to have five times the influence of the average journal included in the dataset in that year. Similarly, a journal with an AI of 5 means the average article within that journal has five times the influence of the average article.

²⁷For greater detail on how EF and AI scores are developed, see <http://www.eigenfactor.org/about.php>.

Of the articles published by DOE CSGF alumni for which data were available, the majority (83 percent) were published in journals with above average EF scores. The EF for journals in which DOE CSGF alumni published articles ranged from less than .1 to 178.9. Excluding the 27 articles in journals without a precise EF reported in the database (i.e., those labeled <.1), the average EF was 24. In other words, on average, DOE CSGF alumni published articles between 1997 and 2014 in journals with 24 times the influence of the average journal during that time.

The Eigenfactor Project also provides a percentile rank for each journal. The percentile ranking is useful in identifying the relative influence of journals in which DOE CSGF alumni were published each year. As Figure 5-15 shows, most articles (1,533, or 72 percent) published by DOE CSGF alumni were in journals with EF scores in the top 10 percent. Another 279, or 13 percent, were in journals with EF scores between the 81st and 90th percentile.

Figure 5-15. Eigenfactor (EF) score percentile rankings of journal articles published by DOE CSGF alumni



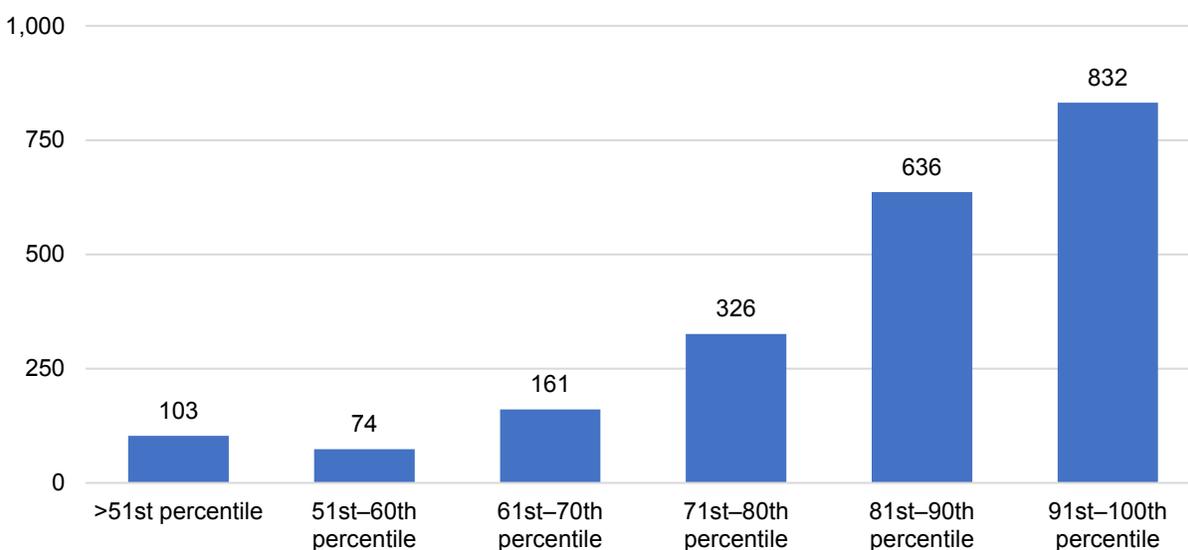
AI provides a slightly different means for determining the level of influence of journals in which DOE CSGF alumni published articles. This measure can be interpreted as the average per-article influence within a given journal for that year. Like EF, the AI is scaled so that an AI of 1 indicates a journal has the same per-article influence as the average journal in the full JCR.

Among the 2,132 articles published by DOE CSGF alumni included in our bibliometric analysis, 66 percent were published in journals with above average AI scores (i.e., greater than 1). AI scores ranged from less than .1 to 20.8. Excluding the six articles with an AI of <.1, the average AI was 2.2.

In other words, based on the AI measure, DOE CSGF alumni published in journals that were slightly more than twice as influential than average.

The percentile rankings for AI present a similar picture to the ranking based on EF scores. As shown in Figure 5-16, more than two-thirds (69 percent) of articles published by DOE CSGF alumni between 1997 and 2014 were in journals with AI scores in the top two deciles, with the largest number (832) published in journals in the top 10 percent.

Figure 5-16. Article Influence (AI) score percentile rankings of journal articles published by DOE CSGF alumni



Taken together, the results from the EF and AI scores and percentile rankings indicate that articles produced by DOE CSGF alumni across the period of 1997 to 2014 were overwhelmingly published in highly influential journals.

6. Summary and Conclusions

In this final chapter we draw on the various data collection and analysis methods used to provide a summary of findings within each of the main areas addressed in the study: characteristics of DOE CSGF recipients; recruitment and entry into the program; experiences in the program; and career activities and accomplishments. This is followed by our conclusions on what these findings suggest about the extent to which the DOE CSGF program is addressing national priorities by contributing to the development of America's advanced technological workforce.

Characteristics of DOE CSGF Recipients

The DOE CSGF has provided 436 fellowships since its inception in 1991, including 69 current fellows. Recipients have been increasingly diverse over time with regard to gender and the specific fields of study in which they pursued a degree. We examined several characteristics of the total fellow and alumni population, including their gender and the field in which they pursued (or are currently pursuing) a Ph.D. With regard to gender, while 76 percent of the 436 recipients have been men, women have increasingly made up a larger proportion of recipients and have comprised 35 percent of those who received the fellowship since 2013. The 436 recipients have pursued degrees in a wide variety of fields of study, with the most common being engineering fields, followed by physical sciences, computer science, and mathematics. However, the proportion of recipients within each of these major fields of study has shifted somewhat over time; whereas more than 50 percent in the early years of the program were in engineering, 20 percent of those who have received the fellowship since 2013 were in engineering. Among those who received the fellowship in the past 10 years, nearly half pursued degrees in physical sciences.

The DOE CSGF has drawn a large number of highly qualified applicants, and those who have received the fellowship typically attend the nation's most prestigious universities. The 436 alumni and current fellows collectively represent 64 universities across 30 states. Virtually all fellows have attended R1 doctoral universities, according to the Carnegie Classification of Institutions of Higher Education (i.e., those with the highest level of research activity). While the 436 fellows represent 64 institutions (about half of which are private and the other half public), seven universities account for nearly half of all recipients: Massachusetts Institute of Technology,

Stanford University, the University of California at Berkeley, the University of Illinois at Urbana-Champaign, Harvard University, Princeton University, and California Institute of Technology.

Recruitment and Entry into the DOE CSGF Program

The most frequent source of information for fellows when applying to the program was their professors or academic advisors. When asked about why they applied to the program in both the survey and interviews, approximately half of respondents indicated that their professors or academic advisors was the most important influence on their decision to pursue a fellowship. Other sources of information included the DOE CSGF website and DOE CSGF posters and mailings. The former became increasingly important over time, while the latter was regarded as important by the earliest fellows (i.e., those who received an award prior to 2000) but not by those who received an award in the last 10 years.

Recipients cited the DOE CSGF's unique combination of benefits and support as a factor in their decision to pursue the fellowship, with many fellows choosing the DOE CSGF over other programs. When asked whether they had applied to fellowships other than the DOE CSGF, nearly three-quarters of fellows overall indicated they had, while about one-quarter applied only to the DOE CSGF. Among those who had applied to other fellowships, just over half were accepted to at least one other program; however, the DOE CSGF was generally regarded as a first choice among fellows. In the survey and interviews, fellows generally offered three reasons for why they decided to accept the DOE CSGF. First, they felt that the program offered generous financial benefits, with some noting that the DOE CSGF offered more financial support relative to other fellowships and four full years of funding, as opposed to three years, which was typical of other programs. Second, fellows indicated that the DOE CSGF was consistent with their academic and professional interests, specifically, in focusing on computational science and engineering (CSE) and working on a supercomputer. Some suggested that the DOE CSGF also provided them flexibility in pursuing specific topics and conducting research within the broader field of computational science and engineering. Last, fellows cited the DOE CSGF's reputation and felt that it was the most prestigious of the various government- or university-sponsored programs to which they applied or considered. Some fellows also suggested that accepting the DOE CSGF would ultimately enhance their prospects for employment after completing their Ph.D.

Experiences in the DOE CSGF Program

For each of the four key components of the DOE CSGF — research practicum, program review meetings, high-performance computing (HPC), and mentoring — recipients reported very positive experiences and held favorable perceptions. For the research practicum, both alumni and fellows reported high levels of satisfaction with the various support provided to them at their practicum site. Recipients were most satisfied with the opportunity to obtain specialized equipment for their research, generate ideas about their research, and collaborate with seasoned researchers and scientists in conducting research. With regard to the program review, virtually all recipients indicated in the survey that they found various elements of this component useful, particularly the opportunities for intellectual stimulation and exchange, networking, and presenting research. When asked about HPC, most indicated they had used it during their time as a fellow and had benefited from their experiences with it. More specifically, about three-quarters of alumni indicated their exposure to HPC had resulted in growth within their career, had equipped them to make an immediate impact once on the job, and had affected their career choice. Similarly, nearly 90 percent of fellows reported using HPC at least to some extent in their own research while a fellow, and a large majority agreed that it had expanded their research capabilities and impacted their career plans and research pursuits. On the mentoring component, nearly all recipients indicated that they had received high levels of support and that the specific opportunities provided to them were useful. The aspects of mentoring that were most frequently cited as useful included collaborating on research, networking, and presenting research.

Survey data indicate that most recipients contributed to the advancement of computing activities and that their participation in the DOE CSGF resulted in their first exposure to dedicated computing time on a DOE supercomputer. The survey asked both alumni and fellows about whether they had contributed to the development of scientific codes or software and the extent to which they took advantage of dedicated computing time on DOE supercomputers. A large majority of alumni reported that they had contributed to and/or led the development of scientific codes both during the fellowship and since completing the fellowship, while about half of alumni contributed to and or led the development of scientific software suites and open source scientific software. With regard to supercomputers, while only a small percentage reported having had dedicated computing time on a DOE supercomputer prior to entering the program, more than half had utilized these resources during the program and nearly half had done so since completing the fellowship.

Both alumni and fellows expressed high levels of satisfaction with the fellowship overall and cited a range of positive impacts because of their participation. In the survey, more than three-quarters of respondents indicated being satisfied with the access to facilities, equipment, and other resources that the program provided. Similar proportions also were satisfied with the networking opportunities and research training that they had been exposed to through the program. As for the impacts of their participation, alumni described in the interviews how the DOE CSGF influenced their career goals and direction, including the desire to work at a DOE laboratory. They also described how they experienced professional growth in their skills and content expertise in computing, computational research, and related areas, as well as in their communication skills and their degree of self-confidence in their professional field. Some also described how the program provided flexibility to pursue specific topics within the field of CSE that interested them or encouraged the development of interdisciplinary skills, both of which had positive impacts on their career development.

Data from the survey and interviews suggest that there is an active DOE CSGF community, with most alumni indicating that they had stayed in touch with others and had recommended the program to others. In addition, some alumni described the DOE CSGF community as one of the best aspects of the program. Over 50 percent of recipients reported that they had stayed in touch with other DOE CSGF recipients, and one-third reported that they had stayed in touch with both their practicum supervisor and other staff at their practicum laboratory. In the interviews, alumni described how the fellowship's strong community component had resulted in benefits that they otherwise would not have had, including the development of important personal and professional relationships with others in their field and the opportunity to learn from role models.

Career Activities and Accomplishments since Participating in the DOE CSGF Program

Virtually all DOE CSGF alumni have been employed since completing their fellowship and in a range of professional settings including academia, industry, and DOE laboratories. Most alumni felt that their participation in the DOE CSGF was an important influence on their ability to obtain their first professional position. Of the 211 alumni who completed a survey, 198 (or 89 percent) reported that they have been employed since completing their fellowship (including post-doc positions). Nearly half of these 211 alumni indicated that their first position was

in academia, while close to one-third reported that their first position was at a DOE laboratory. When asked about the extent to which being a DOE CSGF recipient influenced their employment following the fellowship, nearly four out of five survey respondents agreed that their experience in the program gave them an advantage over others with similar qualifications in securing a position. In the survey, alumni also indicated that several elements of the fellowship were especially useful in obtaining their first position, including the area they researched while a fellow, the publications for which they received credit while a fellow, and the prestige of the DOE CSGF program.

With regard to current employment, the vast majority of all DOE CSGF alumni are currently employed in a CSE field. The most common setting in which alumni are currently employed is industry, followed by academia and DOE laboratories. Alumni also reported having made a range of professional accomplishments since completing the fellowship. In addition to asking in the survey about their initial employment, administrative data maintained by Krell were used to examine the professional setting in which they are currently employed. These data show that although alumni work in a range of settings, industry is the most common employment setting, at 35 percent, while 29 percent of alumni are working in academia and 14 percent are working at a DOE laboratory. Moreover, 84 percent of alumni who responded to the survey reported that their current position was in a CSE field, and more than three-quarters reported both being satisfied in their current position and having a leadership role within their organization. When asked in the survey about the extent to which they have engaged in specific professional activities and accomplishments, an overwhelming majority reported, for example, that they had achieved their overall career goals, contributed to innovative ideas in their field, addressed key knowledge gaps in their field, and advanced within their current organization.

Alumni have received a large number of professional awards and patents and have published research at an impressive and compounding rate. In addition to collecting information about the professional activities and accomplishments of alumni through the survey and interviews, we analyzed both the publication output of the 243 alumni who submitted curriculum vitae (CVs), as well as the extent to which alumni received awards, grants, or patents. Among the 243 alumni who submitted a CV, 165 listed at least one award received, with an average of 3.6 awards per alumnus. Fifty-one alumni listed one or more grants or contracts, with an average of 6.5 grants/contracts per individual. With respect to patents, 35 alumni listed a total of 211; although nearly half of these (i.e., 96) were listed on a single CV, the average number of pending and/or issued patents per alumnus after excluding this outlier was 3.4. Our analysis of the publication output of the 243 alumni who submitted CVs showed that 217 alumni listed at least one publication including journal articles, books, book chapters, presentations such as lectures and invited talks, and

conference presentations, papers, or proceedings. A total of 6,419 publications were produced by these 217 alumni for whom CV data were available, with journal articles being the most common and comprising over half (i.e., 3,283) of this total. With regard to journal articles in particular, the average number per alumnus was 16.3 and, not surprisingly, the number of articles generally increased year to year as the cumulative pool of DOE CSGF alumni grew over time. For example, while alumni who started their fellowship between 2007 and 2013 averaged 8.4 journal articles, the average for those who started their fellowship between 1991 and 2000 was 26.4.

Articles produced by alumni were overwhelmingly published in highly influential journals.

In examining the research productivity of DOE CSGF alumni, we looked not only at how many publications were produced and how often alumni published, but where they have published their work. More specifically, we used two types of publicly available measures obtained from the Eigenfactor Project. These two journal-level measures, the Eigenfactor score (EF) and the Article Influence score (AI), provided insight into the prestige and influence of the journals in which alumni published their research, based in part by how frequently articles in those journals are cited by other researchers. These bibliometric data were available for 2,132 of the 3,283 journal articles produced by DOE CSGF alumni (these include articles that indicated the date of publication and were published between 1997 and 2014, since EF and AI data are not publicly available for articles published in other years). Of these 2,132 articles, the majority (83 percent) were published in journals with above average EF scores, with an average EF score of 24. This means that, on average, DOE CSGF alumni published articles between 1997 and 2014 in journals with 24 times the influence of the average journal during that time. The Eigenfactor Project also provides a percentile rank for each journal, which is useful in identifying the relative influence of journals in which DOE CSGF alumni were published each year. Nearly three-quarters of the articles (72 percent) published by DOE CSGF alumni were in journals with EF scores in the top 10 percent. Another 13 percent were in journals with EF scores between the 81st and 90th percentile. While AI provides a slightly different means for determining the level of influence of journals in which DOE CSGF alumni published articles, the results were similar to the EF scores.

Conclusions

For the past quarter century, the DOE CSGF has provided training and support to students in an effort to address national priorities around workforce development. A partnership within the DOE between the Office of Science and the National Nuclear Security Administration, the DOE CSGF is

designed specifically to help meet the demand for computational scientists, a demand that will only continue to grow. As an independent subcommittee of the Advanced Scientific Computing Advisory Committee found in its November 2011 *Review of the Computational Science Graduate Fellowship*, “the need for well-trained computational scientists in government laboratories and in industry will far exceed the supply in the foreseeable future ... We conclude that the need for programs like the [DOE] CSGF will increase over the next decade.”²⁸ This same subcommittee noted three years later in its February 2014 *Assessment of Workforce Development Needs in Office of Science Research Disciplines*, “Projections of industry needs and employment figures (mostly for [computational science] and [computational engineering]) ... indicate a high and increasing demand for graduates in all areas of computing, with little unemployment.”²⁹

This study of the DOE CSGF program was intended to address important questions concerning the benefits that accrue to both the sponsoring organization and recipients themselves. Taking all the data this study has provided, it is clear that the DOE CSGF is an important factor contributing to the development of America’s advanced technological workforce. Evidence also suggests that the program is addressing its principal objectives, which include 1) helping to ensure an adequate supply of appropriately trained scientists; 2) making DOE laboratories available for practical work experiences; 3) helping to strengthen ties between the academic community and DOE laboratories to enhance the national community of scientists; and 4) raising the visibility of careers in the computational sciences and encouraging talented students to pursue such careers.

First, the data from this study indicate the DOE CSGF is a highly sought after fellowship that draws some of the most promising students in science, technology, engineering, and mathematics, typically from the nation’s most prestigious universities. These data also highlight the effective outreach strategies employed by the DOE CSGF in attracting top talent. In addition, many who enter the program choose the DOE CSGF over other fellowships based on its prestige and level of financial support relative to other programs.

The program also received high praise from alumni for its unique benefits. Alumni reported not only a highly satisfying experience in the program but also that it provided opportunities that were unmatched by other fellowships, through exposure to HPC, access to DOE laboratories and scientists, as well as the chance to be mentored by top researchers in the field. They described how their interest in the field of CSE deepened and strengthened through their exposure to these

²⁸https://science.energy.gov/~media/ascr/ascac/pdf/reports/ASCAC_CSGF_Report_2011-Final.pdf

²⁹https://science.energy.gov/~media/ber/berac/pdf/201410/Dehmer_BERAC_Oct_2014.pdf

programmatic features, and many indicated that these opportunities and experiences were critical to obtaining employment in the field. Based on the data collected as part of this study, the various opportunities provided to students by the DOE CSGF reflect a successful model that offers a broad scope of training and development.

In addition, many DOE CSGF alumni remain involved in the program long after their fellowship support ends, by actively recruiting new fellows and providing guidance and professional development for current recipients and by developing relationships and collaborations with fellows that outlast their time in the program. The annual program review meetings serve as a forum for mentoring and career guidance and help reinforce a sense of community among current and former participants. Moreover, the continued involvement of alumni in the program review and other activities that extend beyond formal programmatic activities illustrate the connectedness to the HPC and computational science community that the DOE CSGF fosters.

By surveying DOE CSGF alumni dating back more than two decades, we were able to document the many long-term career benefits of program participation. One of the benefits we confirmed was the substantial proportion of DOE CSGF alumni who transition directly to permanent employment at DOE laboratories. Meanwhile, most other alumni found employment in highly specialized positions in U.S. industry or in academia, where they are in a position to contribute to the development of the next generation of scientists. A substantial proportion of alumni overall have also achieved leadership positions within these various settings, thereby helping to spread the influence of the program beyond the government agency that sponsors the fellowships.

Furthermore, our findings on the perceived impacts of the program corroborate many of those reported in the prior study of the DOE CSGF conducted in 2012 and extend knowledge of the program and its outcomes in some new directions. In-depth interview data gathered from alumni as part of this study revealed that the program influenced their career goals and direction, including the desire to work at a DOE laboratory. Some also described how they experienced professional growth in their skills and content expertise, as well as in their communication skills and degree of self-confidence in their professional field.

Finally, our inclusion of more objective measures of recipients' accomplishments revealed how prolific DOE CSGF alumni have been in helping to advance the nation's science and technology goals into the future. The fact that alumni have received a large number of professional awards and patents and published research in prestigious journals at an impressive and compounding rate serves

as evidence of their contributions to the broader scientific community through the generation of new knowledge and innovations.

Appendix A.
Survey Instruments

DOE CSGF Longitudinal Study - Alumni Survey

Survey Introduction

Instructions

- This survey may take up to 30 minutes to complete. If at all possible, please allow enough time to finish in one sitting. After you have submitted the survey, you will not be able to re-enter or adjust your responses.
- Each of your responses is important and it is critical that you answer every question to the best of your ability using the options provided.
- The identity of all individuals who participate in the survey will be kept confidential. Overall results will be shared with the DOE, however individual responses will not be reported.
- Please contact the [Krell Institute](#) with any questions regarding your participation in this survey.

Your submission is requested by Friday, November 11, 2016. Thank you for taking the time to complete this survey.

DOE CSGF Longitudinal Study - Alumni Survey

Recruitment and Entry Into the DOE CSGF Program (Recruitment)

* 1. Which one of the following sources of information about the DOE CSGF program was **most influential** in your decision to apply?

- Fellow student(s)
- Academic advisor or other professor
- University career placement office
- Departmental or organizational emails, listserv, etc.
- Former or current DOE CSGF recipient
- DOE employee (laboratory or otherwise)
- DOE CSGF exhibit, presentation or poster at a professional meeting
- DOE CSGF exhibit, presentation or poster at a university career fair
- DOE CSGF poster or mailing
- DOE CSGF website
- Advertisement in a professional publication
- Other (please specify below)

* 2. Which of these recruitment approaches do you think that the DOE CSGF program should emphasize in the future? *(Please select all that apply.)*

- Fellow student(s)
- Academic advisor or other professor
- University career placement office
- Departmental or organizational emails, listserv, etc.
- Former or current DOE CSGF recipient
- DOE employee (laboratory or otherwise)
- DOE CSGF exhibit, presentation or poster at a professional meeting
- DOE CSGF exhibit, presentation or poster at a university career fair
- DOE CSGF poster or mailing
- DOE CSGF website
- Advertisement in a professional publication
- Other (please specify below)

* 3. At the time you applied for the DOE CSGF, did you apply for other fellowship programs?

- Yes
- No

DOE CSGF Longitudinal Study - Alumni Survey

Recruitment and Entry Into the DOE CSGF Program (Other Fellowships)

* 4. In applying for fellowships, was the DOE CSGF program your first choice?

- Yes, I initially applied only for the DOE CSGF
- No, I applied for other programs at the same time
- No, I applied for other programs first and for the DOE CSGF later on

* 5. In which of the following categories did you **apply** for fellowship programs other than the DOE CSGF?
(Please select all that apply.)

- Government
- University-sponsored
- Industry
- Other (please specify)

* 6. Were you offered a fellowship through another program (other than the DOE CSGF)?

- Yes
- No

DOE CSGF Longitudinal Study - Alumni Survey

Recruitment and Entry Into the DOE CSGF Program (Other Offers)

* 7. Taking into account those you applied for, in which categories were you **offered** a fellowship other than the DOE CSGF? (*Please select all that apply.*)

- Government
- University-sponsored
- Industry
- [Insert text from Other]

8. Please name the fellowship(s) you were offered in addition to the DOE CSGF.

DOE CSGF Longitudinal Study - Alumni Survey

Recruitment and Entry Into the DOE CSGF Program (Acceptance)

* 9. What were your **three most important** reasons for accepting the DOE CSGF? (*Please select one answer in each column.*)

	First most important	Second most important	Third most important
Opportunity to receive additional training in my academic field of interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunity to receive training in an area outside of my primary field of interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to conduct research in my academic field of interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prestige of the DOE CSGF program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reputation of specific DOE laboratories	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of DOE research facilities and equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stepping stone to my career	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to conduct practicum at a specific laboratory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The tuition support and stipend were appealing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The DOE CSGF was the only offer I received	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (please specify below)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please specify your "Other" reason for accepting the fellowship.

DOE CSGF Longitudinal Study - Alumni Survey

Experience in and Satisfaction With the DOE CSGF Program (Practicum/APR)

* 10. While a fellow, how satisfied were you with the assistance you received from your **practicum supervisor and other laboratory team members** on each of the following topics?

	Very satisfied	Satisfied	Somewhat satisfied	Not at all satisfied	Not applicable
Generating ideas about research	<input type="radio"/>				
Direction during my research activities (e.g., next steps and how to solve them)	<input type="radio"/>				
Obtaining specialized equipment for my research as needed	<input type="radio"/>				
Improving my writing skills	<input type="radio"/>				
Publishing my research	<input type="radio"/>				
Networking	<input type="radio"/>				
Finding professional development opportunities	<input type="radio"/>				
Setting career goals	<input type="radio"/>				
Finding job opportunities and openings	<input type="radio"/>				
Gaining a better understanding of continued opportunities for collaboration	<input type="radio"/>				

* 11. While a fellow, to what extent did you find the annual DOE CSGF program review meetings (formerly known as conferences) to be useful in each of the following ways?

	Very useful	Useful	Somewhat useful	Not at all useful	Not applicable
Collaboration opportunities	<input type="radio"/>				
Interaction with researchers in my field	<input type="radio"/>				
Interaction with researchers in other fields	<input type="radio"/>				
Opportunities to develop mentoring relationships	<input type="radio"/>				
Intellectual stimulation and exchange	<input type="radio"/>				
Opportunities to present my research	<input type="radio"/>				
Opportunities for feedback on my research	<input type="radio"/>				
Contacts for obtaining employment	<input type="radio"/>				
Postdoctoral opportunities	<input type="radio"/>				
Networking opportunities	<input type="radio"/>				
Professional development topics	<input type="radio"/>				
Insight into current and/or future big picture problems	<input type="radio"/>				
Overall usefulness of the DOE CSGF annual program review events	<input type="radio"/>				

DOE CSGF Longitudinal Study - Alumni Survey

Experience in and Satisfaction With the DOE CSGF Program (HPC)

* 12. To what extent did DOE CSGF-directed exposure to **high-performance computing (HPC)** while a fellow benefit you in each of the following ways?

	Major extent	Moderate extent	Minor extent	Not at all	Not applicable
It impacted/affected my career choice	<input type="radio"/>				
It equipped me to make an immediate impact once on the job	<input type="radio"/>				
It resulted in growth within my career	<input type="radio"/>				

* 13. While a fellow, did you use high-performance computing **in your own research**?

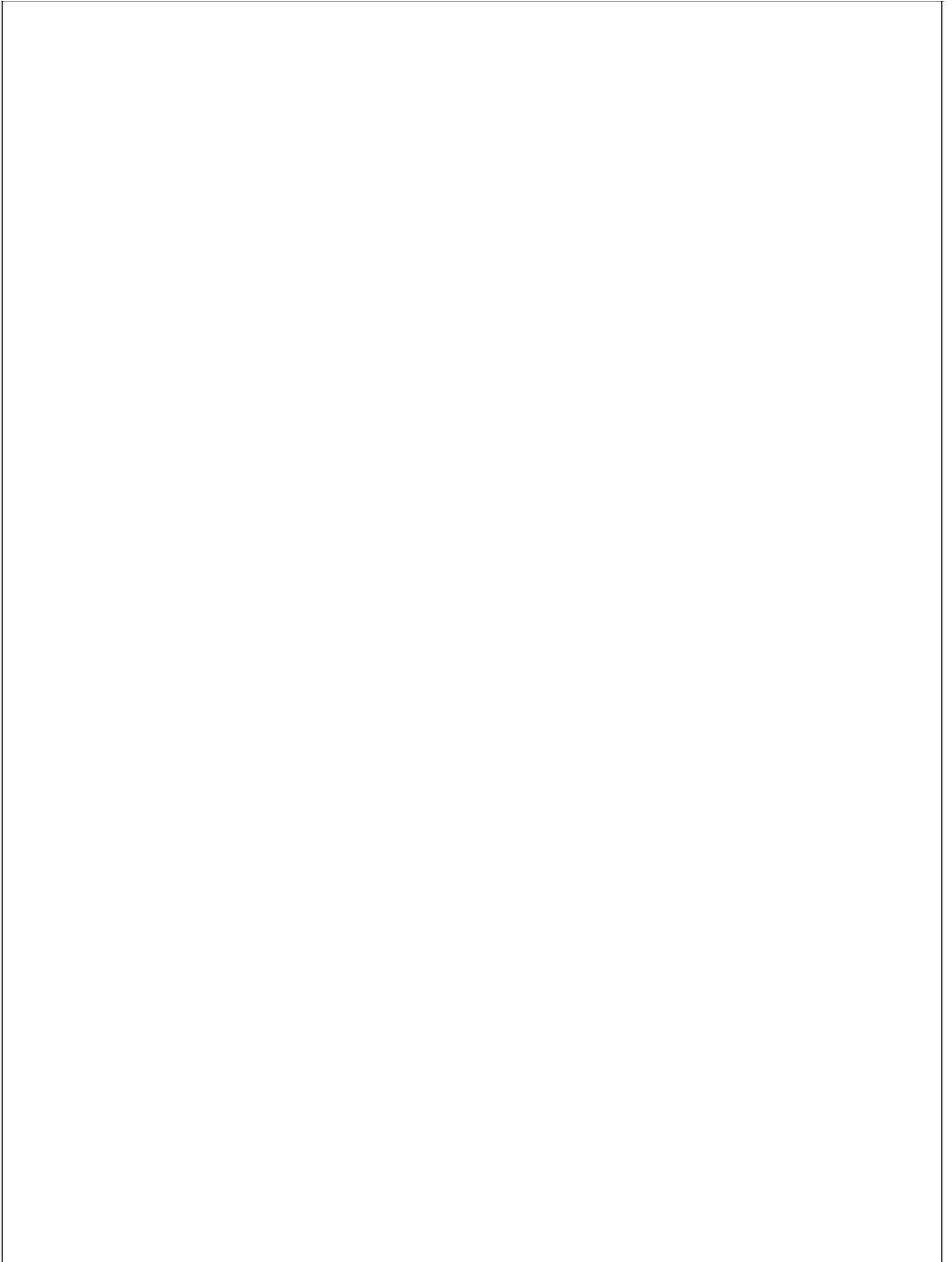
- Yes, to a large extent
- Yes, to some extent
- No

* 14. Please indicate if and when you have **contributed to AND/OR led** the development of the specific aspects of computing listed below. *(Please select a response for each row-column combination.)*

	Prior to my time as a fellow	During my time as a fellow	Since my time as a fellow
Scientific codes	<input type="text"/>	<input type="text"/>	<input type="text"/>
Scientific software suites	<input type="text"/>	<input type="text"/>	<input type="text"/>
Open source scientific software	<input type="text"/>	<input type="text"/>	<input type="text"/>

* 15. For each of the time periods listed below, please indicate if you took/have taken advantage of dedicated computing time on **DOE supercomputers**.

	Yes, I did/have	No, I did/have not
Prior to my time as a fellow	<input type="radio"/>	<input type="radio"/>
During my time as a fellow	<input type="radio"/>	<input type="radio"/>
Since my time as a fellow	<input type="radio"/>	<input type="radio"/>



DOE CSGF Longitudinal Study - Alumni Survey

Experience in and Satisfaction With the DOE CSGF (Mentoring Assessment - Rec'd.)

* 16. Please indicate if and when you have **received** mentoring, guidance or support from your practicum supervisor, laboratory team members, or other DOE CSGF recipients in the following areas. *(Please select all that apply in each row.)*

	During my time as a fellow	Since my time as a fellow	Not at all
Opportunities to collaborate on research in fields related to computational science and engineering (CSE)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Guidance/support for publishing in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opportunities for developing and obtaining research grants in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opportunities to co-author publications in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opportunities to network with other scholars, publishers, editors, etc., in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opportunities to present research in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Guidance/support for obtaining grants, contracts, fellowships, or other resources in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Guidance/support for teaching, student advising, etc., in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Guidance/support for obtaining employment in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advice regarding professional survival and politics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Psychological or emotional support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DOE CSGF Longitudinal Study - Alumni Survey

Experience in and Satisfaction With the DOE CSGF (Mentoring Usefulness)

* 17. For each of the supports you indicated that you **received** in the prior question, please indicate the extent to which you found the support to be useful.

	Very useful	Useful	Somewhat useful	Not at all useful
Opportunities to collaborate on research in fields related to computational science and engineering (CSE)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guidance/support for publishing in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities for developing and obtaining research grants in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities to co-author publications in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities to network with other scholars, publishers, editors, etc., in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities to present research in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guidance/support for obtaining grants, contracts, fellowships, or other resources in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guidance/support for teaching, student advising, etc., in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guidance/support for obtaining employment in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice regarding professional survival and politics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Psychological or emotional support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 18. Please indicate if and when you have **provided** mentoring, guidance or support to members of the scientific community, including other DOE CSGF recipients, in the following areas. *(Please select all that apply in each row.)*

	During my time as a fellow	Since my time as a fellow	Not at all
Opportunities to collaborate on research in fields related to computational science and engineering (CSE)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Guidance/support for publishing in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opportunities for developing and obtaining research grants in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opportunities to co-author publications in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opportunities to network with other scholars, publishers, editors, etc., in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opportunities to present research in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Guidance/support for obtaining grants, contracts, fellowships, or other resources in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Guidance/support for teaching, student advising, etc., in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Guidance/support for obtaining employment in fields related to CSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advice regarding professional survival and politics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Psychological or emotional support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DOE CSGF Longitudinal Study - Alumni Survey

Experience in and Satisfaction With the DOE CSGF Program (As Fellow)

* 19. Please indicate how satisfied you were with each of the following aspects of the DOE CSGF while a fellow.

	Very satisfied	Satisfied	Somewhat satisfied	Not at all satisfied	Not applicable
Research training	<input type="radio"/>				
Access to facilities, equipment and other resources	<input type="radio"/>				
Mentoring on research	<input type="radio"/>				
Mentoring on career development	<input type="radio"/>				
Communication with my practicum supervisor and/or other laboratory team members	<input type="radio"/>				
Communication with other DOE CSGF recipients	<input type="radio"/>				
Annual DOE CSGF program review events (formerly known as conferences)	<input type="radio"/>				
Opportunities for collaboration on research	<input type="radio"/>				
Networking opportunities	<input type="radio"/>				

* 20. Please indicate **up to three** aspects of the DOE CSGF program were most important to your overall satisfaction while a fellow.

- Research training
- Access to facilities, equipment and other resources
- Mentoring on research
- Mentoring on career development
- Communication with my practicum supervisor and/or other laboratory team members
- Communication with other DOE CSGF recipients
- Annual DOE CSGF program review events (formerly known as conferences)
- Opportunities for collaboration on research
- Networking opportunities

DOE CSGF Longitudinal Study - Alumni Survey

Experience in and Satisfaction With the DOE CSGF Program (Bigger Picture)

* 21. To what extent did your participation in the DOE CSGF program benefit you in each of the following ways?

	Major extent	Moderate extent	Minor extent	Not at all
Enhanced my computing capabilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enhanced my knowledge of high-performance computing (HPC)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased my subject matter knowledge/expertise in other areas (i.e., other than computing capabilities)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved my research skills and/or techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved the overall quality of my research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Positively influenced the specific direction of my current research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved my publication and presentation skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved my mentoring skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased my experience using specialized equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased my confidence in performing cutting-edge research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased my contacts with colleagues in my field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helped me pursue a new direction within my field of interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helped me address a topic previously unexplored within my field of interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helped me address key gaps in knowledge within my field of interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 22. To what extent do you agree with each of the following statements about your DOE CSGF participation?

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
My experience provided me with professional knowledge and skills that I would not have developed otherwise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had access and exposure to research opportunities that I would not have had elsewhere	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have had access and exposure to computing resources/capabilities that I would not have had elsewhere	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accepting the DOE CSGF was the right decision for my career	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As a result of my participation as a fellow, I have encouraged students and/or colleagues to pursue Computational Science and Engineering as a field of study	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My experience as a fellow significantly contributed to my knowledge about how to conduct research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My experience as a fellow provided me with professional expertise that I would not have developed otherwise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When it came to securing my first post-DOE CSGF position, my experience in the program gave me an advantage over others with similar qualifications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My experience as a fellow continues to help me achieve my career goals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

DOE CSGF Longitudinal Study - Alumni Survey

Experience in and Satisfaction With the DOE CSGF Program (Networking)

* 23. To what extent have you stayed in touch with each of the following people involved in your DOE CSGF experience?

	Major extent	Moderate extent	Minor extent	Not at all
Your practicum supervisor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other staff at your practicum laboratory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other DOE CSGF recipients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 24. Since completing the fellowship, how many annual DOE CSGF program review meetings (formerly known as conferences) have you attended?

- None
- One
- Two
- Three
- Four or more

* 25. While a fellow or since completing the DOE CSGF, have you recommended to any others that they apply for the fellowship?

- Yes
- No

DOE CSGF Longitudinal Study - Alumni Survey

Experience in and Satisfaction With the DOE CSGF Program (Referrals)

* 26. As it relates to those you recommended apply for the fellowship, please consider the following statements and choose the one that best describes the outcome of your effort.

- At least one of the individuals I recommended went on to apply for the fellowship and **was accepted**
- At least one of the individuals I recommended went on to apply but none were accepted
- None of the individuals I recommended to the program have applied
- I don't know if any of the individuals I recommended to the program have applied and/or were accepted

If applicable, please name the individual(s) that you recommended and who was/were accepted into the DOE CSGF.

DOE CSGF Longitudinal Study - Alumni Survey

Career Since Participating in the DOE CSGF Program (Ph.D. Completion)

* 27. Have you completed/earned your doctoral degree?

- I completed/earned my doctoral degree
- I am still in progress toward completing my doctoral degree
- I am no longer pursuing/did not earn a doctoral degree

DOE CSGF Longitudinal Study - Alumni Survey

Career Since Participating in the DOE CSGF Program (Ph.D. Detail)

* 28. Please indicate the year in which you earned or anticipate earning your doctoral degree.

* 29. Please indicate the field in which you earned or intend to earn your Ph.D.

DOE CSGF Longitudinal Study - Alumni Survey

Career Since Participating in the DOE CSGF Program (No Ph.D.)

* 30. Please indicate why you are no longer pursuing a doctoral degree.

DOE CSGF Longitudinal Study - Alumni Survey

Career Since Participating in the DOE CSGF Program (Assess Any)

* 31. Including self-employment and postdocs, have you been employed in **any** position since completing your DOE CSGF?

Yes

No

DOE CSGF Longitudinal Study - Alumni Survey

Career Since Participating in the DOE CSGF Program (All)

* 32. Including postdoc positions, where have you been employed since finishing your DOE CSGF? *(Please select all that apply.)*

- DOE laboratory
- Government other than a DOE laboratory
- Academia
- Industry
- Not-for-profit
- Self-employed
- Other (please specify)

DOE CSGF Longitudinal Study - Alumni Survey

Career Since Participating in the DOE CSGF Program (First)

* 33. Including postdoc positions, where were you **first** employed after completing your DOE CSGF?

- DOE laboratory
- Government other than a DOE laboratory
- Academia
- Industry
- Not-for-profit
- Self-employed
- [Insert text from Other]

* 34. Including postdoc positions, please provide the following information about your **first** position after completing your DOE CSGF. *(Please select one answer in each row.)*

	Yes	No
This was/is a full-time position	<input type="radio"/>	<input type="radio"/>
This was/is a postdoc position	<input type="radio"/>	<input type="radio"/>

* 35. Rounding to the nearest whole number, how many years did you hold (or have you held) your **first** position?

* 36. How useful did you find each of the following factors in obtaining your **first** position after the DOE CSGF?

	Very useful	Useful	Somewhat useful	Not at all useful	Not applicable
Contacts initiated by my employer	<input type="radio"/>				
Contacts initiated on my own	<input type="radio"/>				
Contacts provided by my DOE CSGF practicum supervisor	<input type="radio"/>				
Contacts provided by someone else at my DOE CSGF practicum site	<input type="radio"/>				
Prestige of the DOE CSGF program	<input type="radio"/>				
Prestige of my DOE CSGF practicum supervisor	<input type="radio"/>				
Prestige of my DOE CSGF practicum site	<input type="radio"/>				
Publications for which I received credit while a fellow	<input type="radio"/>				
Presentations I gave while a fellow	<input type="radio"/>				
Participation in proposals while a fellow	<input type="radio"/>				
The area(s) I researched while a fellow	<input type="radio"/>				
Overall usefulness of the DOE CSGF in obtaining my first position	<input type="radio"/>				

* 37. Including self-employment and postdocs, are you **currently** employed?

Yes

No

DOE CSGF Longitudinal Study - Alumni Survey

Career Since Participating in the DOE CSGF Program (Assess Current)

* 38. Is your **current** employer the same as your first employer?

Yes

No

DOE CSGF Longitudinal Study - Alumni Survey

Career Since Participating in the DOE CSGF Program (Current-Basic)

* 39. Where are you **currently** employed?

- DOE laboratory
- Government other than a DOE laboratory
- Academia
- Industry
- Not-for-profit
- Self-employed
- [Insert text from Other]

* 40. Please provide the following information about your **current** position. *(Please select one answer in each row.)*

	Yes	No
This is a full-time position	<input type="radio"/>	<input type="radio"/>
This is a postdoc position	<input type="radio"/>	<input type="radio"/>

* 41. Rounding to the nearest whole number, how many years have you held your **current** position?

DOE CSGF Longitudinal Study - Alumni Survey

Career Since Participating in the DOE CSGF Program (Current-Detail)

* 42. Are you currently employed in a Computational Science and Engineering field?

- Yes
 No

* 43. To what extent do you agree with each of the following statements about your **current** position?

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I am satisfied with the type of work I am currently doing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am satisfied with the opportunities for advancement at my current employer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a leadership role within my current organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am compensated fairly for the work that I do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall, my career has met my expectations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 44. What is your current **annual** salary?

- Less than \$50,000
 \$50,000-\$99,999
 \$100,000-\$149,999
 \$150,000-\$199,999
 \$200,000-\$249,999
 \$250,000 or more
 I prefer not to answer

DOE CSGF Longitudinal Study - Alumni Survey

Career Since Participating in the DOE CSGF Program (Professional Activities)

* 45. **Since completing your DOE CSGF**, to what extent have you accomplished each of the following professional activities?

	Major extent	Moderate extent	Minor extent	Not at all
Engaged in interdisciplinary research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pursued a new theoretical direction or addressed a topic previously unexplored in your field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Contributed to a scientific breakthrough in your field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Contributed to innovative ideas in your field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Addressed key knowledge gaps in your field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advanced within your employing organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Achieved your overall career goals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

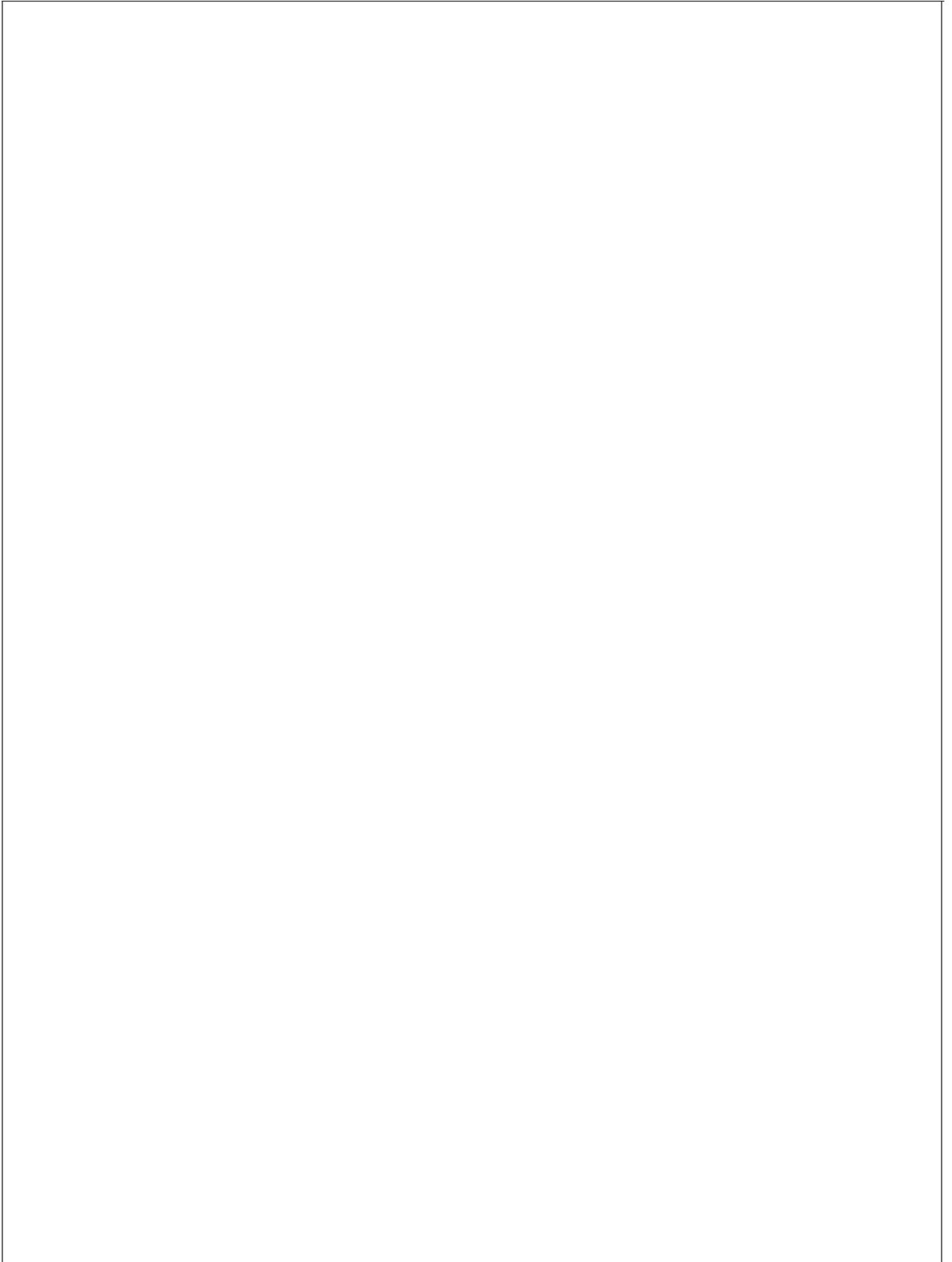
* 46. During the past five years (or since the end of your DOE CSGF if fewer than five years) how often have you engaged in each of the following professional activities?

	Once	Two or three times	Four or five times	Six or more times	Not applicable
Organized a seminar or workshop on my research area	<input type="radio"/>				
Lectured at a host institution	<input type="radio"/>				
Presented my research in my own lab/department at my organization	<input type="radio"/>				
Presented my research in another lab/department at my organization	<input type="radio"/>				
Presented my research at a national meeting	<input type="radio"/>				
Presented my research at an international meeting	<input type="radio"/>				
Authored or co-authored a paper in a peer-reviewed journal	<input type="radio"/>				
Authored or co-authored a book chapter	<input type="radio"/>				
Authored or co-authored a book	<input type="radio"/>				
Authored or co-authored a technical report	<input type="radio"/>				
Received competitive funding for my research	<input type="radio"/>				
Received a patent	<input type="radio"/>				
Received a professional award related to my research	<input type="radio"/>				
Developed a prototype or marketable product	<input type="radio"/>				
Assumed a management position in my organization (e.g., division head, etc.)	<input type="radio"/>				
Served formally or informally as a mentor to others within my organization	<input type="radio"/>				

* 47. How many professional societies or associations do you currently belong to?

- None
- One
- Two
- Three
- Four or more

If applicable, please name the societies/associations to which you belong.



DOE CSGF Longitudinal Study - Alumni Survey

Career Since Participating in the DOE CSGF Program (Professional Leadership)

* 48. Which of the following specific types of leadership positions/roles, if any, have you held within these professional societies or associations? *(Please select all that apply.)*

- I have not held any leadership positions or roles
- Organizational officer (e.g. president, vice-president, treasurer, etc.)
- Board member
- Section officer
- Committee service
- Other (please specify)

DOE CSGF Longitudinal Study - Alumni Survey

Background/Personal Information

* 49. What is your ethnicity?

- Hispanic or Latino
- Not Hispanic or Latino
- I prefer not to answer

* 50. What is your racial background? *(Please select all that apply.)*

- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White
- I prefer not to answer
- Other (please specify)

* 51. Have you submitted your CV (and/or résumé, personal URL or LinkedIn page) to Krell staff in response to recent email requests?

- Yes
- No

DOE CSGF Longitudinal Study - Alumni Survey

Final Data Verification (CV Submission)

52. If readily available, please upload your CV or résumé here.

Choose File

No file chosen

53. And/or, if applicable, copy and paste your LinkedIn or personal URL here.

DOE CSGF Longitudinal Study - Alumni Survey

Survey Submission

**Please click "Submit Your Survey" to indicate that you have completed the response process.
Note that your submission is then final and cannot be modified.**

2016 DOE CSGF Longitudinal Study - Fellows Survey

Survey Introduction

Instructions

- This survey may take up to 20 minutes to complete. If at all possible, please allow enough time to finish in one sitting. After you have submitted the survey, you will not be able to re-enter or adjust your responses.
- Each of your responses is important and it is critical that you answer every question to the best of your ability using the options provided.
- The identity of all individuals who participate in the survey will be kept confidential. Overall results will be shared with the DOE, however individual responses will not be reported.
- Please contact the [Krell Institute](#) with any questions regarding your participation in this survey.

Your submission is requested by Friday, November 11, 2016. Thank you for taking the time to complete this survey.

2016 DOE CSGF Longitudinal Study - Fellows Survey

Recruitment and Entry Into the DOE CSGF Program (Recruitment)

* 1. Which one of the following sources of information about the DOE CSGF program was **most influential** in your decision to apply?

- Fellow student(s)
- Academic advisor or other professor
- University career placement office
- Departmental or organizational emails, listserv, etc.
- Former or current DOE CSGF recipient
- DOE employee (laboratory or otherwise)
- DOE CSGF exhibit, presentation or poster at a professional meeting
- DOE CSGF exhibit, presentation or poster at a university career fair
- DOE CSGF poster or mailing
- DOE CSGF website
- Advertisement in a professional publication
- Other (please specify below)

* 2. Which of these recruitment approaches do you think that the DOE CSGF program should emphasize in the future? *(Please select all that apply.)*

- Fellow student(s)
- Academic advisor or other professor
- University career placement office
- Departmental or organizational emails, listserv, etc.
- Former or current DOE CSGF recipient
- DOE employee (laboratory or otherwise)
- DOE CSGF exhibit, presentation or poster at a professional meeting
- DOE CSGF exhibit, presentation or poster at a university career fair
- DOE CSGF poster or mailing
- DOE CSGF website
- Advertisement in a professional publication
- Other (please specify below)

* 3. At the time you applied for the DOE CSGF, did you also apply for other fellowship programs?

- Yes
- No

2016 DOE CSGF Longitudinal Study - Fellows Survey

Recruitment and Entry Into the DOE CSGF Program (Other Fellowships)

* 4. In applying for fellowships, was the DOE CSGF program your first choice?

- Yes, I initially applied only for the DOE CSGF
- No, I applied for other programs at the same time
- No, I applied for other programs first and for the DOE CSGF later on

* 5. In which of the following categories did you **apply** for fellowship programs other than the DOE CSGF?
(Please select all that apply.)

- Government
- University-sponsored
- Industry
- Other (please specify)

* 6. Were you offered a fellowship through another program (other than the DOE CSGF)?

- Yes
- No

2016 DOE CSGF Longitudinal Study - Fellows Survey

Recruitment and Entry Into the DOE CSGF Program (Other Offers)

* 7. Taking into account those you applied for, in which categories were you **offered** a fellowship other than the DOE CSGF? *(Please select all that apply.)*

- Government
- University-sponsored
- Industry
- [Insert text from Other]

8. Please name the fellowship(s) you were offered in addition to the DOE CSGF.

2016 DOE CSGF Longitudinal Study - Fellows Survey

Recruitment and Entry Into the DOE CSGF Program (Acceptance)

* 9. What were your **three most important** reasons for accepting the DOE CSGF? (*Please select one answer in each column.*)

	First most important	Second most important	Third most important
Opportunity to receive additional training in my academic field of interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunity to receive training in an area outside of my primary field of interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to conduct research in my academic field of interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prestige of the DOE CSGF program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reputation of specific DOE laboratories	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of DOE research facilities and equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stepping stone to my career	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to conduct practicum at a specific laboratory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The tuition support and stipend were appealing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The DOE CSGF was the only offer I received	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (<i>please specify below</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please specify your "Other" reason for accepting the fellowship.

2016 DOE CSGF Longitudinal Study - Fellows Survey

Experience in and Satisfaction With the DOE CSGF Program (Practicum Assessment)

* 10. Which of the following best describes the status of your DOE CSGF practicum?

- I completed my practicum
- I am currently on practicum
- I will begin my practicum in the future

2016 DOE CSGF Longitudinal Study - Fellows Survey

Experience in and Satisfaction With the DOE CSGF Program (Practicum)

* 11. How satisfied have you been with the assistance you received from your **practicum supervisor and other laboratory team members** on each of the following topics?

	Very satisfied	Satisfied	Somewhat satisfied	Not at all satisfied	Not applicable
Generating ideas about research	<input type="radio"/>				
Direction during my research activities (e.g., next steps and how to solve them)	<input type="radio"/>				
Obtaining specialized equipment for my research as needed	<input type="radio"/>				
Improving my writing skills	<input type="radio"/>				
Publishing my research	<input type="radio"/>				
Networking	<input type="radio"/>				
Finding professional development opportunities	<input type="radio"/>				
Setting career goals	<input type="radio"/>				
Finding job opportunities and openings	<input type="radio"/>				
Gaining a better understanding of continued opportunities for collaboration	<input type="radio"/>				

2016 DOE CSGF Longitudinal Study - Fellows Survey

Experience in and Satisfaction With the DOE CSGF (APR)

* 12. To what extent do you find the annual DOE CSGF program review meetings to be useful in each of the following ways?

	Very useful	Useful	Somewhat useful	Not at all useful	Not applicable
Collaboration opportunities	<input type="radio"/>				
Interaction with researchers in my field	<input type="radio"/>				
Interaction with researchers in other fields	<input type="radio"/>				
Opportunities to develop mentoring relationships	<input type="radio"/>				
Intellectual stimulation and exchange	<input type="radio"/>				
Opportunities to present my research	<input type="radio"/>				
Opportunities for feedback on my research	<input type="radio"/>				
Contacts for obtaining employment	<input type="radio"/>				
Postdoctoral opportunities	<input type="radio"/>				
Networking opportunities	<input type="radio"/>				
Professional development topics	<input type="radio"/>				
Insight into current and/or future big picture problems	<input type="radio"/>				
Overall usefulness of the DOE CSGF annual program review events	<input type="radio"/>				

2016 DOE CSGF Longitudinal Study - Fellows Survey

Experience in and Satisfaction With the DOE CSGF Program (HPC)

* 13. To what extent has DOE CSGF-directed exposure to **high-performance computing (HPC)** while a fellow benefited you in each of the following ways?

	Major extent	Moderate extent	Minor extent	Not at all	Not applicable
It has provided adequate exposure and introduction to HPC to kick-start my learning process	<input type="radio"/>				
It has provided insight into best practices for more efficient programming	<input type="radio"/>				
It has directly impacted my research in a positive way	<input type="radio"/>				
It has exposed me to opportunities to use HPC in the DOE labs	<input type="radio"/>				
It has impacted my thoughts regarding post-DOE CSGF/-Ph.D. career opportunities	<input type="radio"/>				

* 14. During your fellowship period, have you used high-performance computing **in your own research**?

- Yes, to a large extent
- Yes, to some extent
- No

* 15. Please indicate if and when you have **contributed to AND/OR led** the development of the specific aspects of computing listed below. *(Please select a response for each row-column combination.)*

	Prior to my time as a fellow	During my time as a fellow
Scientific codes	<input type="text"/>	<input type="text"/>
Scientific software suites	<input type="text"/>	<input type="text"/>
Open source scientific software	<input type="text"/>	<input type="text"/>

* 16. For both of the time periods listed below, please indicate if you took/have taken advantage of dedicated computing time on **DOE supercomputers**.

Yes, I did/have

No, I did/have not

Prior to my time as a fellow

During my time as a fellow

2016 DOE CSGF Longitudinal Study - Fellows Survey

Experience in and Satisfaction With the DOE CSGF Program (Mentoring Assessment - Rec'd.)

* 17. Please indicate if you have **received** mentoring, guidance or support from your practicum supervisor, laboratory team members, or other DOE CSGF recipients in each of the following areas.

	Yes	No
Opportunities to collaborate on research in fields related to computational science and engineering (CSE)	<input type="radio"/>	<input type="radio"/>
Guidance/support for publishing in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Opportunities for developing and obtaining research grants in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Opportunities to co-author publications in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Opportunities to network with other scholars, publishers, editors, etc., in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Opportunities to present research in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Guidance/support for obtaining grants, contracts, fellowships, or other resources in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Guidance/support for teaching, student advising, etc., in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Guidance/support for obtaining employment in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Advice regarding professional survival and politics	<input type="radio"/>	<input type="radio"/>
Psychological or emotional support	<input type="radio"/>	<input type="radio"/>

2016 DOE CSGF Longitudinal Study - Fellows Survey

Experience in and Satisfaction With the DOE CSGF Program (Mentoring Usefulness)

* 18. For each of the supports you indicated that you **received** in the prior question, please indicate the extent to which you have found the support to be useful.

	Very useful	Useful	Somewhat useful	Not at all useful
Opportunities to collaborate on research in fields related to computational science and engineering (CSE)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guidance/support for publishing in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities for developing and obtaining research grants in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities to co-author publications in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities to network with other scholars, publishers, editors, etc., in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities to present research in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guidance/support for obtaining grants, contracts, fellowships, or other resources in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guidance/support for teaching, student advising, etc., in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guidance/support for obtaining employment in fields related to CSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice regarding professional survival and politics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Psychological or emotional support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 19. Please indicate if you have **provided** mentoring, guidance or support to members of the scientific community, including other DOE CSGF recipients, in the following areas.

	Yes	No
Opportunities to collaborate on research in fields related to computational science and engineering (CSE)	<input type="radio"/>	<input type="radio"/>
Guidance/support for publishing in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Opportunities for developing and obtaining research grants in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Opportunities to co-author publications in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Opportunities to network with other scholars, publishers, editors, etc., in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Opportunities to present research in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Guidance/support for obtaining grants, contracts, fellowships, or other resources in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Guidance/support for teaching, student advising, etc., in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Guidance/support for obtaining employment in fields related to CSE	<input type="radio"/>	<input type="radio"/>
Advice regarding professional survival and politics	<input type="radio"/>	<input type="radio"/>
Psychological or emotional support	<input type="radio"/>	<input type="radio"/>

2016 DOE CSGF Longitudinal Study - Fellows Survey

Experience in and Satisfaction With the DOE CSGF Program (Overall)

* 20. Please indicate how satisfied you have been with each of the following aspects of the DOE CSGF.

	Very satisfied	Satisfied	Somewhat satisfied	Not at all satisfied	Not applicable
Research training	<input type="radio"/>				
Access to facilities, equipment and other resources	<input type="radio"/>				
Mentoring on research	<input type="radio"/>				
Mentoring on career development	<input type="radio"/>				
Communication with my practicum supervisor and/or other laboratory team members	<input type="radio"/>				
Communication with other DOE CSGF recipients	<input type="radio"/>				
Annual DOE CSGF program review events	<input type="radio"/>				
Opportunities for collaboration on research	<input type="radio"/>				
Networking opportunities	<input type="radio"/>				

* 21. Please indicate **up to three** aspects of the DOE CSGF program that have been most important to your overall satisfaction.

- Research training
- Access to facilities, equipment and other resources
- Mentoring on research
- Mentoring on career development
- Communication with my practicum supervisor and/or other laboratory team members
- Communication with other DOE CSGF recipients
- Annual DOE CSGF program review events
- Opportunities for collaboration on research
- Networking opportunities

2016 DOE CSGF Longitudinal Study - Fellows Survey

Experience in and Satisfaction With the DOE CSGF Program (Overall)

* 22. To what extent has your participation in the DOE CSGF program benefited you in each of the following ways?

	Major extent	Moderate extent	Minor extent	Not at all
Enhanced my computing capabilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enhanced my knowledge of high-performance computing (HPC)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased my subject matter knowledge/expertise in other areas (i.e., other than computing capabilities)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved my research skills and/or techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved the overall quality of my research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Positively influenced the specific direction of my current research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved my publication and presentation skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved my mentoring skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased my experience using specialized equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased my confidence in performing cutting-edge research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased my contacts with colleagues in my field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helped me pursue a new direction within my field of interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helped me address a topic previously unexplored within my field of interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helped me address key gaps in knowledge within my field of interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 23. To what extent do you agree with each of the following statements about your DOE CSGF participation?

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
My experience has provided me with professional knowledge and skills that I would not have developed otherwise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have had access and exposure to research opportunities that I would not have had elsewhere	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have had access and exposure to computing resources/capabilities that I would not have had elsewhere	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accepting the DOE CSGF has been the right decision for my career trajectory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As a result of my participation as a fellow, I have encouraged students and/or colleagues to pursue Computational Science and Engineering as a field of study	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My experience as a fellow has significantly contributed to my knowledge about how to conduct research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My experience as a fellow has provided me with professional expertise that I would not have developed otherwise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When it comes time to secure my first post-DOE CSGF position, my experience in the program will likely give me an advantage over others with similar qualifications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My experience as a fellow continues to help me advance toward my career goals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2016 DOE CSGF Longitudinal Study - Fellows Survey

Experience in and Satisfaction With the DOE CSGF Program (Referral Assessment)

* 24. Since beginning the DOE CSGF, have you recommended to any others that they apply for the fellowship?

Yes

No

2016 DOE CSGF Longitudinal Study - Fellows Survey

Experience in and Satisfaction With the DOE CSGF Program (Referrals)

* 25. As it relates to those you recommended apply for the fellowship, please consider the following statements and choose the one that best describes the outcome of your effort.

- At least one of the individuals I recommended went on to apply for the fellowship and **was accepted**
- At least one of the individuals I recommended went on to apply but none were accepted
- None of the individuals I recommended to the program have applied
- I don't know if any of the individuals I recommended to the program have applied and/or were accepted

If applicable, please name the individual(s) that you recommended and who was/were accepted into the DOE CSGF.

2016 DOE CSGF Longitudinal Study - Fellows Survey

Career Opportunities and Plans After the DOE CSGF Program (Professional Activities)

* 26. How many professional societies or associations do you currently belong to?

- None
- One
- Two
- Three
- Four or more

If applicable, please name the societies/associations to which you belong.

2016 DOE CSGF Longitudinal Study - Fellows Survey

Career Opportunities and Plans After the DOE CSGF Program (Professional Leadership)

* 27. Which of the following specific types of leadership positions/roles, if any, have you held within these professional societies or associations? *(Please select all that apply.)*

- I have not held any leadership positions or roles
- Organizational officer (e.g. president, vice-president, treasurer, etc.)
- Board member
- Section officer
- Committee service
- Other (please specify)

2016 DOE CSGF Longitudinal Study - Fellows Survey

Career Opportunities and Plans After the DOE CSGF Program

* 28. Upon completing the DOE CSGF program, which of the following types of career opportunities do you plan to pursue? *(Please select all that apply.)*

- Postdoc
- Full-time employment
- Other (please specify)

* 29. In which of the following sectors do you plan to search for a post-fellowship/-Ph.D. position?*(Please select all that apply.)*

- DOE laboratory
- Government other than a DOE laboratory
- Academia
- Industry
- Not-for-profit
- Self-employment
- Other (please specify)

* 30. To what extent do you agree with the following statements about career opportunities available at DOE laboratories after your fellowship ends? *(Please select one answer per row.)*

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
DOE laboratory employment opportunities have been clearly communicated to me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are ample positions available to me at DOE laboratories	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The career opportunities available at DOE laboratories are intellectually challenging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The career opportunities available at DOE laboratories offer competitive salaries for my field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My practicum supervisor or other staff at my practicum laboratory have encouraged me to seek a position at a DOE laboratory after my fellowship ends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
After my fellowship ends, I would actively pursue a position at a DOE laboratory if one were available	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Background/Personal Information

* 31. What is your ethnicity?

- Hispanic or Latino
- Not Hispanic or Latino
- I prefer not to answer

* 32. What is your racial background? *(Please select all that apply.)*

- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White
- I prefer not to answer
- Other (please specify)

* 33. Have you submitted your CV (and/or résumé, personal URL or LinkedIn page) to Krell staff in response to recent email requests?

- Yes
- No

2016 DOE CSGF Longitudinal Study - Fellows Survey

Final Data Verification (CV Submission)

34. If readily available, please upload your CV or résumé here.

Choose File

No file chosen

35. And/or, if applicable, copy and paste your LinkedIn or personal URL here.

2016 DOE CSGF Longitudinal Study - Fellows Survey

Survey Submission

**Please click "Submit Your Survey" to indicate that you have completed the response process.
Note that your submission is then final and cannot be modified.**

Appendix B.
Interview Protocol

U.S. Department of Energy Computational Science Graduate Fellowship (DOE CSGF) – Follow Up Study

Interview Protocol

Instructions and Consent

Thank you for agreeing to participate in the Krell Institute's follow-up study on the Department of Energy Computational Science Graduate Fellowship (DOE CSGF). This interview is an important component of the study since it collects information from current and past DOE CSGF recipients on their experiences, education, and career trajectory.

More specifically, the interview questions will address the following topics:

- Your application and entry into the CSGF program
- Your experiences while as a Fellow and the activities you participated in
- Your satisfaction with and perceptions of the program
- Your professional career and accomplishments since participating in the program

The interview should take about 30-45 minutes to complete. Before we get started, there are a few things I would like to mention:

- As part of this study, we are conducting interviews with approximately 20 DOE CSGF alumni. You are one of 20 alumni who have been randomly selected to participate from a sample of over 100 individuals who completed the DOE CSGF program between 2006 and 2013.
- Your participation in this interview is voluntary. If there are question that you do not want to answer, or if you decide you no longer want to participate, just let me know.
- The identity of all individuals who participate in the survey will be kept confidential. The overall results of the interviews will be shared with the Krell Institute and with the DOE, but there will be no reporting of individual responses. We will not use anyone's name or describe anyone in a way that he or she could be personally identified.
- If at any point after this interview you have any questions about your participation in the study, please contact me or the Krell Institute.
- With your permission, I would like to audio-record our conversation today to make sure that I can accurately represent your viewpoints. Also, we may use quotes from you or other participants in our reports; however, participants' names will not be linked to any responses.

- After our interview, I will transfer the audio file to a password protected network drive. The file will not be shared with the Krell Institute, DOE, or anyone else other than authorized Westat staff. Once the study is completed, all audio files will be destroyed. Do I have your permission to record this interview?
- Do you have any questions before we begin?
- If you don't have any questions, I am going to turn on the audio recorder now.

Questions

A. Entry into the DOE CSGF Program

1) Why did you apply for the DOE CSGF? What initially drew you to the program?

B. Experience in the DOE CSGF Program

2) Please describe your **research practicum experience** and the opportunities you had to collaborate with DOE laboratory researchers and others. Were these experiences what you expected? If not, how were they different than expected?

3) In what ways, if any, did you use **high-performance computing (HPC)** in your research while you were a Fellow? How did your exposure to HPC while a fellow influence your work?

4) Please describe the types of **mentoring** that were made available to you as part of the fellowship. Were there any areas in which you would have benefited from additional mentoring?

5) Please describe your experience with the annual DOE CSGF **program review meetings** (formerly known as conferences). In what ways, if any, were these experiences useful?

6) Overall, was the DOE CSGF experience what you expected? If not, how was it different than expected?

7) What do you consider the best features of the program? *[For each factor mentioned]* Why? Another way of wording this: Was there something that stood out or excited you most about your time as a fellow? What was the most significant outcome of your DOE CSGF experience? What would you say was your most significant achievement or contribution during your fellowship tenure?

8) A core part of the DOE CSGF mission is the development of a community of scholars and leaders in Computational Science and Engineering (CSE). Have your activities (actually or potentially) contributed to or helped to build the CSE community? Have your activities broadened CSE and related professional participation? (These might include, for example,

formal or informal collegial or student mentoring or professional development initiatives or activities.)

C. Career Since Participating in the DOE CSGF Program

9) In what professional field do you currently work (i.e., DOE laboratory; industry; university)?

10) Did you anticipate you'd be working in [field/category] prior to the fellowship? (If no, what were you considering?) What factors influenced your decision to pursue work in your chosen field? To what extent was your experience in the DOE CSGF a factor in your decision to pursue work in this field? How did the DOE CSGF fit into your overall academic direction and goals? Did your involvement in the fellowship impact/change the trajectory of your research/academic direction/goals in any way?

11) What effect has your experience as a DOE CSGF recipient had on your career? What effects, if any, did your experience as a Fellow have on you personally? Is there any other information regarding your experience that you think would be useful for understanding DOE CSGF effects?

12) The DOE has specific workforce needs in the areas of computational science and engineering problems. There are workforce gaps in the computing sciences that the DOE CSGF attempts to address. Do you think that the DOE CSGF program has been successful in meeting some or all of these DOE workforce needs? What might be done to maximize its effectiveness?

D. Improvements to the DOE CSGF Program

13) What changes, if any, would you recommend to the DOE CSGF program?

14) Is there anything else you would like to share with us regarding your experience in the DOE CSGF program?

Appendix C.
Curriculum Vitae Coding Protocol

Variable	Details/values	Notes
ID	Krell unique identifier	
Coder		
CV source	Full CV Partial CV LinkedIn Profile Individual Website Bio Statement Other, specify	
Publication type	Book Book chapter Journal article Report Conference presentation Other, specify	For each publication
Title of Publication		
Title of journal (If applicable)		
Year of Publication		
Author	Sole author Co-author	
Award name		
Award year		
Source	Source, organization, or sponsor of the award if applicable	For each award
Award field/discipline		
Grant/Contract name		
Grant/Contract ID	Official ID if available (Official ID if available (e.g., NSF, NIH, etc. Grant number)	
Grant start year		
Grant end year		
Grant source	Source, organization, or sponsor of the grant/contract	For each grant/contract
Amount	Dollar amount of total award PI Co-PI GRA Consultant Other, specify	
Role		
Patent number		
Patent year		
Patent status	Pending Granted	
Patent US	Yes No	For each patent
Patent International	Yes No	
Patent licensed	No Yes	
Patent sold	No	
Notes/Other information	if applicable	

Variable	Details/values	Code for survey non-respondents only	Notes
ID	Krell unique identifier		
Coder			
CV source	Full CV Partial CV LinkedIn Profile Individual Website Bio Statement Other, specify		
Race/ethnicity	Use values from survey	Yes	
Doctoral degree year	conferred/expected	Yes	
Doctoral degree field of study		Yes	
First job	Job type/title for first post-fellowship position	Yes	
First job started	Year job started	Yes	
First job ended	Year job ended (if applicable)	Yes	
First employer		Yes	
First sector		Yes	
First field	disciplinary field (if applicable)	Yes	
Current job	Job type/title for Current post-fellowship position	Yes	
Current job started	Year job started	Yes	
Current job ended	Year job ended (if applicable)	Yes	
Current employer		Yes	
Current sector		Yes	
Current field	disciplinary field (if applicable)	Yes	
Publication type	Book Book chapter Journal article Report Conference presentation Other, specify		For each publication
Title of Publication			
Title of journal (If applicable)			
Year of Publication			
Author	Sole author Co-author		
Award name			
Award year			
Source	Source, organization, or sponsor of the award		For each award
Award field/discipline	if applicable		
Fellowship name		Yes	Possibly could be coded for all if survey data on this is incomplete - needs to be coded for all if we want additional variables.
Fellowship field/discipline	Fellowship field/discipline	Yes	

Variable	Details/values	Code for survey non-respondents only	Notes
Grant/Contract name	Official ID if available (Official ID if available (e.g., NSF, NIH, etc. Grant number)	Code for survey non-respondents only	Notes
Grant/Contract ID			
Grant start year			
Grant end year			
Grant source	Source, organization, or sponsor of the grant/contract		For each grant/contract
Amount	Dollar amount of total award		
	PI		
	Co-PI		
	GRA		
	Consultant		
Role	Other, specify		
Patent number			
Patent year			
Patent status	Pending		
	Granted		
	Yes		
Patent US	No		For each patent
	Yes		
Patent International	No		
	Yes		
Patent licensed	No		
	Yes		
Patent sold	No		
Professional organization name		Yes	
	(All that apply):		
	Organizational officer (e.g., president, vice-president, treasurer, etc.)		For each organization recipients <i>currently</i> belong to
	Board member		
	Section officer		
	Committee service		
	Other		
Position (s)	None	Yes	
Notes/Other information	if applicable		