

Campus Champions: Building and sustaining a thriving community of practice around research computing and data

Marisa Brazil
Purdue University
West Lafayette, IN USA
brazil@purdue.edu

Dana Brunson
Internet2
Stillwater, OK USA
dbrunson@internet2.edu

Aaron Culich
University of California, Berkeley
Berkeley, CA USA
aculich@berkeley.edu

Lizanne DeStefano
Georgia Institute of Technology
Atlanta, GA USA
ldestefano6@gatech.edu

Douglas Jennewein
University of South Dakota
Vermillion, SD USA
doug.jennewein@usd.edu

Tiffany Jolley
University of Illinois at Urbana
Champaign
Champaign, IL USA
tjolley2@illinois.edu

Timothy Middelkoop
University of Missouri, Columbia
Columbia, MO USA
middelkoop@missouri.edu

Henry Neeman
University of Oklahoma
Norman, OK 73019
hneeman@ou.edu

Lorna Rivera
Georgia Institute of Technology
Atlanta, GA USA
lorna.rivera@gatech.edu

Jack Smith
Marshall University
Huntington, WV USA
smith1106@marshall.edu

Julie Wernert
Indiana University Bloomington
Bloomington, IN USA
jwernert@iu.edu

ABSTRACT

The digital research landscape has changed dramatically over the years, as campuses across the nation have gained access to local research computing resources and services. The Campus Champions program, [1] founded in 2008, has also evolved with these changes to accommodate and support the diversity and growth of the research computing community that we have long supported. Our mission, *to promote and facilitate the effective participation of a diverse national community of institutions in the application of advanced digital resources and services to accelerate scientific discovery and scholarly achievement*, has been made possible by sustained funding from the National Science Foundation (NSF) via the eXtreme Science and Engineering

Discovery Environment (XSEDE) [2] over the past ten years, and has enabled the Campus Champions program to support campus cyberinfrastructure and to foster a thriving community of practice [3] with nationwide impact.

To facilitate the continued growth and sustainability of the Campus Champions program beyond XSEDE, and to provide a deeper understanding of the Champion culture and needs, the Champions Sustainability Working Group and the XSEDE Evaluation team conducted a climate study in 2018. The recommendations provided by the climate study will inform our Leadership Team and staff on how we may further our community outreach goals and plan for the future of the program. This paper will highlight and discuss the development, implementation, key findings, and recommendations from that study.

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CCS CONCEPTS

Social and professional topics → **Professional topics**;
Computing profession; *Computing occupations* • **Social and professional topics** → **Professional topics**; *Computing*

profession; Computing organizations • **Social and professional topics** → **Professional topics**; *Computing profession*; Sustainability

KEYWORDS

Community of practice, Workforce development, Research computing, Cyberinfrastructure, Sustainability

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1 INTRODUCTION

The Campus Champions are a flourishing and evolving, one-of-a-kind community of practice within the national research computing ecosystem. They are peer mentors and facilitators navigating a digital research landscape that has changed dramatically since the inception of the Campus Champions program in 2008. Where once the challenge lay in connecting campus researchers with national computing and data systems, today campuses across the nation provide a broad spectrum of research computing resources and services. The Campus Champions have evolved to accommodate and support the diversity and growth of today's research computing community.

The Campus Champions' mission, *to promote and facilitate the effective participation of a diverse national community of institutions in the application of advanced digital resources and services to accelerate scientific discovery and scholarly achievement*, has been made possible by the National Science Foundation (NSF)-funded Extreme Science and Engineering Discovery Environment (XSEDE) program. Over the past ten years XSEDE has enabled the Campus Champions program to support campus Cyberinfrastructure (CI) and to foster a thriving community of practice with nationwide impact.

2 BACKGROUND

The Campus Champions program began in 2008, as part of the National Science Foundation's (NSF) TeraGrid CI project, and in 2012 was incorporated into TeraGrid's successor, XSEDE. The Campus Champions program, at the time of this paper submission, is composed of over 580 research computing professionals at over 290 academic and research institutions from every US state and EPSCoR jurisdiction. Campus Champions raise awareness of, and facilitate access to, advanced digital resources among faculty, researchers, students, and staff within their organizations, by helping their stakeholders to identify and use research computing resources, especially at large scale and high-end computing levels. To accomplish this mission, Campus

Champions fill a variety of roles at their home institutions, helping researchers find and use the technologies that best fit their needs, at whatever scale is most appropriate for their specific scientific or academic endeavors.

The Campus Champions program provides an array of professional development and training resources that benefit both Champions, and their institutions. Based on feedback from the community, programming is provided in the form of ad hoc presentations from subject matter experts, with topics ranging from systems-focused technical discussions, available resources (XSEDE and non-XSEDE alike), software, education/faculty-focused topics and grant proposal writing. In addition, Campus Champions are exposed to professional development opportunities that they might otherwise not have access to, by applying to an engaging and challenging Fellowship program that pairs selected Champions with exciting projects and expert mentors from the XSEDE ECSS[4] program.

In 2018, the Campus Champions program marked a major milestone: the celebration of the program's tenth anniversary. In addition, the Campus Champions community welcomed its first fully elected leadership team in the summer of 2018, providing an opportunity for individual Champions (a) to gain valuable leadership and strategic planning skills, while (b) making an impact and giving back to this exceptional community.

3 WHAT MAKES A CAMPUS CHAMPION?

Campus Champions are employees or affiliates of academic and non-commercial research institutions, coming from a broad range of roles and disciplines, across all levels, including CI center directors, faculty, researchers, systems administrators, user support specialists, IT staff, researcher-facing professionals, and students. A Campus Champion's role is to help researchers, educators, and scholars at their institutions make the most of their computing-intensive and data-intensive research. They promote awareness and literacy of advanced digital capabilities and facilitate use of CI to accelerate research.

The Campus Champions program provides workforce development opportunities in addition to the regular Champions designation and resources. The program encourages individuals early in their academic career to participate as Student Champions, each of whom is mentored by an active Campus Champion on their campus. The Student Champion experience can vary based on the mentor and the institution. Student Champions may work with their Campus Champion mentor to provide outreach on campus to help users access local or national computational resources, provide training to users on campus, and/or work on special projects assigned by their mentor. Student Champions are also encouraged to attend the annual PEARC conference and to participate in PEARC's student program, as well as to submit posters and/or papers.

In addition, those with advanced expertise in a specific discipline may serve as Domain Champions, providing guidance to researchers in specific disciplines or domains, such geographic information systems, genomics, and digital humanities.

Campus Champions peer mentor each other and share information, best practices, experiences and technical expertise, including but not limited to: asking and answering questions on an active mailing list (for example, in 2018 the mailing list had a total of 1,586 messages and 304 unique contributors), sharing individual or institutional expertise on a variety of topics, participating in technical and educational videoconferences (our most recent Tech Talk on the topic of Spack boasted approximately 80 attendees), as well as face-to-face meetups at regional and national conferences such as PEARC and the SC supercomputing conferences.

4 OVERVIEW OF THE CAMPUS CHAMPIONS CLIMATE STUDY

A thriving, active, and engaged Campus Champions program is key to building and sustaining a diverse and successful CI community of practice that will improve the scientific, academic, and industrial workforce. As the Campus Champions program evolves, it is important to examine its quality and efficacy from the perspectives of participating members. In the spring of 2018, the Campus Champions Sustainability Working Group and the XSEDE Evaluation Team developed the Campus Champions Climate Study, to collect data on the perceived benefit and value Champions place on belonging to this community.

The Campus Champions community encompasses a tremendous range of knowledge and expertise. Sharing that knowledge among the many Champions helps researchers they serve to find and use the best resources, whether local or national, to advance their scientific and scholarly achievements. Measuring the impact of the Campus Champions program will help drive future activities and funding opportunities. Data gathered from this survey will also help to quantify the value of our one-of-a-kind community to funding agencies and other stakeholders.

4.1 Evaluation Methods

A mixed-method evaluative design was employed, using multiple data collection methods and sources to obtain information. Data sources included a survey and follow up focus groups. At the time of the study, the external evaluation team was provided with a list of 474 current Campus Champions to include in the study. Champions responded at a rate of 46% (219/474) to the survey, in which 51 indicated a desire to participate in focus group discussions taking place during the PEARC'18 conference held July 22-26 2018 in Pittsburgh PA; all 51 individuals were invited to register for one of three scheduled focus groups. Ultimately, two separate semi-structured focus groups were held, with a total of 9 Campus Champions, to further investigate survey findings. All data collection methods received Institutional Review Board approval from both the Indiana University Bloomington (survey instrument) and the Georgia Institute of Technology (focus group protocol) prior to the study.

4.2 Respondent Demographics

Survey respondents identified mostly as researcher-facing (68%) at their organizations. Over two thirds (66%) work at doctorate-granting and research-focused (44%) institutions. The majority

identify as non-Hispanic (89%) White (64%) Men (79%). Well over half (63%) had joined the program since 2016.

4.3 Data Analysis

Based on an exploratory factor analysis, 3 dimensions were identified. Six items were combined for an index of "Overall Experience," three items for "Impact," and three items for "Equity." The indexes were formed by taking the mean of each respondent's ratings for the relevant items. Two types of tests were conducted to identify differences in the climate study data. Independent-samples t-tests were used to see whether there is a significant difference in means between two groups. Differences in mean index scores among more than two groups (e.g., race/ethnicity, designation) were tested using one-way ANOVA. Relationships between categorical variables were investigated using the chi-square test of association. For all tests, a difference was considered significant if the p-value was less than 0.05.

4.4 Select Findings

Overall Experience

Campus Champions reported high Overall Experience index scores, with the highest ratings given to their satisfaction as members of the group (Mean = 4.36), followed by the program's management (Mean = 4.34), as seen in the table below.

Table 1. Overall Experience Index and Items Ratings, Scale 1 (Strongly Disagree) – 5 (Strongly Agree)

| Overall Experience Index and Items | N | Mean | SD |
|--|-----|------|------|
| Overall Experience Index | 204 | 4.26 | 0.59 |
| The Campus Champions program is well managed. | 193 | 4.34 | 0.57 |
| The Campus Champions programmatic structure effectively facilitates the program's mission. | 191 | 4.26 | 0.67 |
| Communication from leadership about what is happening across the Champion program is satisfactory. | 201 | 4.30 | 0.64 |
| Opportunities to collaborate with other Campus Champions are satisfactory. | 196 | 4.14 | 0.79 |
| All things considered, my experience as a member of the Campus Champions program is satisfactory. | 201 | 4.36 | 0.64 |
| I feel like I am really a part of the Campus Champions program/community. | 193 | 4.31 | 0.81 |

Nearly half (100/219) of all survey respondents suggested ways to make their overall experience in the program even better, via the question "If the Campus Champions program could deliver to you one must have, what would it be? (This could be something that is personally valuable or professionally useful to you, that would

motivate you to help move the community forward, etc.)” A common theme among respondents was a request for a repository of best practice guides gleaned from the Campus Champions mailing list posts. Another frequently cited “must have” was for opportunities to interact with smaller groups of Campus Champions locally and in-person, through “meet-ups” or more frequent regional meetings. Some comments include:

“I think it would be useful to have short regional meetings/retreats and more opportunities to interact with CCs within my region” – Survey Respondent

“More local meet-ups” – Survey Respondent

“An easier, more accessible way to mind meld, share best practices, provide training, and share knowledge.” – Survey Respondent

Newer Campus Champions, those joining since 2017, rated the index significantly higher than longer-term members, as seen in the table below. Much of the difference is due to their higher satisfaction with “communication from leadership about what is happening across the Champions program” and “opportunities to collaborate with other Champions.”

Table 2. Overall Experience Index Ratings by Champion Year Joined, Scale 1 (Strongly Disagree) – 5 (Strongly Agree)

| Overall Experience Index and Items | Year Joined | N | Mean | SD |
|---|-------------|-----|-------|------|
| Overall Experience Index ¹ | >= 2017 | 87 | 4.38* | 0.54 |
| | < 2017 | 117 | 4.17 | 0.61 |
| The Campus Champions program is well managed. | >= 2017 | 82 | 4.38 | 0.64 |
| | < 2017 | 111 | 4.31 | 0.52 |
| The Campus Champions programmatic structure effectively facilitates the program’s mission. | >= 2017 | 83 | 4.33 | 0.70 |
| | < 2017 | 108 | 4.20 | 0.64 |
| Communication from leadership about what is happening across the Champion program is satisfactory. ² | >= 2017 | 86 | 4.45* | 0.57 |
| | < 2017 | 115 | 4.19 | 0.67 |
| Opportunities to collaborate with other Campus | >= 2017 | 82 | 4.29* | 0.79 |
| | < 2017 | 114 | 4.03 | 0.77 |

| Overall Experience Index and Items | Year Joined | N | Mean | SD |
|---|-------------|-----|------|------|
| Champions are satisfactory. ³ | | | | |
| All things considered, my experience as a member of the Campus Champions program is satisfactory. | >= 2017 | 86 | 4.45 | 0.68 |
| | < 2017 | 115 | 4.30 | 0.61 |
| I feel like I am really a part of the Campus Champions program/community. | >= 2017 | 80 | 4.43 | 0.67 |
| | < 2017 | 113 | 4.22 | 0.84 |

p*<.05, *p*<.01, ****p*<.001; ¹*t*(202)=2.469, *p*=.014, ²*t*(199)=2.917, *p*=.004, ³*t*(194)=2.360, *p*=.019.

Impact and Institutionalization

Three items probing program impact on Campus Champions’ campuses and individual professional development were combined for an Impact index. Overall, belonging to the Campus Champions program has had a positive impact on respondent institutional roles and professional development activities, as seen in the table below. Over 1/3 (35%, 65/186) believe the program has had “a lot” or “a great deal” of impact on their campus.

Table 3. Impact Index Ratings, Scale 1(extremely negative) – 5 (extremely positive), ²Scale 1 (none at all) – 5 (a great deal).[5]

| Impact Index and Items | N | Mean | SD |
|---|-----|------|------|
| Impact Index | 201 | 3.74 | 0.76 |
| Impact of belonging to the Campus Champions community on your current role at your institution ¹ | 190 | 4.07 | 0.68 |
| Impact of belonging to the Campus Champions community on your professional development activities ¹ | 191 | 4.09 | 0.70 |
| How much impact do you feel your participation with the Campus Champions program has had on your campus? ² | 186 | 3.13 | 1.02 |

Professional Learning Community (PLC)

Most (80%, 152/191) Campus Champions report the program has had a “positive” or “extremely positive” impact on their professional development activities. Comments suggest the various program resources as responsible for this impact. The

highest rated resources include Campus Champions activities at conferences and the listserv/email list – both having to do with establishing and maintaining a PLC. Another highly rated resource are Champions themselves, as seen in the table below.

Table 4. Champion Resource Ratings, Scale 1 (Not at all helpful) – 5 (Extremely helpful)

| Resources | N | Mean | SD |
|---|-----|------|------|
| Champion activities at conferences (e.g. PEARC, SC, etc.) | 149 | 4.18 | 0.91 |
| Campus Champions listserv/email list | 197 | 4.12 | 0.86 |
| Campus Champions allocations | 169 | 4.06 | 1.04 |
| Interacting with other Campus Champions directly | 157 | 4.01 | 0.86 |
| Networking opportunities | 157 | 3.82 | 1.02 |
| Campus Champions working groups | 98 | 3.48 | 1.16 |
| Monthly all-Champions calls | 161 | 3.34 | 0.99 |
| Ad hoc calls | 117 | 3.26 | 1.04 |
| Campus Champions Slack team | 133 | 3.21 | 1.15 |
| Monthly community chat calls | 137 | 3.19 | 1.04 |
| Campus Champions website | 154 | 3.19 | 1.02 |

In an effort to understand what void the Campus Champions program fills for its members, PEARC'18 focus group participants were asked, "If the Champions program disappeared tomorrow what would that mean for you?" Attendees agreed the loss of community for "asking questions" would be the greatest loss. One participant likened the situation to "losing contact with humanity," which was met with laughter and agreement from the others present. Some comments include:

"It would be like losing contact with humanity." – Focus Group Participant

"Professional development... I would return to smaller organizations, but it would be harder because the champions umbrella...so it would be harder to find it. Without that clearinghouse we would suffer." – Focus Group Participant

"Having the community to ask questions to." – Focus Group Participant

4.5 Equity

Three items were combined to create an Equity index that was rated extremely high (M=4.63, SD=0.53, N=194, Scale 1, strongly

disagree – 5, strongly agree). Nearly all (95%, N=194) of respondents agreed or strongly agreed with equity statements regarding discrimination. Comments throughout the survey suggest the group is largely welcoming, and issues regarding equity may require a more sensitive survey instrument or alternative data collection method.

Table 5. Equity Index and Item Ratings, Scale 1 (Strongly Disagree) - 5 (Strongly Agree), N=194

| Equity Index and Items | Mean | SD |
|--|------|------|
| Equity Index | 4.63 | 0.53 |
| I feel that Campus Champions treat each other equally, regardless of gender, race, ethnicity, etc. | 4.60 | 0.60 |
| I never experience discrimination by other Campus Champions. | 4.64 | 0.56 |
| I never experience discrimination by Campus Champions program leadership. | 4.68 | 0.53 |

A few (4%, 8/194) Campus Champions responded "neither agree nor disagree" regarding experiencing discrimination from other program participants, though details were not generally provided. One respondent did, however, comment on an incident their colleague endured at PEARC'17. This event was reported to program leadership at the time. Since PEARC'17, XSEDE has publicized "an external Code of Conduct for XSEDE sponsored events" on the public website, <https://www.xsede.org/codeofconduct>.

5 KEY FINDINGS

- Champions reported high Overall Experience in the program. Newer members expressed exceptionally high satisfaction and accounted for more than half of the respondents.
- The Champions community's impact extends beyond individual knowledge and skills improvement to institutionalization of the Champions role, changes in institutional research computing policy, and inclusion of Champions in strategic talent recruitment for their organizations.
- Some Champions are considering sustainability following XSEDE. They would also like to see the program continue to expand beyond advocating for NSF systems to other agencies.
- Respondents from non-research-intensive organizations and members of marginalized groups including women and underrepresented racial/ethnic groups in HPC, report positive experiences in the organization.
- Key program components (i.e. listserv/ mailing list, peer mentoring, and Champions allocations) are seen as critical to functioning as a Champion. Some suggested the addition

of a more detailed Champions directory, to facilitate networking and collaborations.

- Champions would like to combine popular mailing list topics and solutions into a regular newsletter, GitHub repository, and best practice guides for HPC.
- Domain Champions reported lower Overall Experience and Impact ratings. Comments from this group suggest a lack of clear alignment with traditional Champions.
- Champions believe the Regional program's geographic structure should be revisited, to prioritize similar institutions over state location. They also view the program as particularly useful for onboarding new Champions and research computing staff.

6 RECOMMENDATIONS

- Increase opportunities for small group engagement through the formation of topical interest or identity groups, such as operations-oriented staff or computing at teaching institutions, to further encourage personal connections and belonging in the community.
- Consider exploring support for the program beyond NSF to include additional funding agencies. Support may vary and include access to resources similar to Champions allocations, so that program participants can familiarize themselves with allocable resources to inform their system recommendations to local users.
- Create a series of best practice guides, technical reports, or short white papers on popular listserv topics that address common issues or policies coupled with repositories on GitHub, when appropriate. Consider crowdsourcing their creation among the Champions, to address resource constraints. Prioritize topics by allowing voting via a Slack poll. Couple these activities with a regular newsletter or mailing list digest that summarizes current threads.
- Improve the current Champions directory utility for facilitating collaborations and networking, by creating an optional space for members to include their HPC-related expertise.
- Explore ways to align Domain Champions more with current Campus Champions, to increase understanding of membership and responsibilities in relation to the larger program. Consider including representatives in related topical interest groups as key content experts available for advice and guidance.
- Revisit the Regional Campus Champions geographic structure to account more for institutional characteristics than location. Encourage the development of locally specific training programs, such as extended workshops or mentoring, to aide in onboarding of new Champions within the region.

The results of the Climate Study were presented to the Campus Champions Leadership team by the XSEDE Evaluation team on November 6, 2018 and to the full Champions community on December 18, 2018. The Campus Champions Leadership team, staff and Sustainability Working group are actively evaluating the results of the study and have already taken measures to begin

responding to some of the recommendations. These actions include:

- A re-evaluation of the Champions Regional program is currently underway. Actions taken include: a meeting of all Regional leaders and staff to discuss the survey results and to gather feedback and ideas on restructuring the Regional program to better fit the changing needs of the community. This information will be passed along to the evaluation team for a follow up micro-survey leading up to the PEARC'19 conference and focus groups will be organized at the PEARC'19 conference.
- A focus group at PEARC'19 will be planned, to gather feedback from Student Champions in attendance on how the Champions program might further enhance their professional development.
- Conversations are underway with Domain Champions to explore how to further engage and highlight these domain experts within the community.
- Efforts are underway to form a working group that will foster the formation of a *campuschampions.org* web presence, which will serve as a central repository of resources, best practices/guides, and information for the community.
- Staff have started to evaluate options for a more comprehensive Champions directory that will help address requests for facilitating more networking and collaborations.

The Campus Champions community has almost doubled in size over the past few years. This growth of the Champions program only serves to underscore the need for and value of this community of practice within the professional field of research computing. The biggest challenge that the Campus Champions program faces is limited time and human resources available to support the growing program. The Campus Champions Leadership team is working to identify immediate priorities as well as short-term and long-term goals and tasks for the staff. The program will also utilize working groups to assist in the implementation of various projects and tasks.

7 CONCLUSION

The Campus Champions program has enjoyed tremendous growth, mirroring the explosion of computational and data-enabled research and scholarly work across domains. The Campus Champions community has established themselves as the intersectional footprint of national research computing and data professionals. These strengths, paired with the findings and recommendations from this study, are propelling the program forward to not only foster new connections between researchers, systems, and expertise, but also to nurture a cross sectional community of practice whose value is greater than the sum of its parts.

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