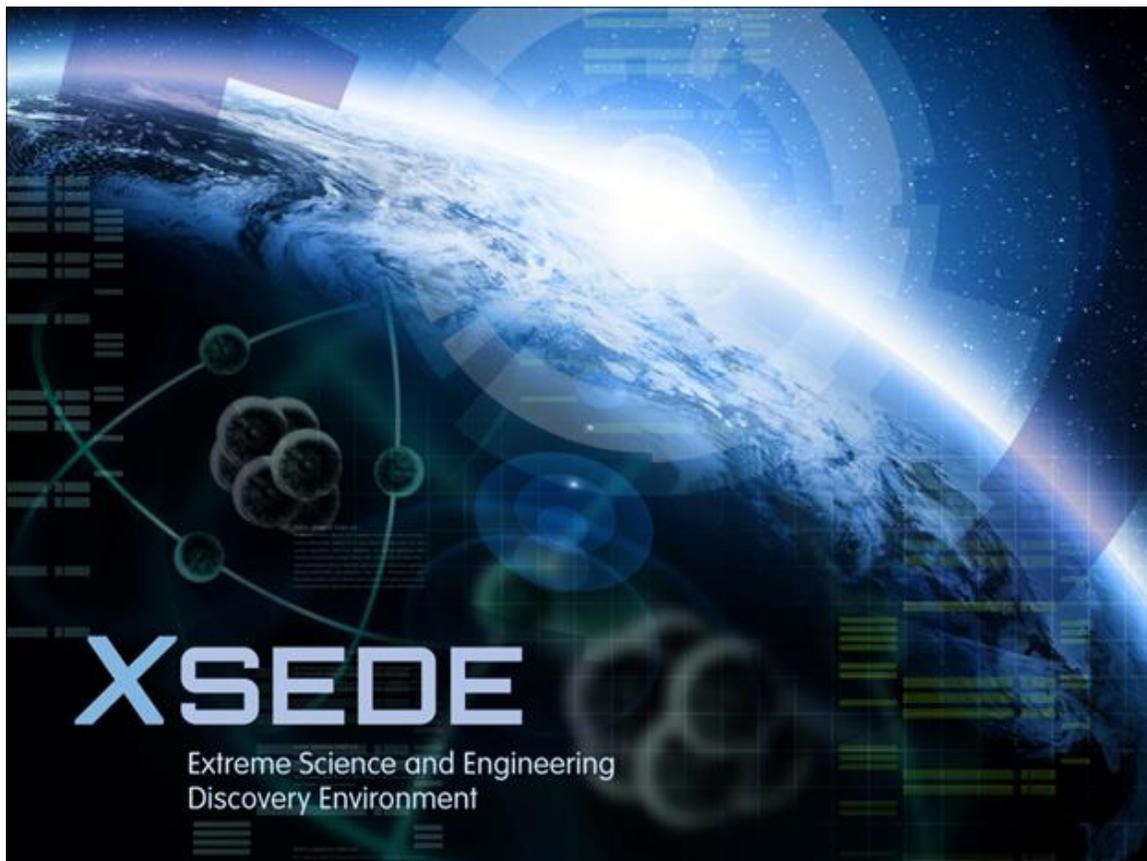# XSEDE:
The Extreme Science and Engineering Discovery Environment

Post-XSEDE 2.0 Preliminary Transition Plan

January 30, 2019

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1. Introduction

XSEDE (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. 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.* XSEDE has developed its strategic goals in a manner consistent with NSF's strategic plan, *Building the Future: Investing in Discovery and Innovation - NSF Strategic Plan for Fiscal Years (FY) 2018 - 2022,* NSF's strategies stated broadly in the *Cyberinfrastructure Framework for 21st Century Science and Engineering* vision document, and the more specifically relevant *Advanced Computing Infrastructure: Vision and Strategic Plan* document.

The XSEDE team is committed to a seamless transition with no interruption in services at the hand-off from current XSEDE 2.0 operations to potential follow-on award(s) and awardee(s). XSEDE is comprised of six Work Breakdown Structure (WBS) Level 2 sub-groups (L2s), and each of those is further divided into WBS Level 3 areas (L3s). Specific documents and activities to be transitioned are described in each L2/L3 section below.

Many of the documents to be shared as part of the transition can be found on the XSEDE website (https://www.xsede.org), XSEDE User Portal (https://portal.xsede.org), XSEDE Wiki (https://confluence.xsede.org), XSEDE Jira (https://jira.xsede.org), and the XSEDE Digital Object Repository (XDOR) provided as part of the University of Illinois' IDEALS system (https://www.ideals.illinois.edu/handle/2142/35660).

2. Transition Plan for Community Engagement & Enrichment (WBS 2.1)

At the core of Community Engagement & Enrichment (CEE) is the researcher, broadly defined to include anyone who uses or may potentially use the array of resources and services offered by XSEDE. The CEE team is dedicated to actively engaging a broad and diverse cross-section of the open science community, bringing together those interested in using, integrating with, enabling, and enhancing the national cyberinfrastructure. Vital to the CEE mission is the persistent relationship with existing and future users, including allocated users, training participants, XSEDE collaborators, and campus personnel. CEE unifies public offerings to provide a more consistent, clear, and concise message about XSEDE resources and services, and brings together those aspects of XSEDE that have as their mission teaching, informing, and engaging those interested in advanced cyberinfrastructure. Information about CEE's KPIs can be found on the [XSEDE KPIs & Metrics wiki page](#).

Specific CEE activities that we suggest should be continued both during and after the transition from XSEDE 2.0 are listed below in each CEE L3 section.

2.1. CEE Director's Office (WBS 2.1.1)

The CEE Director's Office provides the necessary oversight to ensure the greatest efficiency and effectiveness of the CEE area. This oversight includes providing direction to the L3 management team, coordination of, and participation in, CEE planning activities and reports through the area's Project Manager, and monitoring compliance with budgets, and retargeting effort, if necessary. The Director's Office also attends and supports the preparation of project-level reviews and activities. CEE activities include a diverse portfolio of activities which need ongoing management and oversight.

For the post-XSEDE 2.0 transition, the CEE team will provide access to the following resources:

- CEE Risks in the Risk Register will be provided by the PM&R team (see §7.3).
- Documentation regarding oversight and management will be provided.

2.2. Workforce Development (WBS 2.1.2)

The Workforce Development mission is to provide a continuum of learning resources and services designed to address the needs and requirements of researchers, educators, developers, integrators, and students utilizing advanced digital resources. This includes providing professional development for XSEDE team members.

Workforce Development fulfills its mission through an integrated suite of training, education, and student preparation activities to address formal and informal learning about advanced digital resources. Additionally, Workforce Development provides broad access to training services and student internships that have historically proven beneficial to not only the open science community, but industry as well.

Workforce Development is comprised of three areas: Training, Education, and Student Preparation. The Training team develops and delivers training programs to enhance the skills of the national open science community and ensure productive use of XSEDE's cyberinfrastructure. The Education team works closely with Training and Student Preparation to support faculty in all fields of study with their incorporation of advanced digital technology capabilities within the undergraduate and graduate curriculum. The Student Preparation program actively recruits students to use the aforementioned training and education offerings to enable the use of XSEDE resources by undergraduate and graduate students to motivate and prepare them to pursue advanced studies and careers to advance discovery and scholarly studies.

For the post-XSEDE 2.0 transition, the Workforce Development team will provide access to the following resources:

- Documentation of all educational materials that are owned by XSEDE will be packaged and delivered as part of the transition plan.
- Training materials are developed by a variety of stakeholders. A document that provides a site map of all training materials (including site ownership) will be provided.
- A document that provides an overview of student programs with participation data (where available) will also be provided.

2.3. User Engagement (WBS 2.1.3)

The mission of the User Engagement (UE) team is to capture community needs, requirements, and recommendations for improvements to XSEDE's resources and services, and report to the national community how their feedback is being addressed. XSEDE places an emphasis on maintaining consistent user contact, traceability in tracking user issues, and closing the feedback loop.

For the post-XSEDE 2.0 transition, the UE team will provide access to the following resources:

- A document with historical user satisfaction, user demographics, and any unresolved user-expressed needs that may be fulfilled post-transition.

2.4. Broadening Participation (WBS 2.1.4)

The Broadening Participation mission is to engage underrepresented minority researchers from domains that are not traditional users of HPC and from Minority Serving Institutions. This target audience ranges from potential users with no computational experience to computationally savvy researchers, educators, Campus Champions, and administrators who will promote change at their institutions to increase use of advanced digital services for research and teaching.

For the post-XSEDE 2.0 transition, the Broadening Participation team will provide access to the following resources:

- Documentation of best practices developed over the life of the XSEDE project.
- Historical reference to successful programs with demographic information where available.

2.5. User Interfaces & Online Information (WBS 2.1.5)

User Interfaces & Online Information (UII) is committed to enabling the discovery, understanding, and effective utilization of XSEDE's powerful capabilities and services. Through UII's ongoing effort to improve and engage a variety of audiences via the XSEDE website and user portal, UII has an immediate impact on a variety of stakeholders including the general public, potential and current users, educators, services providers, campus affiliates, and funding agencies. These stakeholders will gain valuable information about XSEDE through an information-rich website, the XSEDE User Portal, and a uniform set of user documentation.

For the post-XSEDE 2.0 transition, the UII team will provide access to the following resources:

- Assistance in the transition of the User Portal environment.
- Documentation to assist future developers wishing to extend existing capability.

2.6. Campus Engagement (WBS 2.1.6)

The Campus Engagement program promotes and facilitates the effective participation of a diverse national community of campuses in the application of advanced digital resources and services to accelerate discovery, enhance education, and foster scholarly achievement.

Campus Engagement, via the Campus Champions, works directly with institutions across the U.S. both to facilitate computing and data-intensive research and education, nationally and with collaborators worldwide, and to expand the scale, scope, ambition, and impact of these endeavors. This is done by increasing scalable, sustainable institutional uptake of advanced digital services from providers at all levels (e.g., workgroup, institutional, regional, national, international), fostering a broader, deeper, more agile, more sustainable and more diverse nationwide cyberinfrastructure ecosystem across all levels, and cultivating inter-institutional interchange of resources, expertise, and support. Campus Engagement also aims to assist with the establishment and expansion of consortia (e.g., intra-state, regional, domain-specific) that collaborate to better serve the needs of their advanced computing stakeholders.

For the post-XSEDE 2.0 transition, the Campus Engagement team will provide access to the following resources:

- Documentation including existing Campus Champions and samples of the current agreements and MOUs.

3. Transition Plan for Extended Collaborative Support Service (WBS 2.2)

The Extended Collaborative Support Service (ECSS) improves the productivity of the XSEDE user community through meaningful collaborations and well-planned training activities. The objective is to optimize applications, improve work and data flows, increase effective use of the XSEDE digital infrastructure, and broadly expand the XSEDE user base by engaging members of underrepresented communities and domain areas. The ECSS program provides professionals who can be part of a collaborative team—dedicated staff who develop deep, collaborative relationships with XSEDE users—helping them make best use of XSEDE resources to advance their work. These professionals possess combined expertise in many fields of computational science and engineering. They have a deep knowledge of underlying computer systems and of the design and implementation principles for optimally mapping scientific problems, codes, and middleware to these resources. ECSS includes experts in not just the traditional use of advanced computing systems but also in data-intensive work, workflow engineering, and the enhancement of scientific gateways.

Information about ECSS's KPIs can be found on the [XSEDE KPIs & Metrics wiki page](#).

Since most of the transition deliverables for ECSS cross-cut several ECSS areas, all ECSS deliverables are listed in this section, followed by a brief description of each ECSS area to provide context (see §3.1 to §3.6 below).

For the post-XSEDE 2.0 transition, the ECSS team will provide access to the following resources:

- ECSS Risks in the Risk Register will be provided by the PM&R team (see §7.3).
- List of questions that must be answered by PIs to request ECSS support.
- Read-only access to ECSS Jira pages for each project with links to work plans and, where applicable, quarterly reports, final reports, and PI interviews. The PI interviews for older projects (i.e., before Jira deployment) will be provided as web pages or PDFs if necessary.
- Copies of XSEDE Confluence pages that provide high-level summary of activities for each ECSS area and ECSS overall.
- Links to ECSS Symposia, including videos and PDFs of slide decks.
- Links to XSEDE/PEARC conference presentations from previous Campus Champion Fellows. All Fellows projects should be done by the end of XSEDE 2.0 and no other materials from this program will need to be transitioned.
- Skills survey that is sent to ECSS staff. The survey captures experience and expertise in programming languages, parallel computing techniques, numerical methods, gateway development, workflow tools, and other technical skills and is used to help in the assignment of staff to projects.
- Documents describing the onboarding and offboarding process for new and departing staff, respectively.

3.1. ECSS Director's Office (WBS 2.2.1)

The ECSS Director's Office has been established to provide the necessary oversight to ensure the greatest efficiency and effectiveness of the ECSS area. This oversight includes providing direction to the L3 management team, coordination of and participation in ECSS planning activities and reports through the area's Project Manager, and monitoring compliance with budgets, and retargeting effort, if necessary. The Director's Office also attends and supports the preparation of project level reviews and activities. The ECSS Director's Office manages and sets direction for ECSS activities and responsibilities. They attend bi-weekly Senior Management Team calls; contribute to the project level plan, schedule, and budget; contribute to XSEDE quarterly, annual, and other reports as required by the NSF; and attend XSEDE quarterly and annual meetings. The Director's Office advises the XSEDE PI on many issues, especially those relevant to this WBS area.

3.2. Extended Support for Research Teams (WBS 2.2.2)

Extended Support for Research Teams (ESRT) accelerates scientific discovery by collaborating with researchers, engineers, and scholars to optimize their application codes, improve their work and data flows, and increase the effectiveness of their use of XSEDE digital infrastructure.

ESRT projects are initiated as a result of support requests or recommendations obtained during the allocation process. Most projects focus on research codes associated with specific research teams, as community codes fall under ESCC (§3.4), but are not exclusively restricted to this classification. The primary mandate of ESRT is the support of individual research teams within the context of their research goals.

3.3. Novel and Innovative Projects (WBS 2.2.3)

Novel and Innovative Projects (NIP) accelerates research, scholarship, and education provided by new communities that can strongly benefit from the use of XSEDE's ecosystem of advanced digital services. Working closely with the XSEDE Outreach team, the NIP team identifies a subset of scientists, scholars, and educators from *new communities,* i.e., from disciplines that have not yet made significant use of advanced computing infrastructure, who are now committed to projects that appear to require XSEDE services, and are in a good position to use them efficiently. NIP staff then provide personal mentoring to these projects, helping them to obtain XSEDE allocations and use them successfully.

NIP activities may include building and promotion of science gateways serving communities of end-users and the enhancement of the Domain Champions program by which successful practitioners spread the word about the benefits of XSEDE to their colleagues.

3.4. Extended Support for Community Codes (WBS 2.2.4)

Extended Collaborative Support for Community Codes (ESCC) extends the use of XSEDE resources by collaborating with researchers and community code developers to deploy, harden, and optimize software systems necessary for research communities to create new knowledge.

ESCC supports users via requested projects and XSEDE-initiated projects. ESCC projects may be created in two different ways. Most ESCC projects are initiated as a result of requests for assistance during the allocation process. These projects are similar in nature to ESRT projects but involve community codes rather than codes developed for and by individual research groups. ESCC projects may also be initiated by staff to support a community's needs.

3.5. Extended Support for Science Gateways (WBS 2.2.5)

Extended Support for Science Gateways (ESSGW) broadens science impact and accelerates scientific discovery by collaborating in the development and enhancement of science-centric gateway interfaces and by fostering a science gateway community ecosystem. ESSGW provides consulting support for specific gateway providers as well as general support for the XSEDE-allocated gateway provider community. For example, ESSGW is responsible for determining the quarterly unique gateway user counts for XSEDE and for promoting dialogue between science gateways and XSEDE Service Providers on usage policies.

ESSGW cooperates with the NSF's Science Gateways Community Institute (SGCI), with SGCI acting as a Level 2 Service Provider. SGCI provides complementary capabilities to ESSGW projects, including support for gateway security reviews, usability consulting, business planning, and integration with non-XSEDE resources.

3.6. Extended Support for Training, Education, & Outreach (WBS 2.2.6)

Extended Collaborative Support for Training, Education & Outreach (ESTEO) prepares the current and next generation of researchers, engineers, and scholars in the use of advanced digital technologies by providing the technical support for Training, Education, and Outreach planned activities.

Typical events include train-the-trainers events, on-site classes requested by Campus Champions, regional workshops, conferences, and summer schools (including the International HPC Summer School). Staff also create and review online documentation and training modules. This on-demand training is increasingly popular with the user community when both time and travel budgets are limited.

4. Transition Plan for XSEDE Cyberinfrastructure Integration (WBS 2.3)

The mission of XSEDE Cyberinfrastructure Integration (XCI) is to facilitate interaction, sharing, interoperability, and compatibility of all relevant software and related services across the national CI community, building and improving upon the foundational efforts of XSEDE.

Through XCI, XSEDE serves an aligning function within the nation by assembling a technical infrastructure that facilitates interaction and interoperability across the national CI ecosystem. In turn, this infrastructure is adopted by campus, regional, and national CI providers because it makes their task of delivering services easier and the delivered services better.

Information about XCI's KPIs can be found on the XSEDE KPIs & Metrics wiki page.

Activities and information that will be provided as part of the XCI transition plan are included in each L3 section below.

4.1. XCI Director's Office (WBS 2.3.1)

The XCI Director's Office has been established to provide necessary oversight to ensure the greatest efficiency and effectiveness of the XCI area. This oversight includes providing direction to the L3 management team, coordination of and participation in XCI planning activities and reports through the area's project manager, and monitoring compliance with budgets, retargeting effort, if necessary. The Director's Office also attends and supports the preparation of project level reviews and activities.

The XCI Director's Office continues to manage and set direction for XCI activities and responsibilities. They contribute to and attend bi-weekly Senior Management Team calls; contribute to the project level plan, schedule, and budget; contribute to XSEDE IPRs, annual reports, and other reports as required by the NSF; and attend XSEDE quarterly and annual meetings. Lastly, the Director's Office advises the XSEDE PI on many issues, especially those relevant to this WBS area.

For the post-XSEDE 2.0 transition, the XCI team will provide access to the following resources:

- XCI Risks in the Risk Register will be provided by the PM&R team (see §7.3).

4.2. Requirements Analysis & Capability Delivery (WBS 2.3.2)

The Requirements Analysis & Capability Delivery (RACD) team facilitates the integration, maintenance, and support of cyberinfrastructure capabilities addressing user technical requirements. The process begins by preparing Use Cases and Capability Delivery Plans (CDPs) that describe the technical gaps in XSEDE's prioritized Use Cases. To fill the gaps, RACD evaluates and/or tests existing software solutions, engages with software providers, and facilitates software and service integration. To ensure software and service adoption and ROI, RACD involves users, Service Providers (SPs), and operators in an integration process that uses engineering best practices and instruments components to measure usage. Once components are integrated, RACD facilitates software maintenance and enhancements in response to evolving user needs and an evolving infrastructure environment.

RACD operated infrastructure will be hosted on AWS and simply transitioned from XSEDE 2.0 to its successor organization(s), including their deployment, maintenance, and support documentation. The RACD operated infrastructure services are:

- Research Software Portal (software.xsede.org)
- Information Services (info.xsede.org)
- XSEDE GIT, SVN, and CVS Source Repositories

- XSEDE Packaged Software Distribution Repositories
- RACD Google Drive
- XCI Component Usage Tracking Service

The RACD maintained software components that will be transitioned are:

- Gateway Submit Attributes (tracks gateway users running jobs under community accounts)
- Information Publishing Framework/IPF (publisher HPC resource information to Information Services)
- Component usage analysis tools
- XD allocations usage lookup command line tool (xdusage)
- Software that implements RACD operated infrastructure services (above)
- Ansible repositories used to deploy and maintain RACD operated infrastructure services (above)

RACD engineering process documentation and all XSEDE 2.0 integrated component documentation, whether XSEDE operated or otherwise, will be stored in Confluence, Jira, the RACD Google Drive, and XSEDE Source Repositories.

4.3. Cyberinfrastructure Resource Integration (WBS 2.3.3)

The mission of the XSEDE Cyberinfrastructure Resource Integration (XCRI) team is to work with SPs, CI providers, and campuses to maximize the aggregate utility of national cyberinfrastructure. XCRI facilitates the incorporation of XSEDE software at SPs and encourages SPs to publish their information in the Resource Description Repository (RDR). XCRI's activities are reflected in the coordination of installation of the XSEDE software stack on SPs participating in the XSEDE Federation at the different integration levels and uptake of XCRI-integrated toolkits, such as the XSEDE Campus Bridging Cluster toolkit and XSEDE National Integration Toolkit, but also Globus Transfer clients and other toolkits as developed.

XCRI software resources are included in the Research Software Portal and will be transitioned from XSEDE 2.0 to its successor. A significant part of the XCRI "resource" is the human expertise; especially when conducting site visits, working with Level 3 SPs, etc. We will document this as best we can.

One set of tasks undertaken in XCRI is the Service Provider Coordination activities. Items from Service Provider Coordination to be handed off for transition include the following:
- Service Provider Coordination processes and procedures
- Resource Description Repository (RDR) user guide for SPs entering info in RDR
- Service Provider Coordination documents (which can include originals in Word) from the XSEDE website and in IDEALS
- Guide to Integrating Service Provider Resources into the XSEDE Federation
- XSEDE Service Provider Advanced Integration Options
- XSEDE Service Provider Software and Services Baseline
- XSEDE Service Provider Checklist
- XSEDE Software and Services Table for Service Providers and Campus Bridging
- Information Services Baseline
- XSEDE Software Deployment and Retirement Processes for Service Providers
- XSEDE Community User Accounts Policy
- XSEDE Common User Environment Variable Definitions

5. Transition Plan for XSEDE Operations (WBS 2.4)

The mission of XSEDE Operations is to install, connect, maintain, secure, and evolve an integrated cyberinfrastructure that incorporates a wide range of digital capabilities to support national scientific, engineering, and scholarly research efforts.

Information about the Operations KPIs can be found on the [XSEDE KPIs & Metrics wiki page](#).

Activities and information that will be provided as part of the XSEDE Operations transition plan are included in each L3 section below.

5.1. Operations Director's Office (WBS 2.4.1)

The Operations Director's Office provides oversight to ensure the greatest efficiency and effectiveness of XSEDE Operations. This oversight includes providing direction to the L3 management team, coordination of and participation in Operations planning activities, reporting through the area's Project Manager, and monitoring compliance with budgets, retargeting effort as necessary. The Director's Office also attends and supports the preparation of project level reviews and activities.

The Operations Director's Office manages and sets direction for Operations activities and responsibilities. Many of these tasks for each project year are listed in the project year planning documents. Operations participates in Senior Management Team calls; contributes to the project-level planning, schedule, and budget; contributes to XSEDE reports as required by the NSF; and attends XSEDE quarterly and annual meetings.

For the post-XSEDE 2.0 transition, the Operations team will provide access to the following resources:

- Operations Risks in the Risk Register will be provided by the PM&R team (see §7.3).

5.2. Cybersecurity (WBS 2.4.2)

The Cybersecurity Security (SecOps) group protects the confidentiality, integrity and availability of XSEDE resources and services. The security team's goal is to minimize any interruption of services related to a security event.

As part of the transition following XSEDE 2.0, Cybersecurity will provide access to all XSEDE-related Cybersecurity meeting minutes including the XSEDE Trust Group (SPs and wider trust group) and XSEDE Cybersecurity group meetings (XSEDE-funded staff).

Moreover, access and transition will be provided to Cybersecurity-administered services including:

- XSEDE Certificate Authority
- OAuth service
- CILogon service
- Kerberos service

Cybersecurity documentation of processes, past meeting notes, and other key information will be made available. The key activity documents include:

- Incident Response Process and Procedures
- XSEDE audit process and past audit reports
- Vulnerability Scanning (with Qualys)
- Coordination with XCI for engineering activities security reviews
- Cybersecurity related documents at
  https://www.xsede.org/ecosystem/operations/security

5.3. Data Transfer Services (WBS 2.4.3)

The Data Transfer Services (DTS) group facilitates data movement and management for the community by maintaining and continuously evolving XSEDE data services and resources. The group also engages with the community to work on issues directly affecting their day-to-day data transfer experiences.

As part of the transition following XSEDE 2.0, DTS will provide access to:

- XSEDEnet information, processes, and procedures, including contacts with Internet2 and campus contacts
- XSEDEnet PerfSONAR information, processes, and procedures
- XSEDE DNS information including delegation of sub-domains to SPs
- Data transfer services information, processes, procedures (Globus/GridFTP configuration and logging), and metrics

5.4. XSEDE Operations Center (WBS 2.4.4)

The XSEDE Operations Center (XOC) staff serve as user advocates, providing timely and accurate assistance to the XSEDE community, while simultaneously monitoring and troubleshooting user-facing systems and services.

As part of the transition, XOC will provide access to documentation of its operating instructions, processes, and procedures for operating the XSEDE helpdesk and call center including:

- the XOC playbook
- ticket routing guide
- XOC contact lists
- procedures for the monitoring of XSEDE systems and services.

Any XOC tickets not in a closed state at the end of XSEDE 2.0 will either be resolved before transition, or will be transcribed and given to the new operators for transition to any new ticket system.

5.5. System Operations Support (WBS 2.4.5)

Systems Operational Support (SysOps) provides enterprise-level support and system administration for all XSEDE central services. It is critical to maintain a reliable, efficient, and secure infrastructure, while maintaining a high-level of system availability. To this end, XSEDE operates a variety of services located across multiple partner sites, on both physical hardware and virtual servers, as well as in the cloud utilizing Amazon Web Services (AWS).

As part of the transition following XSEDE 2.0, SysOps will provide access to:

- The hybrid cloud of XSEDE Enterprise Services (XES), which is currently made up of approximately 50 servers/services. Full list of servers and services is maintained at https://sysops.xsede.org/xes-index/
  - ~40 XES in virtual servers at NCSA, NICS, IU, PSC, and TACC
    Transition of these servers would consist of transferring images of the virtual machines via standard protocols.
  - ~10 XES in the cloud at AWS
    Servers that would be included within the AWS compute realm will be transitioned by providing login credentials to the AWS accounts. This includes the XDCDB and many XRAS services.

- XES policies, processes, and procedure documents and instructions are included within the XSEDE wiki and will be transitioned via providing proper login credentials to the XSEDE wiki.
- XSEDE Duo (commercial) will be transitioned by creating a new Account Owner profile within DUO and providing those login credentials.
- XSEDE configuration management data (ansible) will be transitioned via encrypted methods, along with all related encryption keys, accounts, passwords, license keys, etc.
- All vendor contacts and licensing information for third-party software to be shared to enable potential transition to new licensees.

6. Transition Plan for Resource Allocation Service (WBS 2.5)

The Resource Allocation Service (RAS) has maintained XSEDE's current allocation processes and has continually evolved to meet the challenges presented by new types of resources to be allocated via XSEDE, new computing and data modalities to support increasingly diverse research needs, and large-scale demands from the user community for limited XSEDE-allocated resources. RAS has pursued these objectives through three activities: managing the XSEDE allocations process in coordination with the XD Service Providers, enhancing and maintaining the RAS infrastructure and services, and anticipating changing community needs.

Information about the RAS KPIs can be found on the [XSEDE KPIs & Metrics wiki page](#).

Activities and information that will be provided as part of the RAS transition plan are included in each L3 section below.

6.1. RAS Director's Office (WBS 2.5.1)

The RAS Director's Office was established to oversee the RAS area and ensure the greatest efficiency and effectiveness. This oversight includes providing direction to the L3 management team, coordinating and participating in RAS planning activities and reports, and monitoring compliance with budgets. The Director's Office supports the preparation of project-level reviews and activities and contributes to an analytics effort to support NSF, Service Providers, and XSEDE in understanding and projecting the stewardship of, demand for, and impact of CI resources and services.

The RAS Director's Office has managed and set direction for RAS activities and responsibilities. They contribute to and attend bi-weekly Senior Management Team calls; contribute to the project-level plan, schedule, and budget; contribute to XSEDE interim, annual, and other reports as required by the NSF; and attend XSEDE quarterly and annual meetings. Lastly, the Director's Office has advised the XSEDE PI on many issues, especially those relevant to this WBS area.

The following items RAS-wide activities and agreements would have to be addressed in transitioning RAS activities to a follow-on award(s) and awardee(s):

- RAS Risks in the Risk Register will be provided by the PM&R team (see §[7.3](#)).
- IPR metrics appendix process and queries
- [Data set publication process](#), queries, and published data sets
- ORCID membership agreement
- XRAS Service Agreements for non-XSEDE clients
- User satisfaction survey instrument used for quarterly metrics

Note that the ORCID membership agreement and XRAS service agreements have been signed by the University of Illinois on behalf of the XSEDE project.

6.2. XSEDE Allocations Process & Policies (WBS 2.5.2)

The XSEDE-managed allocations process helps the national open science community achieve its research and education goals by allowing researchers to easily gain access to the resources in the XSEDE-coordinated ecosystem. The following items would have to be addressed in transitioning RAS activities to a follow-on award(s) and awardee(s):

- The current NSF-approved Allocations Policies, which incorporate input from a range of stakeholders, including the Service Providers, reviewers, and the user community.
- Current allocation procedures and associated documentation, including the XRAC Reviewer Manual.

- To ensure a smooth transition, we expect that a follow-on awardee would want to retain the current roster of XRAC members.
- The quarterly process and schedule for Research (panel-reviewed) allocation requests and a continual submission and review process for smaller-scale requests.

Most significantly, XSEDE ensures the user community receives uninterrupted access to SP resources by maintaining the quarterly allocations schedule. Close coordination between RAS, NSF, and the follow-on awardee will be required to minimize any impacts on the user community.

6.3. Allocations, Accounting, and Account Management CI (WBS 2.5.3)

The Allocations, Accounting and Account Management CI (A3M) group maintains and improves the interfaces, databases, and data transfer mechanisms for XSEDE-wide resource allocations, accounting of resource usage, and user account management. These A3M services also support a wide-range of XSEDE services outside of RAS.

The following items would have to be addressed in transitioning RAS activities to a follow-on award(s) and awardee(s). During any transition, these services would require at least basic operational support to minimize impact on the user community and Service Providers.

- XSEDE Resource Allocations Service (XRAS)—XRAS encompasses the code base, as well as developer, user, and administrator documentation.
- XSEDE Accounting Service—This service, including the information exchange protocol and messaging service, supports the Service Providers, the allocations process, gateways and gateway usage tracking, and the central XDMoD instance supported by the XD Metrics Service.
- Resource Description Repository (RDR)—The RDR supports a range of services, including XRAS, accounting, and various user-facing information services.
- XSEDE Central Database (XDCDB) and data—The XDCDB includes, for example, allocations, accounting and user-related data (within the bounds of any regulatory/privacy constraints) for XSEDE. XDCDB also encompasses separate schemas supporting the XSEDE User Portal, the RDR, MyProxy, and so on.
- XDCDB-admin utilities and Staff Queries—This set of interfaces provides to allow XSEDE to support, report on, and monitor the data in the XDCDB.
- AWS-hosted services and applications—Most A3M-maintained services are hosted in the AWS cloud; we expect all A3M-maintained services and supporting components to be running in the cloud by the end of the XSEDE award. The billing and accounts will need to be addressed in the transition.
- A3M code repository—Maintained in GitHub, the code for all supported components and utilities will be part of the transition plan.

7. Transition Plan for Program Office (WBS 2.6)

The Program Office has ensured that critical project level functions are in place and operating effectively and efficiently. The Project Office has provided consistent guidance and leadership to the L3 managers across the project. The Project Management, Reporting and Risk Management (PM&R) team has provided a common and consistent approach to managing projects and risks. The Business Operations has managed all financial functions and sub-awards. The External Relations team has focused on communicating to all stakeholders. Finally, Strategy, Planning, Policy, Evaluation & Organizational Improvement (SP&E) has focused attention in those areas to ensure the best possible structure continues to exist within XSEDE to allow the support of all significant project activities and enable efficient and effective performance of all project responsibilities.

Information about the Program Office KPIs can be found on the XSEDE KPIs & Metrics wiki page.

Activities and information that will be provided as part of the Program Office transition plan are included in each L3 section below. All contributions would be historical information available via XDOR (IDEALS), wiki historical files, Jira historical files, or historical XSEDE website files.

7.1. Project Office (WBS 2.6.1)

The Project Office provides oversight to ensure the greatest efficiency and effectiveness of the Program Office area and to establish responsibility for assuring advisory activities of the project occurred. This oversight has included providing direction to the L3 management team and coordination of and participation in Program Office planning activities and reports through the area's Project Manager. The Project Office has also attended and supported the preparation of project-level reviews and activities. Importantly, the Project Office has been responsible for ensuring that the XSEDE Advisory Board (XAB), the User Advisory Committee (UAC), and the SP Forum (SPF) were functioning. The Project Office has been responsible for coordination of project-level meetings such as the bi-weekly Senior Management Team (SMT) teleconference calls and the project quarterly meetings. Lastly, the Project Office has advised the XSEDE PI on many issues, especially those relevant to this WBS area.

The following historical information and documentation would be made available in transitioning Project Office activities to a follow-on award(s) and awardee(s):

- Program Office Risks in the Risk Register will be provided by the PM&R team (see §7.3).
- Policies & Processes
- XSEDE Federation charter, membership, and mailing list documentation
- SP Forum information including archived meeting agendas and notes
- Key Project Documents
    o Organization & Governance
    o Project Execution Plan (PEP)
    o Performance Management Plan (PMP)
    o Data Management Plan
    o Cybersecurity Plan
    o Admin docs: email lists, glossary & acronyms, project tools

7.2. External Relations (WBS 2.6.2)

External Relations' (ER) mission has been to communicate the value and importance of XSEDE to all stakeholders (including the internal audience) through creative and strategic communications.

The following historical information and documentation would be made available in transitioning ER activities to a follow-on award(s) and awardee(s):

- XSEDE video content
- Website (via UII)

7.3. Project Management, Reporting, & Risk Management (WBS 2.6.3)

The Project Management, Reporting & Risk Management (PM&R) team has enabled an effective virtual organization through the application of project management principles, provided visibility to project progress, successes, and challenges, brought new ideas and management practices into the project, and disseminated lessons learned in XSEDE to other virtual organizations. Communication has been critical to success in this highly distributed virtual organization.

The following historical information, processes, and documentation would be made available in transitioning PM&R activities to a follow-on award(s) and awardee(s):

- Change control management process documentation including Project Change Requests (PCRs)
- Project risk management process documentation including Risk Register administration
- Complete Risk Register or subsets of risks depending on the award structure for any potential subsequent award(s) and awardee(s).
- Reports and report generation process
- Program year planning management
- Metric (KPI) facilitation/coordination

7.4. Business Operations (WBS 2.6.4)

The Business Operations group, working closely with staff at the University of Illinois' Grants and Contracts Office (GCO) and the National Center for Supercomputing Applications' (NCSA) Business Office, has managed budgetary issues and sub-awards and ensured timely processing of sub-award amendments and invoices.

The following historical information and documentation would be made available in transitioning Business Operations activities to a follow-on award(s) and awardee(s):

- Process Flows

7.5. Strategy, Planning, Policy, Evaluation & Organizational Improvement (WBS 2.6.5)

XSEDE has dedicated effort to project-wide strategic planning, policy development, evaluation and assessment, and organizational improvement in support of sustaining an effective and productive virtual organization.

The XSEDE Program Office encompasses an independent Evaluation Team designed to provide information to guide program improvement and assess the impact of XSEDE services. Evaluations were based on five primary data sources: (1) an Annual User Survey that is part of the XSEDE annual report and program plan; (2) an Enhanced Longitudinal Study, encompassing additional target groups (e.g., faculty, institutions, disciplines, etc.) and additional measures (e.g., publications, citations, research funding, promotion and tenure, etc.); (3) an Annual XSEDE Staff Climate Study; (4) XSEDE KPIs, Area Metrics, and Organizational Improvement efforts, including ensuring that procedures are in place to assess these data; and (5) Specialized Studies as contracted by Level 2 directors and the Program Office.

Contents of questionnaires, interviews, and focus groups are governed by IRB and thus will not available for transition. The following historical information and documentation would be made available in transitioning SP&E activities to a follow-on award(s) and awardee(s):

- Staff Climate Study summary reports
- User Survey summary reports
- Enhanced Longitudinal Study report(s)
- Reports from all specialized studies
- KPI set
- All reports associated with the organizational improvement efforts