

Findings from the XSEDE User Survey on Needs of the Research Community

(OAC 15-48562)

February 24, 2020

Version 1.0

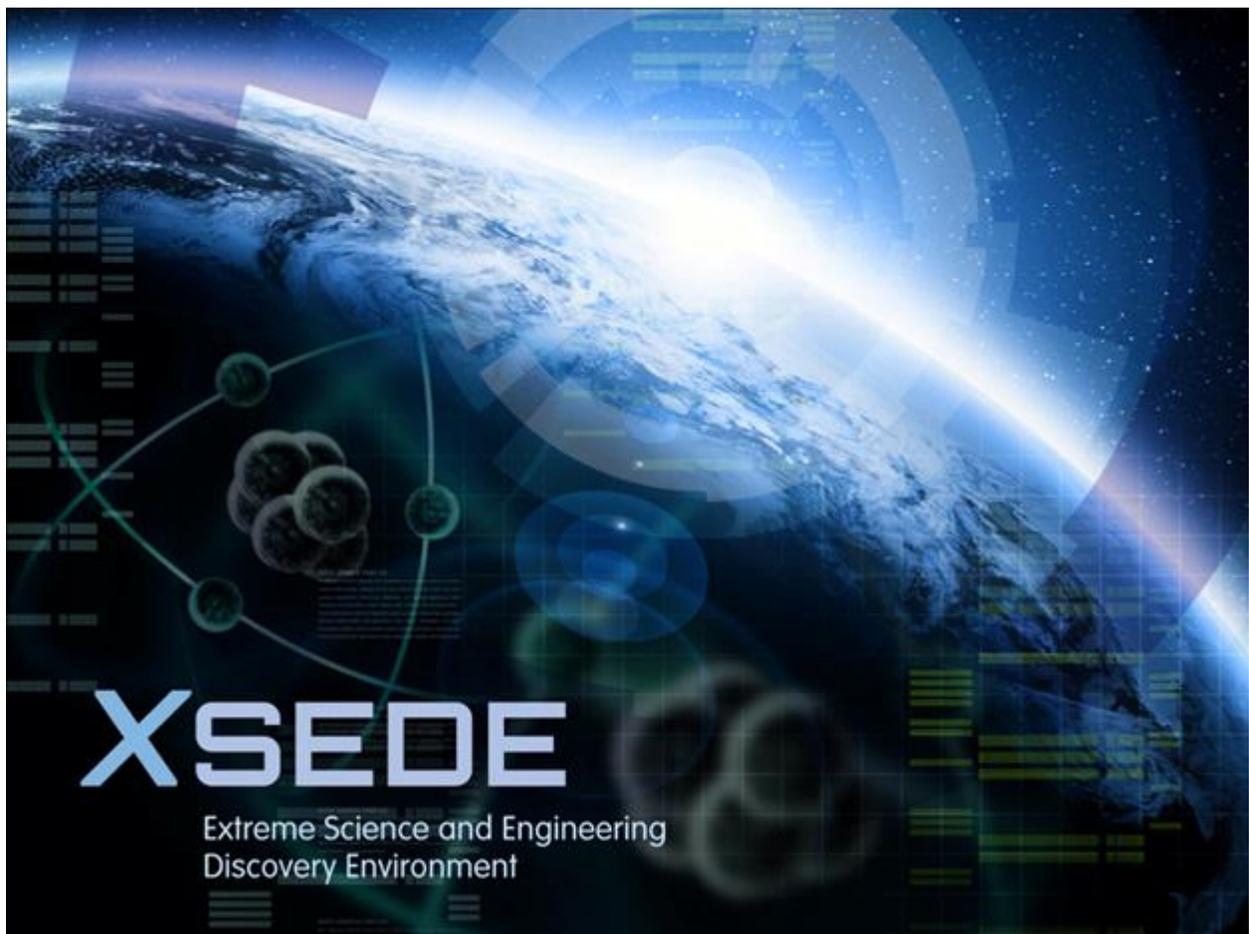


Table of Contents

Findings from the XSEDE User Survey on Needs of the Research Community	1
1. Introduction.....	3
2. Findings	3
2.1. 2018.....	4
2.2. 2019.....	4
3. Conclusion	6

1. Introduction

The NSF-funded XSEDE (the Extreme Science and Engineering Discovery Environment) is a socio-technical platform that integrates and coordinates advanced digital services within the national ecosystem to support contemporary science. This ecosystem involves a highly distributed, yet integrated and coordinated, assemblage of software, supercomputers, visualization systems, storage systems, networks, portals and gateways, collections of data, instruments, and personnel with specific expertise. XSEDE supports the need for an advanced digital services ecosystem distributed beyond the scope of a single institution and provides a long-term platform to empower modern science and engineering research and education. As a significant contributor to this ecosystem, driven by the needs of the open research community, XSEDE substantially enhances the productivity of a growing community of scholars, researchers, and engineers. XSEDE federates with other high-end facilities and campus-based resources, serving as the foundation for a national e-science infrastructure with tremendous potential for enabling new advancements in research and education. *Our vision is a world of digitally-enabled scholars, researchers, and engineers participating in multidisciplinary collaborations while seamlessly accessing computing resources and sharing data to tackle society's grand challenges.*

Researchers use advanced digital resources and services every day to expand their understanding of our world. More pointedly, research now requires more than just supercomputers, and XSEDE represents a step toward a more comprehensive and cohesive set of advanced digital services through our mission: *to substantially enhance the productivity of a growing community of scholars, researchers, and engineers through access to advanced digital services that support open research; and to coordinate and add significant value to the leading cyberinfrastructure resources funded by the NSF and other agencies.*

The XSEDE project provides significant value to the national research community by enabling high-impact scientific advances across a broad range of disciplines. These science successes span a range of domains, and a continually updated collection of these successes are documented on the XSEDE website (see: <https://www.xsede.org/science-successes>).

Given that the XSEDE award will end in August 2021, the program sought to understand how the user community would be impacted if XSEDE did not exist. Beginning in 2018 and continuing in 2019, questions were added to the annual XSEDE User Survey (XUS) to gauge how users' work would be affected if XSEDE did not exist. In reviewing the responses, it seemed appropriate to extract and share this specific information with the NSF as it contemplates what the next program might be. *To be clear*, this document is not intended to advocate simply extending XSEDE, but to provide NSF with input on the what the community values from what is currently called XSEDE. While the questions are specific to the current XSEDE project, that comments have broader applicability and perhaps will help to shed additional light on the needs of the community.

2. Findings

The XSEDE external evaluation team who administers the annual XSEDE User Survey developed a set of questions related to the theme, "How would your work be affected if XSEDE did not exist?" Ten statements for how their work might be impacted were offered, and respondents were allowed to select all that apply to them. The options included:

- Time required to finish projects would substantially increase
- Size and/or scope of projects would be substantially reduced
- Quality of results would likely suffer
- Would abandon some/all projects

- Would complete projects with other similar HP resources
- Ability to collaborate with other researchers would be limited
- Would complete projects with conventional resources
- Employment prospects would be limited
- Don't know/Not applicable
- Other

Across both years that these questions were administered, approximately 21% of respondents indicated that the time required to complete their projects would substantially increase, approximately 19% indicated that the size and/or scope of their projects would be substantially reduced, and approximately 16% stated that the quality of results would likely suffer. Further details related to the responses from each year are presented below.

2.1. 2018

In 2018, 944 respondents to the XUS out of a total of 2,641 chose to respond to the set of questions related to how their work would be impacted if XSEDE did not exist. Table 1 below shows how they responded to each of the items. Most notable is that 21.6% of the total number of respondents indicated that the time required to finish project would substantially increase, 19.8% stated that the size and/or scope of their projects would be substantially reduced, and 16.2% indicated that the quality of results would likely suffer. It is also worthwhile to note that on average each of the 944 respondents selected 2.80 items that would impact them.

Open text comments from researchers in 2018 included the following statements:

- *"Biggest impact would be missing the community support and collaboration that XSEDE fosters."*
- *"I would have had to find other resources for my students."*
- *"I would have to find another way to make Singularity images."*
- *"It would be very difficult to teach my course on deep learning."*
- *"It would cost us a lot more to deliver same outcome."*
- *"It's been a huge help with parallel processing."*
- *"My research is DEAD without XSEDE."*
- *"My research will get affected very badly."*
- *"Other training opportunities would need to be found."*
- *"Our project required XSEDE for evaluation of cloud services."*
- *"If we didn't have XSEDE, we would probably have to go with a second commercial vendor for this particular project, which might have been cost prohibitive."*
- *"This project might not happen, might happen elsewhere."*
- *"Would not be able to run my science gateway."*
- *"Would not have essential software."*

2.2. 2019

In 2019, 813 respondents to the XUS out of a total of 2,224 chose to respond to the set of questions related to how their work would be impacted if XSEDE did not exist. Table 1 below shows how they responded to each of the items. Most notable is that 21.4% of the total number

of respondents indicated that the time required to finish project would substantially increase, 18.9% stated that the size and/or scope of their projects would be substantially reduced, and 15.9% indicated that the quality of results would likely suffer. It is also worthwhile to note that on average each of the 813 respondents selected 2.74 items that would impact them.

Open text comments from researchers in 2019 included the following statements:

- *"...it would really hurt my university's researchers."*
- *"I needed the training to perform my research."*
- *"I use these resources for educational purposes, and they are significant in my development of student's abilities and skills."*
- *"I would have to find similar resources to conduct my course labs."*
- *"I would not be able to educate new students on the topics."*
- *"It was essential to have cloud resources to give my tutorial."*
- *"It will be more work for me to teach the course..."*
- *"My research will be dead."*
- *"My work would be impossible without XSEDE resources."*
- *"No sandbox to learn and develop hpc skills."*
- *"Students will not have a MDC class."*
- *"The cost of research in terms of grant money would substantially increase."*
- *"Would have to secure funding some where else."*
- *"Would not have access to software required for research projects."*

Table 1: 2018 and 2019 Aggregated Responses to XSEDE User Survey Questions: How would your work be affected if XSEDE did not exist?

How would your work be affected if XSEDE did not exist? (Select all that apply.)				
Response	2018 (944 respondents)		2019 (813 respondents)	
	# of responses	% of total responses ¹	# of responses	% of total responses ²
Time required to finish projects would substantially increase	571	21.6%	476	21.4%
Size and/or scope of projects would be substantially reduced	523	19.8%	420	18.9%
Quality of results would likely suffer	429	16.2%	353	15.9%
Would abandon some/all projects	291	11.0%	284	12.8%
Would complete projects with other similar HP resources	230	8.7%	192	8.6%
Ability to collaborate with other researchers would be limited	223	8.4%	190	8.5%

How would your work be affected if XSEDE did not exist? (Select all that apply.)				
Would complete projects with conventional resources	135	5.1%	114	5.1%
Employment prospects would be limited	125	4.7%	106	4.8%
Don't know/Not applicable	94	3.6%	73	3.3%
Other	20	0.8%	16	0.7%

¹Total number of respondents to the overall XUS in 2018 was 2,641.

²Total number of respondents to the overall XUS in 2019 was 2,224.

3. Conclusion

XSEDE provides a valuable and essential service to the research community. Respondents to the annual XSEDE User Survey in 2018 and 2019 indicated that without XSEDE, many researchers' work as well as classroom instruction will be negatively impacted. The issues identified by the researchers are independent of XSEDE *per se* and are capabilities they need to successfully move their teaching and research efforts forward.