WIP: From Lack of Time to Stigma: Barriers Facing Faculty at Minority Serving Institutions Pursuing Federally Funded Research

Introduction

Minority Serving Institutions (MSIs) serve a high proportion of students from underrepresented minority groups, particularly within STEM fields. MSIs make up approximately 14 percent of all degree-granting, Title IV-eligible institutions for higher education, and they enroll approximately 30 percent of all undergraduates in the United States [1]. However, in 2018, only 3 percent of all federal obligations for science and engineering research and development provided to institutions of higher education was distributed to MSIs. Two agencies that tend to provide most of the research funding, the National Institute for Health (NIH) and the National Science Foundation (NSF), awarded 2 percent and 6 percent of their research funding to MSIs in 2018 [2]. Federal funding agencies, such as the NSF, have recognized the need to diversify their funding portfolios to increase the engagement of under-participating institutions, including MSIs. With this in mind, a conference was held in February 2020, funded by NSF, with the goal to increase the number and competitiveness of proposals from MSI faculty to core programs within NSF's Directorate for Computer and Information Science and Engineering (CISE). While informative, the conference, along with the interest survey sent to potential participants, revealed multiple challenges and barriers MSI faculty face as they attempt to secure and conduct research funding. This work-in-progress paper focuses on the responses to an open-ended question of the conference interest survey focusing on barriers to securing research funding.

Methods

In preparation for the conference, we examined the list of MSIs maintained by the Penn Center for Minority Serving Institutions (relocated to Rutgers University in 2020) to determine which MSIs had a computer science or computer engineering department. We searched the institution websites to identify a point of contact collecting 494 email addresses (in most cases, the point of contact was the department chair). We then sent an interest survey to everyone on the mailing list to increase the pool of potential conference attendees and inform the conference agenda. The interest survey included an open-ended question asking about the factors preventing successful competition for NSF CISE funding. Responses to this question were manually coded noting salient categories and themes.

While the interest survey was sent to 494 email addresses, we cannot assert the exact number of individuals who received the survey link. On one hand, we assume that some of these addresses might have not been updated on the institution websites, and it is likely that some of the messages could have been blocked by spam filters. On the other hand, it is possible that some individuals forwarded the message to colleagues within our outside of their institution (à la snowball sampling).

Results

The conference interest survey received 111 responses; 104 respondents wrote *something* in the open-ended question about factors preventing securing research funding. Responses varied in level of detail, from a single word (e.g., "time" or "none") to a fully articulated paragraph describing multifaceted concerns (~150 words). Responses generally fell into three categories: (1) factors preventing securing research funding (84 percent of responses), (2) strategies to

secure research funding (13 percent of responses), and (3) other (11 percent of responses). This work-in-progress paper focuses on the themes raised in category 1.

Figure 1 summarizes the themes that emerged from responses in category 1, factors preventing securing research funding. Consistent with other studies [3]-5], *lack of time* emerged as the most common factor preventing successful competition for NSF CISE funding, with 43 percent of the respondents mentioning time constraints.
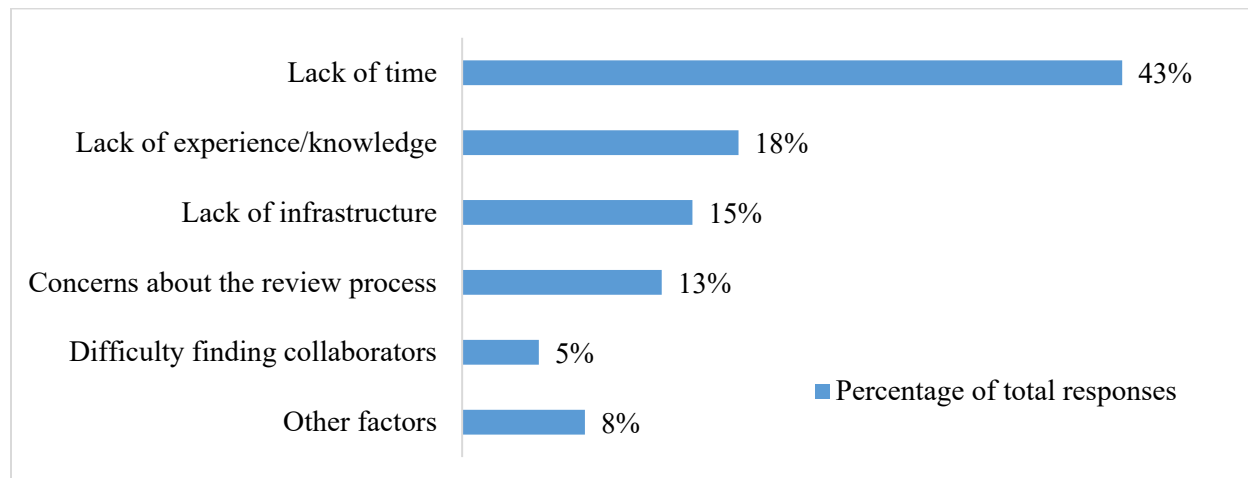

Figure 1. Factors preventing MSI faculty securing NSF CISE funding (n=104).

When respondents spoke about time issues, their concerns centered around time needed to (a) cover their heavy teaching loads, (b) pursue research funding opportunities, (c) write proposals, and (d) conduct the research. A couple of responses alluded to poor timing of submission deadlines. Lack of time due to *heavy teaching loads* was the most frequently mentioned time-related constraint (22 percent of the overall responses).

> "I work at a teaching institution so the teaching load is heavy and it is difficult to carve out time for research and proposal writing. While often attempted in summer, usually submission deadlines are usually in the midst of the teaching semester when teaching deliverables take priority."

> "Teaching load is one main factor - teaching four courses per semester makes it very difficult to find a solid block of time to dedicate in grant writing preparation. grant writing workshops have been helpful; however, need more time."

Approximately 18 percent of responses discussed *lack of experience and knowledge* in preparing federal grant proposals as another barrier. One respondent "didn't feel that […they] have enough information to [be] competitive," and another respondent said, "it's difficult to understand how to fit research activities into the requirements of the funding." A few of the responses specifically cited not knowing the funding opportunities available within the CISE Directorate at NSF.

Along with lack of time and experience concerns, 15 percent of respondents commented on the *lack of infrastructure* at their institutions necessary to support the submission of federal grant proposals and the administration of awarded grants. It is often up to MSI faculty to figure out how to navigate the rules and regulations of proposal submission and grant administration.

> "Our college does not have a grants department so the grants are written by individuals and/or departments who want to engage in grant activities."

> "… Lack of infrastructure at home institution to receive the resources needed to successfully deliver upon grants, including release time to do the work and sufficient administrative staff to push paperwork through the processes in a timely fashion."

Approximately 13 percent of responses raised concerns about the *review process,* indicating potential implicit bias as a barrier to securing funding. Respondents indicated that review panels are often formed by researchers that do not have an understanding of the limitations of resources that many MSIs face compared to research institutions.

> "I have received completely different feedback every time I have revised and submitted my proposal. Although I have asked several times to be included in panel reviews, I haven't been given a chance. As long as the people who review the proposal are typically those who get the grants, this cycle does not change."

> "My university and my school are not understood by peer review panels. The profile that we offer does not fit the expectations of the reviewers. I.e. [sic] we are not R1, we do not have a PhD program, faculty with limited travel funds have not presented at top-tier conferences, etc. The playing field is not level."

> "…faculty expressed that review panels at NSF CISE can be biased against less well-resourced institutions and favor more selective institutions, even when the quality of proposals from different institutional types is equivalent […]"

Approximately 5 percent of respondents spoke of the *difficulty to find collaborators* for research projects with compatible research goals and experience in proposal development. One respondent spoke of the difficulty of "finding collaborators from institutions that really want to collaborate and not just use our institution as their 'broader impact'."

Other issues raised by respondents included issues facing community colleges interested in research funding, not yet having the opportunity to apply for research funds, previously failed proposals, and a feeling of discouragement to apply for funding. While only 1 percent of the responses spoke specifically to faculty becoming discouraged in submitting grant proposals, the barriers and concerns raised by the survey respondents could lead to discouragement in submitting federal grant proposals.

Discussion and Recommendations
The barriers and concerns towards securing federal funds raised in this survey highlight issues related to time availability and stigma and bias MSI and their faculty face. While the sample was limited in scope, the challenges identified via the interest survey are not specific to the NSF, to the CISE Directorate, or to MSI faculty specifically in engineering and computer science fields. For instance, NIH has also recognized the need to diversify their research funding portfolio and find ways to encourage MSI faculty to submit more competitive grant proposals [4-5]. Researchers and representatives from NIH have noted potential implicit bias in policies and the grant review processes followed by federal agencies providing research funding [5]. To encourage more MSI faculty and underrepresented minority faculty in the biomedical sciences to submit federal grant proposals, the NIH created programs to provide support for underserved faculty to provide them with skills and tools to develop better proposals [4, 5, 6, 8].

While not the focus of this paper, survey respondents also shared insight about strategies to help MSI faculty successfully compete for federal funding, including finding strong collaborators, providing training on the development of competitive proposals, and providing seed money to MSI faculty to assist them in the development of research ideas and the management of grant funding. Previous research supports the suggestions of training on faculty research [5, 8], providing mentorship opportunities for MSI faculty with experienced research faculty [4-6], creating opportunities for MSI faculty to meet future collaborators [3, 6], and providing seed money to MSI faculty to learn from faculty at research intensive institutions [7]. Additional research is needed to explore how funding agencies can achieve their goal of increasing the participation of MSI in funded research, understanding the mismatch between the pressure to compete for funds to conduct research and the core institutional missions of many MSIs focused primarily on teaching.

Lastly, it is relevant to share that insights of the 2020 conference, excluding results from the interest survey, were documented in a public report that summarizes findings and recommendations [9]. Two key outcomes of the conference were (1) informing the development of a new solicitation (NSF-21-533), *Computer and Information Science and Engineering Minority-Serving Institutions Research Expansion Program* (CISE-MSI Program) with three threads "recognizing the wide range of research capacity at MSIs" [10] ; and (2) funding and implementation of a five-part proposal development workshop, designed as a capacity-building program featuring highly customized mentoring for participating research teams lead by faculty at MSIs [11].

Acknowledgments

References

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