XSEDE Project-wide KPIs & Metrics

Changes resulting from a project-wide KPI review were implemented beginning with RY3, RP1 (May - July 2018). As a result, significant changes were made to XSEDE reporting. This page now reflects those changes. For results of KPIs and Metrics prior to May 2018, see RY1-RY2: XSEDE Project-wide KPIs & Metrics (ARCHIVED).

More Information: What is a KPI - KPI Guidelines - Annual KPI Reviews

1   Executive Summary

Computing across all fields of scholarship is becoming ubiquitous. Digital technologies underpin, accelerate, and enable new, even transformational, research in all domains. Researchers continue to integrate an increasingly diverse set of distributed resources and instruments directly into their research and educational pursuits. Access to an array of integrated and well-supported high-end digital services is critical for the advancement of knowledge. 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.* 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,*[1] NSF's strategies stated broadly in the *Cyberinfrastructure Framework for 21st Century Science and Engineering,*[2] vision document, and, the more specifically relevant, *Advanced Computing Infrastructure: Vision and Strategic Plan*[3] document. Though the latter two documents are now out of date for the NSF, in the absence of documents that supplant them, XSEDE continues to use them for general guidance until such time as successor documents are released. It should be noted here that a draft document, *Transforming Science Through Cyberinfrastructure: NSF's Blueprint for a National Cyberinfrastructure Ecosystem for Science and Engineering in the 21st Century*[4], distributed by NSF's Office Director for the Office of Advanced Cyberinfrastructure, is currently available for public comment.

1.1　Strategic Goals

To support our mission and to guide the project's activities toward the realization of our vision, three strategic goals are defined:

Deepen and Extend Use: XSEDE will *deepen the use—make more effective use—*of the advanced digital services ecosystem by existing scholars, researchers, and engineers, and *extend the use* to new communities. We will *contribute to preparation—workforce development—*of the current and next generation of scholars, researchers, and engineers in the use of advanced digital services via training, education, and outreach; and we will *raise the general awareness of the value of advanced digital services*.

Advance the Ecosystem: Exploiting its internal efforts and drawing on those of others, XSEDE will advance the broader ecosystem of advanced digital services by *creating an open and evolving e-infrastructure*, and by *enhancing the array of technical expertise and support services* offered.

Sustain the Ecosystem: XSEDE will sustain the advanced digital services ecosystem by *ensuring and maintaining a reliable, efficient, and secure infrastructure*, and *providing excellent user support services*. XSEDE will further *operate an effective, productive, and innovative virtual organization*.

The strategic goals of XSEDE cover a considerable scope. To ensure we are delivering on our mission and to assess progress toward our vision, we have identified key metrics to measure our progress toward meeting each sub-goal. These Key Performance Indicators (KPIs) are a high-level encapsulation of our project metrics that measure how well we are meeting each sub-goal. Planning is driven by our vision, mission, goals, and these metrics—which are in turn rooted in the needs and requirements of the communities we serve.

The key concept is not that the KPIs themselves must have a direct causal effect on eventual outcomes, or measure eventual outcomes or long-term impacts, but rather that the KPIs are chosen so that actions and decisions which move the metrics in the desired direction also move the organization in the direction of the desired outcomes and goals.

The table below shows the project's three strategic goals and associated sub-goals along with the KPIs used to measure progress toward achieving those goals.

Table 1-1: Summary of key performance indicators (KPIs) for XSEDE.

Strategic Goals	Sub-goals	KPIs
Deepen and Extend Use	Deepen use (existing communities)	- Number of sustained users of XSEDE resources and services via the portal - Number of sustained underrepresented individuals using XSEDE resources and services via the portal - Percentage of sustained allocation users from non-traditional disciplines of XSEDE resources and service

	Extend use (new communities)	• Number of new users of XSEDE resources and services via the portal • Number of new underrepresented individuals using XSEDE resources and services via the portal • Percentage of new allocation users from non-traditional disciplines of XSEDE resources and services
	Prepare the current and next generation	• Number of participant hours of live training delivered by XSEDE
	Raise awareness of the value of advanced digital services	• Aggregate mean rating of user awareness of XSEDE resources and services • Percent increase in social media impressions over time
Advance the Ecosystem	Create an open and evolving e-infrastructure	• Total number of capabilities in production
	Enhance the array of technical expertise and support services	• Aggregate mean rating of user satisfaction with XSEDE technical support services
Sustain the Ecosystem	Provide reliable, efficient, and secure infrastructure	• Mean composite availability of core services (%)
	Provide excellent user support	• Mean time to ticket resolution (hours) • Aggregate mean rating of user satisfaction with allocations process and support services • Percentage of research requests successful (not rejected)
	Operate an effective and productive virtual organization	• Mean rating of importance of XSEDE resources and services to researcher productivity • Percentage of users who indicate the use of XSEDE-managed and/or XSEDE-associated resources in the creation of their work product
	Operate an innovative virtual organization	• Percentage of Project Improvement Fund funded projects resulting in innovations in the XSEDE organization • Mean rating of innovation within the organization by XSEDE staff

2   Discussion of Strategic Goals and Key Performance Indicators

The strategic goals of XSEDE cover a considerable scope. Additionally, the specific activities within our scope are often very detailed; therefore, to ensure that this significant and detailed scope will ultimately deliver our mission and realize our vision, we decompose the three strategic goals into components or sub-goals to be considered individually.

In determining the best measures of progress toward each of the sub-goals, KPIs that correlate to impact on the scientific community are used. These often pair measurements of outcome with an assessment of quality or impact to provide both a sense of scope and significance of the supporting activities.

2.1   Deepen and Extend Use

XSEDE will 1) *deepen the use—make more effective use*—of the advanced digital services ecosystem by existing scholars, researchers, and engineers and 2) *extend the use* to new communities. We will 3) *contribute to preparation—workforce development*—of scholars, researchers, and engineers in the use of advanced digital technologies via training, education, and outreach; and we will 4) *raise the general awareness of the value of advanced digital research services*.

2.1.1 Deepen use to Existing Communities

XSEDE engages in a range of activities that serve to deepen use including identifying new technologies and new service providers, evolving the e-infrastructure, and enhancing the research prowess of current and future researchers. However, the ongoing use of resources and services available via XSEDE is the key indicator of this deepening use. As a result, the project has chosen three KPIs (Table 2-1) that together measure the ongoing engagement with the community with an emphasis on exposing the diversity of those consuming these services: 1) Number of sustained users of XSEDE resources and services via the portal, 2) Number of sustained underrepresented individuals using XSEDE resources and services via the portal, and 3) Percentage of sustained allocation users from non-traditional disciplines of XSEDE resources and services.

Table 2-1: KPIs for the sub-goal of deepen use (existing communities).

KPI	Program Year	Target	RP1	RP2	RP3	RP4	Total	Owner(s)
Number of sustained community members of XSEDE resources and services via the portal[2]	RY6	4,500 / qtr	5,148	4,722	4,812	5,132	8,575	CEE (§3)
	RY5	4,500 / qtr	4,644	4,489	4,494	5,280	7,014	
	RY4	3,500 / qtr	4,137	4,728	4,070	4,615	6,578	
	RY3	3,500 / qtr	4,196	4,089	3,099	4,864	6,851	
	RY2	3,000 / qtr	3,962	3,754	2,488	3,020	4,527	
	RY1	> 5,000 / qtr	*	4,755	4,446	4,924	6,186	
	Definition/Description: Number of sustained users within the current reporting period. A "sustained user" is any individual who created a portal account prior to the current reporting period and logged in during the reporting period. **Collection methodology:** There is a usage log parsing script that collects the tomcat logs and parses out the relevant data during the selected time period.								
Number of sustained underrepresented individuals using XSEDE resources and services via the portal[2]	RY6	1,750 / yr	1,009	869	858	852	1,549	CEE (§3)
	RY5	1,750 / yr	831	805	763	1,013	1,266	
	RY4	1,750 / yr	625	809	564	705	1,014	
	RY3	1,500 / yr	529	509[1]	343	636	1,818	
	RY2	1,500 / yr	490	408	296	402	1,640	
	RY1	> 1,000 / yr	*	322	238	535	1,095	
	Definition/Description: Number of sustained underrepresented users. A "sustained user" is any individual who created a portal account prior to the current reporting period and logged in during the reporting period. Only individuals from underrepresented communities including women and racial/ethnic domestic minorities in HPC are counted. Users identifying with multiple underrepresented communities are only counted once. **Collection methodology:** There is a usage log parsing script that collects the tomcat logs and parses out the relevant data during the selected time period. Self reported demographic XUP data is then matched to these data to select underrepresented users including women and racial/ethnic minorities from the list. Users identifying with multiple underrepresented communities are only counted once.								
Percentage of sustained allocation community members from non-traditional disciplines of XSEDE resources and services	RY6	33% / yr	24.4	24.7	25.1	24.4	31.9	ECSS (§4)
	RY5	33% / yr	23.2	23.8	24.9	26.0	33.3	
	RY4	22% / yr	21.1	22.7	23.0	23.5	30.4	
	RY3	20% / qtr	22.1	20.7	25.8	22.7	22.8	
	RY2	*	21.5	20.4	21.1	21.0	21.0	
	RY1	*	*	18.2	19.9	18.6	18.9	
	Definition/Description: Number of sustained allocation users from non-traditional disciplines in HPC divided by the total number of sustained allocation users within the reporting period. **Collection methodology:** A set of 63 fields of science (FOS) have been identified in the XD Central Database (XDCDB), each of whose usage over the past 10 years is below 0.5% of the total normalized usage. A scripted query to XDCDB counts "sustained allocation users" as the total number of users on grants from these FOS that are active during the reporting period and have used at least 10% of their allocated usage on at least one service provider (SP). This is divided by the total number of users on all the grants that that are active during the reporting period and have used at least 10% of their allocated usage on at least one SP.								

1 The totals of these KPIs do not equal the sum of the data from each reporting period because one person could be counted as a sustained user /individual in more than one reporting period if they continue to log in for multiple reporting periods; however, they will only be counted once in the total.

2.1.2 Extend Use to New Communities

New communities are defined as fields of science, industry, and underrepresented communities that represent less than one percent of XSEDE Resource Allocation Committee (XRAC) allocations. The Novel & Innovative Projects (NIP) team and the Broadening Participation team both work to bring advanced digital services to new communities. XSEDE measures both the number of new users and the number of new users on research projects from underrepresented communities and non-traditional disciplines of XSEDE resources and services as the indicators of progress (Table 2-2).

Table 2-2: KPIs for the sub-goal of extend use (new communities).

KPI	Program Year	Target	RP1	RP2	RP3	RP4	Total	Owner(s)
Number of new community members of XSEDE resources and services via the portal	RY 6	2,500/qtr	1,603	2,377	2,001	2,228	8.352	
	RY 5	2,500/qtr	2,157	2,612	1,972	2,211	9,050	

KPI	Program Year	Target	RP1	RP2	RP3	RP4	Total	Owner(s)
	RY 4	3,000 / qtr	2,415	3,209	2,365	3,089	11,078	
	RY 3	3,000 / qtr	1,905[1]	2,763[1]	2,527[1]	2,757	9,952	
	RY 2	2,000 / qtr	2,305	2,813	2,346	2,917	10,381	CEE (§3)
	RY 1	>1,000 / qtr	*	1,973	1,849	2,359	6,181	

Definition/Description: Number of new users of XSEDE resources and services as determined by the number of portal accounts created within the reporting period.

　Collection methodology: The Liferay Database is queried for the number of users in the Users table that was created during the selected time periods. Sample query: select screenName, createDate from User_ where createDate between '2016-09-01 00:00:00' AND '2016-10-31 00:00:00';

KPI	Program Year	Target	RP1	RP2	RP3	RP4	Total	Owner(s)
Number of new underrepresented individuals using XSEDE resources and services via the portal	RY 6	250 / qtr	181	163	123	119	677	
	RY 5	250 / qtr	301	159	188	219	998	
	RY 4	175 / qtr	380	332	214	400	1,326	
	RY 3	200 / qtr	134	155	129	238	656	CEE (§3)
	RY 2	150 / qtr	251	175	222	234	950	
	RY 1	100 / qtr	*	150	135	240	525	

Definition/Description: Number of new underrepresented users. A "new user" is any individual who created a portal account within the reporting period. Only individuals from underrepresented communities including women and racial/ethnic domestic minorities in HPC are counted. Users identifying with multiple underrepresented communities are only counted once.

Collection methodology: XSEDE portal users are able to specify their race/ethnicity, gender, and institution in their user profile and are encouraged to complete this data when registering for training events through the XSEDE portal. Date of allocation awards is also recorded in the XSEDE database (XDCDB). A query is then run to generate the number of individuals meeting the aforementioned criteria within a given quarter. Care is taken to not over represent this metric by ensuring an individual who meets multiple criteria is only accounted for one time.

KPI	Program Year	Target	RP1	RP2	RP3	RP4	Total	Owner(s)
Percentage of new allocation community members from non-traditional disciplines of XSEDE resources and services	RY 6	35% / yr	30.9	30.0	46.1	40.0	42.4	
	RY 5	35% / yr	30.1	35.0	39.7	35.4	40.0	
	RY 4	35% / yr	26.4	37.1	33.4	38.4	34.8	
	RY 3	30% / yr	33.1	26.0	38.7	32.5	32.8	ECSS (§4)
	RY 2	NA	24.8	26.0	26.6	33.9	27.8	
	RY 1	NA	*	21.8	24.9	31.0	25.7	

Definition/Description: Number of new allocation users from non-traditional disciplines in HPC divided by the total number of new allocation users within the reporting period.

Collection methodology: A set of 63 fields of science (FOS) have been identified in the XD Central Database (XDCDB), each of whose usage over the past 10 years is below 0.5% of the total normalized usage. A scripted query to XDCDB counts "new allocation users" as the total number of users on the grants from these FOS that have been newly awarded during the reporting period. This is divided by the total number of users on all the grants that have been awarded during the reporting period.

2.1.3 Prepare the Current and Next Generation

Part of XSEDE's mission is to provide a broad community of existing and future researchers with access and training to use advanced digital services via the sub-goal of preparing the current and next generation of computationally-savvy researchers. While many activities support this sub-goal, such as the various Champion (§3.6), Student Engagement (§3.4), and Education (§3.2) programs, the training offered through Community Engagement & Enrichment (CEE) impacts the most people directly. Therefore, the key indicator (Table 2-3) of performance toward this goal, which is reflective of industry standards, is the number of participant hours of live training delivered by XSEDE.

Table 2-3: KPIs for the sub-goal of prepare the current and next generation

KPI	Program Year	Target	RP1	RP2	RP3	RP4	Total	Owner(s)
Number of participant hours of live training delivered by XSEDE	RY 6	45,000 / yr	16,315	12,531	5,235	9,534	43,615	
	RY 5	40,000 / yr	19,751	16,111	5,689	15,515	57,066	
	RY 4	40,000 / yr	15,461	16,135	6,380	12,667	50,643	
	RY 3	40,000 / yr	14,140	8,274	7,259	12,352	42,025	CEE (§3)
	RY 2	NA[1]	12,787	8,876	6,004	14,753	42,421	
	RY 1	NA[1]	5,994	3,770	5,180	9,199	24,143	

Definition/Description: Number of total participant hours spent in XSEDE live, in-person, or webcast events during the current reporting period.

Collection methodology: Measured using registrations via the XSEDE User Portal. Does not include training events that do not require registration such as Cornell Virtual Workshop, CI-Tutor, Youtube videos, etc.

[1]This was a new KPI in RY3. Data provided for RY1 and RY2 was reported retroactively.

2.1.4 Raise Awareness of the value of advanced digital services

While many activities led by teams throughout the XSEDE organization, such as our Workforce Development (§3.2), User Engagement (§3.3), Broadening Participation (§3.4), and Campus Engagement (§3.6) contribute to our ability to raise the general awareness of the value of advanced digital research services, we have chosen to focus on measures in two areas (Table 2-4): user input and social media. Desirable trends in these key outcomes can be correlated to success for this sub-goal.

Table 2-4: KPIs for the sub-goal of raise awareness of the value of advanced digital research services

KPI	Program Year	Target	RP1	RP2	RP3	RP4	Total	Owner(s)
Grand (aggregate) mean of XSEDE Community Survey awareness items regarding XSEDE resources and services	RY 6	3.7 of 5 / yr	3.6	-	-	-	3.6	Program Office (§8)
	RY 5	3.7 of 5 / yr	3.8	-	-	-	3.8	
	RY 4	3.7 of 5 / yr	3.8	-	-	-	3.8	
	RY 3	3.5 of 5 / yr	3.7	-	-	-	3.7	
	RY 2	*	3.6	-	-	-	3.6	
	RY 1	*	*	-	-	-	NA	
	Definition/Description: Aggregate mean rating of user awareness of XSEDE resources and services as measured by the annual User Survey on a scale of 1 (not at all aware) - 5 (extremely aware). The core items included in the calculation for this purpose are: Mission, Computational Resources, Data Storage Services, Viz Services, Science Gateways, XUP, Data Transfer Services, Website, Training Opportunities, Online Technical Documentation; Community Engagement and Enrichment Opportunities (f.k.a., Education and Outreach Opportunities); Help Desk Services, and ECSS. **Collection methodology:** Aggregate rating of awareness scale items measuring current XSEDE resources and services listed on the annual XSEDE User Survey.							
Number of social media impressions over time[1]	RY 6	424,000 / yr	91,770	85,506	40,078	29,611	249,965	Program Office (§8)
	RY 5	430,000/ yr	86,046	101,394	106,263	109,800	403,503	
	RY 4	426,198 / yr	87,482	75,164	84,185	110,904	357,735	
	RY 3	359,714 / yr	112,806	63,269	93,803	85,287	355,165	
	RY 2	NA	69,607	55,506	59,490	128,180	312,783	
	RY 1	NA	*	52,200	128,675	88,332	269,207	
	Definition/Description: Each reporting period the number of people who have seen XSEDE interactions on Facebook + Twitter is reported. "Impressions" are generated by Facebook and Twitter to determine how many individuals have seen XSEDE interactions or posts on said platforms. This includes "likes," "retweets," "followers," "shares," as well as people who see the post based on their friends or followers sharing XSEDE information. At the end of each reporting year, impressions across the four reporting periods for that year are summed, and a percentage increase over the total number from the previous reporting year is calculated as follows: Number of social media impressions within the current reporting period year (x) minus the number of social media impressions during the previous reporting year (y). This number is divided by the number of social media impressions in the previous reporting year (y) to determine percent increase $(((x-y)/y)*100))$. **Collection methodology:** The External Relations team pulls the information from Facebook and Twitters' internal tracking methods at the end of each report period. The percent increase is then computed based on the previous reporting year data.							

- Data reportedly annually.

[1] This was a new KPI in RY3. Data provided for RY1 and RY2 was reported retroactively. Beginning in RY5, this KPI is calculated as the number of social media impressions with the annual target calculated based on a 20% increase over the previous year.

2.2   Advance the Ecosystem

Exploiting its internal efforts and drawing on those of others, XSEDE will advance the broader ecosystem of advanced digital services by 1) *creating an open and evolving e-infrastructure*, and by 2) *enhancing the array of technical expertise and support services* offered.

2.2.1 Create an Open and Evolving e-Infrastructure

There are a variety of factors that affect the evolution of the e-infrastructure. These range from external factors, such as the number of XSEDE Federation members and the variety of services they provide, to internal factors, like Operations (§6) of critical infrastructure and services and the evaluation and integration of new capabilities. While XSEDE actively seeks new Federation members and Service Providers, as well as partnerships with national and international cyberinfrastructure projects, the group views their role as connectors of these elements to have the most impact. Thus, XSEDE focuses on the number of new capabilities in production as an indicator of performance with respect to this sub-goal (Table 2-5).

Table 2-5: KPIs for the sub-goal of create an open and evolving e-infrastructure

KPI	Program Year	Target	RP1	RP2	RP3	RP4	Total	Owner(s)
Total number of capabilities in production[1]	RY 6	123 by end of RY6	121	125	127	127	127	XCI (§5)
	RY 5	110 by end of RY5	102	104	109	118	118	
	RY 4	100 by end of RY4	88	88	91	102	102	
	RY 3	81 by end of RY3	76	85[1]	87	87	87	
	RY 2	NA	72	74	74	75	75	
	RY 1	NA	*	63	63	69	69	

	Definition/Description: Total number of capabilities in production across XSEDE SPs, central operations, partner service providers (Globus, etc.), campuses, science gateways, etc.
	Collection methodology: A list of capabilities in production through XSEDE is kept in the Community Software Repository which catalogs Use Cases and Capability Delivery Plans.

[1] This was a new KPI in RY3. Data provided for RY1 and RY2 was reported retroactively.

2.2.2 Enhance the Array of Technical Expertise and Support Services

To enhance the technical expertise of XSEDE's staff to offer an evolving set of support services, the project will continue many activities including workshops, symposia, and training events hosted by Extended Collaborative Support Services (ECSS) and Service Providers (§4.6). The KPI for this is feedback provided from the XSEDE user-base through the annual user survey (Table 2-6).

Table 2-6: KPIs for the sub-goal of enhance the array of technical expertise and support services.

KPI	Program Year	Target	RP1	RP2	RP3	RP4	Total	Owner(s)
Grand (aggregate) mean rating of XSEDE Community Survey satisfaction items regarding XSEDE technical support services[1]	RY 6	3.8 of 5 / yr	4.4	-	-	-	4.4	Program Office (§8)
	RY 5	3.5 of 5 / yr	4.4	-	-	-	4.4	
	RY 4	3.5 of 5 / yr	3.9	-	-	-	3.9	
	RY 3	3.5 of 5 / yr	3.6	-	-	-	3.6	
	RY 2	NA	3.4	-	-	-	3.4	
	RY 1	NA	*	*	*	*	*	
	Definition/Description: Aggregate rating of user satisfaction with XSEDE technical expertise and support services via the annual User Survey on a scale of 1 (very dissatisfied) - 5 (very satisfied). Collection methodology: Aggregate rating of all current "XSEDE Software and Service Components" measured using the "frequency of performance meeting expectations" scale on the annual XSEDE User Survey.							

- Data reported annually.

[1] This is a new KPI in RY3. Data provided for RY2 was reported retroactively.

2.3   Sustain the Ecosystem

XSEDE will sustain the advanced digital services ecosystem by 1) *ensuring and maintaining a reliable, efficient, and secure infrastructure*, and 2) *providing excellent user support services.* Furthermore, XSEDE will operate an 3) *effective*, 4) *productive,* and 5) *innovative virtual organization.*

2.3.1 Provide Reliable, Efficient, and Secure Infrastructure

Many activities support the provisioning and support of reliable, efficient and secure infrastructure—such as User Interfaces & Online Information (§3.5), Security (§6.2), Data Transfer Services (§6.3), Systems Operations and Support (§6.5), support for Allocations (§7.2), and Allocations, Accounting & Account Management (§7.3)—but perhaps the truest measure of an infrastructure's reliability is its robustness as reflected by sustained availability. Thus, the KPI for this sub-goal is the mean composite availability of core services, shown as a percentage (Table 2-7), measured as a geometric mean. This is a composite measure of the availability of critical enterprise services and the XRAS allocations request management service.

Table 2-7: KPIs for the sub-goal of provide reliable, efficient, and secure infrastructure

KPI	Program Year	Target	RP1	RP2	RP3	RP4	Total	Owner(s)
Mean composite availability of core services (%)	RY 6	99.9% / qtr	99.9	99.9	99.9	99.9	99.9	Operations (§6)
	RY 5	99.9% / qtr	99.9	99.9	99.9	99.9	99.9	
	RY 4	99.9% / qtr	99.9	99.9	99.9	99.9	99.9	
	RY 3	99.9% / qtr	99.9	99.9	99.9	99.9	99.9	
	RY 2	99.9% / qtr	99.8	99.9	99.9	99.9	99.9	
	RY 1	99.0% / qtr	*	99.9	99.9	99.9	99.9	

	Definition/Description: Mean composite availability of core services is the geometric mean of % core enterprise services availability and % POPS/XRAS availability. Availability percentage of each component is measured separately, then aggregated and averaged using a geometric mean to determine the composite availability.							
	Mean composite of: "Average availability of critical enterprise services (%) [geometric mean]" (Systems Operational Support 2.4.5) and "Availability of XRAS systems" (AA&AM 2.5.3).							
	Collection Methodology: Average availability of critical enterprise services (%) [geometric mean]: The data is stored locally to the Nagios service at IU. Nagios is an application that constantly logs the availability of core central services. These logs are queried to determine if/when a service becomes unavailable to users.							
	Availability of XRAS systems: There is a table acct.downtime in the XDCDB, which is manually completed when there is an outage in the XDCDB, a network outage disrupting availability of the XRAS services, or an outage of the XSEDE User Portal. Currently, outages are detected via a variety of e-mail notifications, and the data is manually entered into the XDCDB.							

2.3.2 Provide Excellent User Support

Although nearly every group in the organization has some support function, XSEDE has chosen to focus on metrics with respect to two primary support interfaces to the community: the XSEDE Operations Center (XOC) and the Resource Allocation Services (RAS) team. The XOC is the frontline centralized support group that either resolves or escalates tickets to the appropriate resolution center depending on the request. RAS is responsible for the allocations process and the allocation request system. These two support interfaces are the focus for gauging the progress towards achieving the sub-goal of providing excellent user support, specifically: 1) the mean time to resolution on support tickets that are resolved by the XOC or routed to, and resolved by, other XSEDE areas, 2) the aggregate mean rating of user satisfaction with allocations process and support services measured via a quarterly survey of users who have interacted with the allocations request system and the allocations process more generally, and 3) the percentage of research requests successful (not rejected) determined following the quarterly allocations session (Table 2-8).

Table 2-8: KPIs for the sub-goal of provide excellent user support

KPI	Program Year	Target	RP1	RP2	RP3	RP4	Total	Owner(s)
Mean time to ticket resolution (hours)	RY 6	< 16 hrs/ qtr	14.6	17.6	18.5	13.9	16.2	Operations (§6)
	RY 5	< 16 hrs/ qtr	15.3	23.2	18.8	12.2	17.4	
	RY 4	< 16 hrs/ qtr	14.0	14.6	21.0	14.3	16.0	
	RY 3	< 16 hrs/ qtr[1]	12.3	18.5	23.2	17.5	17.9	
	RY 2	< 24 hrs/ qtr	26	20.1	22.8	15.0	21.0	
	RY 1	< 24 hrs/ qtr	*	24.0	28.2	23.1	25.1	
	Definition/Description: Mean time to ticket resolution within XSEDE WBS ticket queues and the XOC queue. This metric does not apply to Service Provider ticket queues. **Collection methodology:** The data is stored locally via the Request Tracker service, which is the XSEDE ticket software and which is located at TACC. Reports are generated against the RT database to determine MTTR and other metrics.							
Mean rating of community member satisfaction with allocations process and support services[1]	RY 6	4 of 5 / yr	4.1	4.2	4.3	4.2	4.2	RAS (§7)
	RY 5	4 of 5 / yr	4.4	4.3	4.3	4.3	4.3	
	RY 4	4 of 5 / yr	4.2	4.3	4.4	4.2	4.3	
	RY 3	4 of 5 / yr	4.1	4.2	4.1	4.4	4.2	
	RY 2	4 of 5 / yr	4.1	4.0	4.1	3.9	4.0	
	RY 1	4 of 5 / yr	*	4.0	4.0	4.0	4.0	
	Definition/Description: Aggregate mean rating of user satisfaction with allocations process and XRAS services on a scale of 1 (not at all satisfied) - 5 (extremely satisfied). **Collection methodology:** Average of the L2 KPI satisfaction ratings for the allocations process and for the XRAS system.							
Percentage of research requests successful (not rejected)	RY 6	85.0% / qtr	85.4	76.0	87.0	80.0	82.1	RAS (§7)
	RY 5	85.0% / qtr	80.0	84.0	84.0	91.0	84.8	
	RY 4	85.0% / qtr	81.0	80.0	78.0	87.0	82.0	
	RY 3	85.0% / qtr	65.0	70.0	72.0	75.0	70.5	
	RY 2	85.0% / qtr	70.0	69.0	72.0	68.0	69.8	
	RY 1	85.0% / qtr	*	76.0	75.0	74.0	75.0	
	Definition/Description: Number of Research allocation requests receiving some non-zero award from an XRAC meeting divided by the number of Research allocation requests submitted to the same XRAC meeting. **Collection methodology:** Request data comes from the Quarterly XRAC meetings and is stored in XRAS as well as some meeting spreadsheets.							

[1] KPI name updated in RY4.

2.3.3 Effective and Productive Virtual Organization

During the first five years of XSEDE, in conjunction with developing a methodology for driving and assessing performance excellence, XSEDE adopted the Baldrige Criteria[5] and has assessed and applied applicable criteria from all seven criteria by that methodology. These include annual reviews of the vision, mission, strategic goals, project-wide processes and standards (KPIs); user and staff surveys (§3.3, §8.5); stakeholder communications (§8.1); advisory boards (§8.1); community engagement (§3); workforce enhancement (§3.2); and the analysis of organizational data that leads to organizational learning, strategic improvement, and innovation. With this foundation, it is now appropriate to look to the XSEDE users to give us an indication of our effectiveness by rating the importance of the resources and services provided by XSEDE (Table 2-9).

Table 2-9: KPIs for the sub-goal of operate an effective and productive virtual organization.

KPI	Program Year	Target	RP1	RP2	RP3	RP4	Total	Owner(s)
Mean rating of importance of XSEDE resources and services to researcher productivity	RY 6	4.4 of 5 / yr	4.2	-	-	-	4.2	Program Office (§8)
	RY 5	4.4 of 5 / yr	4.2	-	-	-	4.2	
	RY 4	4.4 of 5 / yr	4.2	-	-	-	4.2	
	RY 3	4.2 of 5 / yr	4.4	-	-	-	4.4	
	RY 2		4.4[2]	-	-	-	4.4	
	RY 1		4.3[2]	-	-	-	4.3	
	Definition/Description: Mean rating of importance of XSEDE resources and services to researcher productivity as measured by the annual User Survey on a scale of 1 (not important at all) - 5 (essential). **Collection methodology:** A mean rating is calculated from the responses to the annual XSEDE User Survey item, "How important are XSEDE resources to your work?"								
Percentage of community members who indicate the use of XSEDE-managed and /or XSEDE-associated resources in the creation of their work product[1]	RY 6	80%/yr	88	-	-	-	88	Program Office (§8)
	RY 5	80%/yr	83	-	-	-	83	
	RY 4	80%/yr	79	-	-	-	79	
	RY 3	79%/yr	79	-	-	-	79	
	RY 2	*	*	*	*	*	*	
	RY 1	*	*	*	*	*	*	
	Definition/Description: Percentage of users who self-report the use of XSEDE resources in their work product when responding to the annual User Survey. **Collection methodology:** Annual User Survey response. The Annual User Survey is a representative sample of XSEDE Users who have interacted with XSEDE via the portal or an allocation within 2 years of the current dissemination date. When particular groups are targeted, it is to increase the response rate from that group in order to ensure adequate representation that mimics the general population. The evaluation team is confident that the responses from this group can be generalized.								

- Data reported annually.

[1] New KPI added in RY3 RP2.

[2] These historical values are based on other survey data that was vaguely related to this KPI. We created a new survey item in RY3 to address it directly.

2.3.4 Innovative Virtual Organization

Measuring innovation for an organization like XSEDE (or for organizations in general) is difficult and represents an area of open research. After much thought and discussion both internally and with external stakeholders and advisors, XSEDE has identified two indicators that correlate to innovation within the project: 1) percentage of Project Improvement Fund proposals resulting in innovations in the XSEDE organization and 2) mean rating of innovation within the organization by XSEDE staff (Table 2-10). The first indicator is a measurement of XSEDE's ability to fund smaller innovative improvements within the project; the second measures how staff rate the level of innovation within the project. These KPIs will continue to be the subject of an open conversation within the organization and with stakeholders and advisors as XSEDE assesses these measurements and how to best quantify innovation.

Table 2-10: KPIs for the sub-goal of operate an innovative organization

KPI	Program Year	Target	RP1	RP2	RP3	RP4	Total	Owner(s)
Percentage of Project Improvement Fund funded proje cts resulting in innovations in the XSEDE organization	RY 6	70% / yr	-	-	-	76.9	76.9	Program Office (§8)
	RY 5	70% / yr	-	-	-	66.7	66.7	
	RY 4	70% / yr	-	-	-	66.7	66.7	
	RY 3	60% / yr	-	-	-	71.4	71.4	
	RY 2	*	*	*	*	*	*	
	RY 1	*	*	*	*	*	*	
	Definition/Description: Number of completed PIF (Project Improvement Fund) funded projects resulting in innovations as determined by SMT review divided by the total number of completed PIF funded projects to date. **Collection methodology:** The results of each Project Improvement Fund approved submissions to date is evaluated, at the end of the project year, to assess the level of innovation. This is a manual effort completed by the SP&E team.								
Mean rating of innovation within the organization by XSEDE staff	RY 6	4 of 5 / yr	-	4.1	-	-	4.1	
	RY 5	4 of 5 / yr	-	4.2	-	-	4.2	

	RY 4	4 of 5 / yr	-	4.0	-	-	4.0	Program Office (§8)
	RY 3	3.5 of 5 / yr	-	4.0	-	-	4.0	
	RY 2	*	*	*	*	*	*	
	RY 1	*	*	*	*	*	*	
	Definition/Description: Mean rating of innovation within the organization by XSEDE employees as measured by the annual XSEDE Staff Climate Study on a scale of 1 (not at all innovative) - 5 (highly innovative). **Collection methodology:** New item added to 2018 XSEDE Staff Climate Study where staff will rate the level of innovation within the organization of a scale of 1 (low/negative) to 5 (high/positive).							

- Data reported annually.

3   Community Engagement & Enrichment - CEE (WBS 2.1)

Community Engagement & Enrichment (CEE) sits at the front lines of XSEDE and is tasked with balancing support for a large and diverse portfolio of existing users and the broader population of potential users and future leaders in cyberinfrastructure. While maintaining high quality support for existing users engaged in science at all levels, CEE is concerned with training and educating future generations and trying to creatively address what has been widely accepted as a leaky pipeline of potential users, leaders, practitioners, and researchers.

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 will unify public offerings to provide a more consistent, clear, and concise message about XSEDE resources and services, and bring together those aspects of XSEDE that have as their mission teaching, informing, and engaging those interested in advanced cyberinfrastructure.

The five components of CEE are Workforce Development (§3.2), which includes Training, Education and Student Preparation, User Engagement (§3.3), Broadening Participation (§3.4), User Interfaces & Online Information (§3.5), and Campus Engagement (§3.6). These five teams ensure routine collection and reporting of XSEDE's actions to address user requirements. They provide a consistent suite of web-based information and documentation and engage with a broad range of campus personnel to ensure that XSEDE's resources and services complement those offered by campuses. Additionally, CEE teams expand workforce development efforts to enable many more researchers, faculty, staff, and students to make effective use of local, regional, and national advanced digital resources. CEE expands efforts to broaden the diversity of the community utilizing advanced digital resources.

The success of the CEE team depends on effective collaboration across all L2 areas of the project. Specifically, User Engagement works closely with RAS and ECSS to establish a dialogue with XSEDE's User Community in order to better understand their needs and desires. Workforce Development and Broadening Participation partner with ECSS to develop impactful training and education opportunities for the community, especially underrepresented students, researchers, and faculty. The User Interfaces & Online Information team relies heavily on all areas of the project to ensure that the website remains accurate and informative. The Campus Engagement team likewise depends on all parts of the project to facilitate 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.

CEE is focused on personal interactions, ensuring that existing users, potential users, and the general public have sufficient access to materials and have a positive and effective experience with XSEDE public offerings and frontline user support. As such, the CEE Key Performance Indicators are designed to broadly assess this performance. CEE focuses on metrics that quantify how many users in aggregate are benefiting from XSEDE resources and services. Additionally, CEE focuses on how well the user base is sustained over time and how well training offerings evolve with changing user community needs.

Key Performance Indicators for CEE are listed in the table below.

Table 3-1: KPIs for Community Engagement & Enrichment (CEE).

KPI	Report Year	Target	RP1	RP2	RP3	RP4	Total	Goal Supported
Number of students benefiting from XSEDE resources and services through training, XSEDE projects, or conference attendance	RY 6	2,000 / qtr	2,298	2.027	1,983	1,903	4,302	Deepen/Extend – Extend use to new communities
	RY 5	2,000 / qtr	2,277	2,043	1,944	2,509	5,761	
	RY 4	1,500 / qtr	2,210	2,634	1,649	2,252	6,196	
	RY 3	1,250 / qtr	1,613	1,666	1,145	2,104	2,323	
	RY 2	950 / qtr	1,722	1,478	1,170	1,522	1,802	
	RY 1	50 / qtr	*	997	815	2,679	3,122	
	Definition/Description: Number of students who participated in XSEDE training, were supported by XSEDE to work on XSEDE projects, received funding to attend the annual PEARC Conference (formerly XSEDExy), or SC conference as indicated by registrations in the XSEDE portal during the current reporting period. **Collection methodology:** Measured using registrations via the XSEDE User Portal, participants in CEE student programs (i.e. EMPOWER), and PEARC student program attendees.								
Number of under-represented students benefiting from XSEDE resources and services through training, XSEDE projects, or conference attendance	RY 6	650 / qtr	775	666	613	600	1,457	Deepen/Extend – Deepen use to existing communities
	RY 5	650 / qtr	741	632	616	792	1,970	
	RY 4	500 / qtr	674	794[1]	492	753	2,072	
	RY 3	625 / qtr	449	438	307	436	1,630	
	RY 2	475 / qtr	488	399	347	423	1,104	

| | RY 1 | 50 / qtr | * | 34 | 33 | 19 | 28 | |

Definition/Description: Number of underrepresented students who participated in XSEDE training, were supported by XSEDE to work on XSEDE projects, received funding to attend the annual PEARC Conference (formerly XSEDExy), or SC conferences as indicated by registrations in the XSEDE portal during the current reporting period. Only students from underrepresented communities including women and racial/ethnic domestic minorities in HPC are counted in the numerator. Students identifying with multiple underrepresented communities are only counted once.

Collection methodology: Measured using registrations via the XSEDE User Portal, participants in CEE student programs (i.e. EMPOWER), and PEARC student program attendees. Only students from underrepresented communities including women and racial/ethnic domestic minorities in HPC are counted in the numerator. Students identifying with multiple underrepresented communities are only counted once.

Metric	RY	Target						Notes
Grand (aggregate) mean rating of Post Training Event Survey items related to training impact for attendees registered through the portal	RY 6	4.4 of 5 / qtr	4.5	4.5	4.5	4.4	4.5	Deepen/Extend – Extend use to new communities
	RY 5	4.4 of 5 / qtr	4.6	4.5	4.4	4.6	4.5	
	RY 4	4.4 of 5 / qtr	4.5	4.3	4.3	4.6	4.4	
	RY 3	4.4 of 5 / qtr	4.5	4.4	4.5	4.3	4.4	
	RY 2	4 of 5 / qtr	4.3	4.3	4.6	4.5	4.4	
	RY 1	4 of 5 / qtr	*	4.5	4.4	4.3	4.4	

Definition/Description: Aggregate mean rating of training impact for attendees registered via the XSEDE User Portal for XSEDE delivered training sessions as measured by the Post Training Event Survey on a scale of 1 (low impact) to 5 (high impact).

Collection methodology: The data is collected from post event surveys and recorded in the database. Specific items included in this index are:

Q1. The training session fulfilled my expectations.
Q2. The trainer stimulated my interest.
Q6. The training session was well-organized.
Q8. I was able to easily access this training session.
Q10. Overall I would rate my experience as successful.

Metric	RY							Notes
Number of institutions with a Champion	RY 6	345	344	349	350	353	353	Deepen/Extend – Deepen use to existing communities
	RY 5	340	327	332	333	337	337	
	RY 4	300	304	305	315	325	325	
	RY 3	250	259	266	277	284	284	
	RY 2	240	218	238	239	246	246	
	RY 1	225	*	224	231	234	234	

Definition/Description: Total number of institutions that have a signed letter of collaboration with the Champions program.

Collection methodology: All champions are tracked using a master spreadsheet managed by champion program managers and coordinator. All champions in the spreadsheet with a current corresponding letter of collaboration with XSEDE are counted for this metric.

Metric	RY							Notes
Percentage of user requirements addressed within 30 days	RY 6	98% / qtr	100 (11/11)	100 (12/12)	100 (9/9)	100 (27/27)	100 (59/59)	Deepen/Extend – Prepare the current and next generation
	RY 5	98% / qtr	100 (16/16)	100 (20/20)	100 (28/28)	100 (26/26)	100 (90/90)	
	RY 4	98% / qtr	100 (34/34)	96 (23/24)	100 (26/26)	97 (36/37)	98 (119/121)	
	RY 3	100% / qtr	89 (40/45)	90 (47/52)	100 (36/36)	100 (27/27)	94 (150/160)	
	RY 2	100% / qtr	78 (36/44)	102 (47/46)	86 (32/37)	93 (41/44)	91 (156/157)	
	RY 1	100% / qtr	*	50 (16/32)	89 (40/45)	75 (40/53)	74 (96/130)	

Definition/Description: The number of user requirements addressed within 30 days during the current reporting year divided by the total number of requirements identified by the XSEDE User Engagement team through regular email contact with all XSEDE PIs. Total number of requirements identified does not include those identified within the last 30 days of the reporting year.

Collection methodology: All requirements addressed within 30 days tracked in JIRA within the current reporting year divided by the total number of requirements in JIRA within the same year that are over 30 days old. For purposes of this metric, the time period includes the last 30 days of the previous reporting year but does not include the last 30 days of the current reporting year. Requirements are considered addressed when the PI is presented with a solution via email, a ticket is submitted via the XSEDE ticket system, or a use case is submitted for further consideration.

[1] This number was previously mis-reported due to a transcription error.

3.1 CEE Director's Office (WBS 2.1.1)

The CEE Director's Office has been established to provide 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 retarget effort if necessary. The Director's Office also attends and supports the preparation of project level reviews and activities.

The CEE Director's Office will continue to manage and set the direction for CEE activities and responsibilities. They will contribute to and 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. Lastly, the Director's Office will advise the XSEDE PI on many issues, especially those relevant to this WBS area.

3.2 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. Workforce Development provides business and industry with access to XSEDE's workforce development efforts including training services and student internships that have historically proven beneficial to industry.

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.

3.3 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 to 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.

3.4 Broadening Participation (WBS 2.1.4)

Broadening Participation's 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, Champions, and administrators who will promote change at their institutions for increased use of advanced digital services for research and teaching.

Broadening Participation will continue the most effective recruitment activities— conference exhibiting, campus visits, and regional workshops—while increasing national impact through new partnerships and the utilization of lower cost awareness strategies to continue the growth in new users from underrepresented communities. The Diversity Forum and the Minority Research Community listservs and community calls focus on user persistence in their use of XSEDE services and their deepening engagement through participation in committees such as the User Advisory Committee (UAC) and XSEDE Resource Allocations Committee (XRAC), and participation in Champions, Campus Bridging, and other programs. Persistent institutional engagement is enabled by curriculum reform and larger numbers of researchers adopting the use of advanced digital resources as a standard research method.

3.5 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, service 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.

3.6 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 (workgroup, institutional, regional, national, and 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.

4 Extended Collaborative Support Service - ECSS (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 the 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.

ECSS projects fall into five categories: Extended Support for Research Teams (ESRT), Novel and Innovative Projects (NIP), Extended Support for Community Codes (ESCC), Extended Support for Science Gateways (ESSGW), and Extended Support for Training, Education and Outreach (ESTEO). Project-based ECSS support is requested by researchers via the XSEDE peer-review allocation process, or, in some cases, suggested by reviewers as something that would benefit the researchers. If reviewers recommend support and if staff resources are available, projects progress through three activities. First, the project is assigned to an ECSS expert. Second, the project is quantified with the formation of a work plan through collaboration with the research group. The work plan includes concrete quarterly goals and staffing commitments from both the PI team and ECSS. Third, when the project is completed, the ECSS expert produces a final report with input from the research group. A successful project is the completion of all three phases. Each state of the progression is measured to provide an assessment of progress. Submission of work plans within 45 days of initial contact, 90% of projects with work plans completed, and 85% of completed projects with final reports within three months are additional criteria for success. The ECSS managers review work plans and also track progress via Interim Project Reports.

The success of the ECSS team depends on effective collaboration across all L2 areas of the project. Specifically, ECSS works closely with XCI to expand software capabilities; External Relations within PgO to communicate the science successes enabled by ECSS assistance; RAS to review allocations requests; and CEE to develop and deliver training in HPC, data intensive computing, effective use of XSEDE resources and other topics. In addition, ECSS partners with CEE to manage the Campus Champions Fellows program, which can involve mentors from any L2 area.

Key Performance Indicators for Extended Collaborative Support Service are listed in the table below.

Table 4-1: KPIs for Extended Collaborative Support Service (ECSS).

KPI	Report Year	Target	RP1	RP2	RP3	RP4	Total	Goal Supported
Number of completed ECSS projects	RY 6	50 / yr	24	17	13	7	61	
	RY 5	45 / yr	17	10	18	10	55	Deepen/Extend – Deepening use to existing communities
	RY 4	45 / yr	15	11	16	10	52	
	RY 3	45 / yr	17	10	12	8	47	
	RY 2	50 / yr	16	9	10	12	47	
	RY 1	50 / yr	*	10	13	25	48	
	Definition/Description: The total number of completed ECSS projects in ESRT, ESCC, and ESSGW within the current reporting period. A completed project is defined as having progressed through the full support pipeline, namely assigning a consultant, producing a work plan, executing the work plan, reporting progress through quarterly reports, and filing of a final project report. **Collection methodology:** The number of completed projects is tracked in JIRA, XSEDE's project management software. A report has been created in JIRA that queries all the ECSS projects, filters for allocations that have ended in that quarter and also for projects that have a final report.								
Grand (aggregate) mean rating of ECSS impact by PIs measured by ECSS Project Exit Survey items	RY 6	4 of 5 / yr	4.0	4.9	4.5	5.0	4.5	
	RY 5	4 of 5 / yr	4.1	4.2	4.5	4.8	4.3	
	RY 4	4 of 5 / yr	3.0	4.7	4.3	4.7	4.5	Deepen/Extend – Deepen use to existing communities
	RY 3	4 of 5 / yr	NA	3.9	4.4	4.3	4.2	
	RY 2	4 of 5 / yr	4.1	4.0	3.8	4.3	4.0	
	RY 1	4 of 5 / qtr	*	4.6	4.6	3.3	4.1	
	Definition/Description: Aggregate mean rating of ECSS impact by PIs collected after an ECSS project is complete (i.e. has a workplan, work has progressed, and a final report has been filed) measured by the ECSS Project Exit Survey on a scale of 1 (low impact) - 5 (high impact). **Collection methodology:**								
Grand (aggregate) mean rating of PI satisfaction with ECSS support measured by ECSS Project Exit Survey items	RY6	4.5 of 5 / yr	4.3	5.0	5.0	5.0	4.7	
	RY5	4.5 of 5 / yr	4.8	4.9	3.8	5.0	4.8	
	RY4	4.5 of 5 / yr	3.0	5.0	5.0	4.7	4.8	Deepen/Extend – Deepening use to existing communities
	RY3	4.5 of 5 / yr	NA	4.3	4.8	4.5	4.6	
	RY2	4.5 of 5 / yr	4.7	4.6	4.2	4.8	4.5	
	RY1	4.5 of 5 / qtr	*	4.9	4.7	4.6	4.5	
	Definition/Description: Aggregate mean rating of PI satisfaction with ECSS support collected after an ECSS project is complete (i.e. has a work plan, work has progressed, and a final report has been filed) measured by the ECSS Project Exit Survey on a scale of 1 (not at all satisfied) - 5 extremely satisfied). **Collection methodology:** Measured by the average of selected question(s) of the PI's satisfaction survey.								

NA – Interviews were not conducted during this reporting period so no Impact and Satisfaction ratings were collected.

4.1 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 will continue to manage and set direction for ECSS activities and responsibilities. They will contribute to and 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 will advise the XSEDE PI on many issues, especially those relevant to this WBS area. The office consists of two Level 2 Co-Directors, Philip Blood, who manages ESRT and NIP activities, and Bob Sinkovits, who manages ESCC, ESSGW, and ESTEO activities. The office also has three project managers (Marques Bland, Sonia Nayak, and Leslie Morsek).

Blood and Sinkovits carry out the post-project interviews with all project PIs who have received ECSS support, both to get their assessment of how the project went, and to hear and act on any concerns they may express. Sinkovits also organizes the monthly symposium series, serves as one of the contributors to staff training, and runs the Campus Champions Fellows program (§3.6). Blood convenes User Advisory Committee meetings and supports the User Advisory Committee Chair.

The project managers aid in the management of the day-to-day activities of ECSS, which includes the management of project requests (XRAC and startups), active projects, project assignments, and staffing. They continuously refine the ECSS project lifecycle, further defining processes to aid in the management of over 100 active projects. They also administer JIRA for the management and tracking of projects.

4.2 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 (§5.4), 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.

4.3 Novel & 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 or demographics 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.

XSEDE projects generated by, and mentored by, the personal efforts of the NIP experts should stimulate additional practitioners in their field to become interested in XSEDE. Strategies used include building and promoting 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.

4.4 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.

4.5 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.

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

Extended 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.

5 XSEDE Cyberinfrastructure Integration (XCI, 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.

XCI envisions a national cyberinfrastructure that is consistent, straightforward to understand, and practical for use by researchers and students. Service to XSEDE Service Providers (SPs) is a particularly important aspect of XCI's activities. XCI strives to make it possible for researchers and students to effortlessly use computational and data analysis resources ranging from those allocated by XSEDE to campus-based CI facilities, an individual's workstation, and commercial cloud providers, and to interact with these resources via CI software services such as science gateways and Globus Online. XCI provides two essential integrating services: XCI provides the software glue that ties XSEDE together; particularly, it enables the interoperability of advanced computing resources supported by XSEDE with each other and with the XSEDE portal and other underlying infrastructure (e.g., accounting information), and XCI also improves the capabilities of campus cyberinfrastructure administrators anywhere in the US to manage local facilities in ways that are easily interoperable with the evolving national CI fabric while simultaneously leveraging training and educational materials created and disseminated by XSEDE.

The success of the XCI team depends on effective collaboration across all L2 areas of the project. Specifically, the Requirements Analysis & Capability Delivery (RACD) team relies on Ops to integrate new capabilities as well as CEE, RAS, and the PgO's External Relations (ER) team to help improve XSEDE services and inform the user community of their existence. The Cyberinfrastructure Resource Integration (CRI) team also collaborates with ER to communicate the tools and services which XSEDE makes available to the national CI community.

Key Performance Indicators for XSEDE Cyberinfrastructure Integration are listed in the table below.

Table 5-1: KPIs for XSEDE Cyberinfrastructure Integration (XCI).

KPI	Report Year	Target	RP1	RP2	RP3	RP4	Total	Goal Supported
Grand (aggregate) mean rating of XSEDE Community Survey community member satisfaction items regarding XCI software and technical services, capabilities, and resources[4]	RY 6	4 of 5 / yr	4.1	-	-	-	4.1	Advance – Create an open and evolving e-infrastructure
	RY 5	4 of 5 / yr	4.4	-	-	-	4.4	
	RY 4	*	*	*	*	*	*	
	RY 3	*	*	*	*	*	*	
	RY 2	*	*	*	*	*	*	
	RY 1	*	*	*	*	*	*	
	Definition/Description: Aggregate rating of USER satisfaction with XSEDE software and technical services, capabilities, and resources via the annual User Survey on a scale of 1–5, where "1" is "performance never meets expectations" and "5" is "performance always meets expectations." **Collection methodology:** Aggregate ratings of USER-facing XCI software and technical services, capabilities and resources as measured using the "frequency of performance meeting expectations" scale on the annual XSEDE User Survey, to include the following items: Authenticating to the XSEDE User Portal and other web services using campus InCommon credentials (CILogon); Using XSEDE credentials to log into non-XSEDE Web services (e.g., GENI and OrCID.); Globus Transfer Service; Globus Sharing Service; Globus Connect for moving data between personal systems and XSEDE resources; Job start prediction service (Karnak); Login to XSEDE affiliated web sites without entering a password every time; Cluster integration software (XCBC); Scientific software for campus clusters (XNIT); Cluster integration tutorials and documentation; and Cluster integration site visits.							
Grand (aggregate) mean rating of XSEDE Community Survey Service Provider satisfaction items regarding XCI software and technical services, capabilities, and resources	RY 6	4 of 5 / yr	4.4	-	-	-	4.4	Advance – Create an open and evolving e-infrastructure
	RY 5	4 of 5 / yr	4.5	-	-	-	4.5	
	RY 4	*	*	*	*	*	*	
	RY 3	*	*	*	*	*	*	
	RY 2	*	*	*	*	*	*	
	RY 1	*	*	*	*	*	*	
	Definition/Description: Aggregate rating of SP satisfaction with XSEDE software and technical services, capabilities, and resources via the annual User Survey on a scale of 1–5, where "1" is "performance never meets expectations" and "5" is "performance always meets expectations." **Collection methodology:** Aggregate ratings of SP-facing XCI software and technical services, capabilities and resources as measured using the "frequency of performance meeting expectations" scale on the annual XSEDE User Survey, to include the following items: IPF software used to publish resource information to XSEDE; XSEDE accepted CA certificates; XSEDE Resource Operational Status Dashboards; XSEDE Resource Integration Steps Dashboard; Resource Description Repository (RDR); Install software from XSEDE RPM repositories on software.xsede.org; Opportunities to discuss software needs, delivery activities, deployment, and usage; Opportunities to participate in software technical reviews; Software Integration Support; Software Usage Instrumentation Support; Use case requirements analysis processes; and Use case development processes; and Use case prioritization processes. In order to get an adequate number of responses from Service Providers, that population will be over-sampled. If that does not result in an adequate response rate, these questions will be pulled and sent to the SPs separately to improve the number of responses.							
Number of non-XSEDE partnerships with XCI[2]	RY 6	14 / yr	14	14	12	11	14	Advance – Create an open and evolving e-infrastructure
	RY 5	18 / yr	14	11[3]	16	15	21[1]	
	RY 4	12 / yr	9	10	11	21	21	
	RY 3	8 / yr	13	12	11	12	20[1]	
	RY 2	-	-	-	-	-	8	
	RY 1	-	*	-	-	-	8	
	Definition/Description: Number of XCI partnerships supported/facilitated between CRI and SPs, national CI organizations, and campus CI providers. **Collection methodology:** Non-XSEDE partnerships are tracked through the ticket system and through JIRA.							
Mean time to issue resolution (days)	RY 6	< 10 days/ qtr	2.8	1.7	2.0	1.8	2.1	Sustain — Provide excellent user support
	RY 5	< 10 days/ qtr	4.2	6.0	10.1	2.4	5.3	
	RY 4	< 10 days/ qtr	5.4	4.5	8.6	35.8	13.7	
	RY 3	< 14 days/ qtr	22.3	7.3	2.9	2.9	8.8	
	RY 2	< 30 days	4.0	7.0	8.0	5.0	6.1	
	RY 1	< 45 days	*	7.0	4.0	16.0	9.0	
	Definition/Description: Average number of days from defect or support request submitted to solution communicated. **Collection methodology:** The data is stored locally via the Request Tracker service, which is the XSEDE ticket software. Reports are generated against the RT database to determine MTTR and other metrics.							

- Data reported annually.

[1] Engagements often continue over multiple reporting periods and get counted in each period they are active. The annual total is calculated by the number of unique engagements across all reporting periods.

[2] Number of non-XSEDE partnerships with XCI was a new KPI in RY3 so there were no targets set for RY1 or RY2. Annual totals were calculated retroactively.

[3] Previously mis-reported number is now corrected in RY4RP3 report.

5.1 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 will continue to manage and set direction for XCI activities and responsibilities. They will 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 will advise the XSEDE PI on many issues, especially those relevant to this WBS area.

5.2 Requirements Analysis and Capability Delivery (RACD, 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 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.

5.3 XSEDE Cyberinfrastructure Resource Integration (WBS 2.3.3)

The mission of the Cyberinfrastructure Resource Integration (CRI) team is to work with SPs, CI providers, and campuses to maximize the aggregate utility of national cyberinfrastructure. CRI facilitates the incorporation of XSEDE software at SPs and encourages SPs to publish their information in the RDR. CRI's activities are reflected in the uptake of CRI-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. 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. The suite of interoperable and compatible software tools that XSEDE makes available to the CI community is based on those already in use, and services are added that address emerging needs including data and computational services. Because the XSEDE Cyberinfrastructure Resource Integration team (CRI) deals primarily with Level 1, 2, and 3 SPs, along with campus cyberinfrastructure administrators and support experts, the SP Forum and Campus Champions are XCI's primary sources of direction regarding prioritization of efforts.

6 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.

In addition to the Operations Director's Office (§6.1), Operations staff is subdivided into four teams based on the work breakdown structure: Cybersecurity (SecOps) (§6.2), Data Transfer Services (DTS) (§6.3), XSEDE Operations Center (XOC) (§6.4), and Systems Operational Support (SysOps) (§6.5). The Operations management team meets weekly, and individual Operations groups meet approximately bi-weekly with all meeting minutes posted to the XSEDE wiki.

The success of the Operations (Ops) team depends on effective collaboration across all L2 areas of the project. In particular, Ops relies on XCI to support new capabilities and services (e.g., security or networking technologies) and RAS to create and deploy solutions to improve help ticket response or the central database. In addition, Ops relies on all WBS teams and the Service Providers to respond to help tickets for their areas that are submitted by users.

Key Performance Indicators for Operations are listed in the table below.

Table 6-1: KPIs for XSEDE Operations.

KPI	Report Year	Target	RP1	RP2	RP3	RP4	Total	Goal Supported
Mean rating of community member satisfaction with tickets closed by the XOC	RY 6	4.5 of 5 / qtr	4.7	4.7	4.8	4.9	4.8	Sustain – Provide excellent user support.
	RY 5	4.5 of 5 / qtr	4.7	4.7	4.7	4.7	4.7	
	RY 4	4.5 of 5 / qtr	4.8	4.7	4.7	4.7	4.7	
	RY 3	4.5 of 5 / qtr	4.5	4.9	4.6	4.7	4.7	
	RY 2	4.5 of 5 / qtr	4.5	4.8	4.8	4.4	4.6	

	RY	Target				
	RY 1	4 of 5 / qtr	*	4.8	4.2	5.0	4.7

Definition/Description: Mean rating of satisfaction by users who submitted help tickets that were closed by the XOC during the specified reporting period as measured by the XSEDE Operations Point-of-Service Satisfaction Survey on a scale of 1 (not at all satisfied) - 5 (extremely satisfied).				
Collection methodology: Within two hours of the resolution and closure of a ticket, the user receives an e-mail containing a link to a Survey Monkey survey. The survey consists of five questions using a 5 point Likert scale and the results are stored in Survey Monkey.				

Metric	RY	Target						Goal
Hours of downtime with direct user impacts from XSEDE security incidents	RY 6	0 hrs/ qtr	0	0	0	0	0	Sustain – Provide reliable, and secure infrastructure
	RY 5	0 hrs/ qtr	0	0	0	0	0	
	RY 4	0 hrs/ qtr	0	0	22	0	22	
	RY 3	0 hrs/ qtr	0	0	0	0	0	
	RY 2	0 hrs/ qtr	0	0	0	0	0	
	RY 1	<24 hrs/ qtr	*	0	146	0	146	

Definition/Description: Hours of downtime is calculated as the Time to Return to Repair (TTR) across all applicable services and incidents during the quarter in order to measure resource unavailability as a result of an XSEDE-wide security event (involving a Tier 1 service or spanning more than one SP).

Collection methodology: The Cybersecurity co-leads determine that an XSEDE-wide security event is responsible for an outage. The Sysops lead will determine the TTR based on monitoring and other information in logs and tickets, and the TTR value will be the data point reported.

6.1 Operations Director's Office (WBS 2.4.1)

The Operations Director's Office has been established to provide the necessary oversight to ensure the greatest efficiency and effectiveness of the Operations area. This oversight includes providing direction to the L3 management team, coordination of and participation in Operations 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 Operations Director's Office will continue to manage and set direction for Operations activities and responsibilities. The Office will contribute to and attend bi-weekly Senior Management Team calls; contribute to the project-level plan, schedule, and budget; contribute to XSEDE IPR, annual, and other reports as required by the NSF; and attend XSEDE quarterly and annual meetings. Lastly, the Director's Office will advise the XSEDE PI on many issues, especially those relevant to this WBS area.

6.2 Cybersecurity (WBS 2.4.2)

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

6.3 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.

6.4 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.

6.5 Systems Operational Support (WBS 2.4.5)

Systems Operational Support (SysOps) provides enterprise-level support and system administration for all XSEDE central services.

7   Resource Allocation Service (WBS 2.5)

The Resource Allocation Service (RAS) is building on XSEDE's current allocation processes and evolving 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 is pursuing these objectives through three activities: managing the XSEDE allocations process in coordination with the XD Service Providers (§8.2), enhancing and maintaining the RAS infrastructure and services (§7.2), enhancing and maintaining the RAS infrastructure and services (§7.3), and anticipating changing community needs.

The success of the RAS team depends on effective collaboration across all L2 areas of the project. Specifically, RAS collaborates closely with Ops to ensure capabilities are available, secure, and up-to-date; with External Relations (ER) within the Program Office to promote allocations periods and services; with XCI for continual product improvement and optimization; with CEE's User Interfaces and Online Information (UII) for user optimization of services and processes; and with ECSS for efficient review of quarterly allocation requests.

Key Performance Indicators for the Resource Allocation Service are listed in the table below.

Table 7-1: KPIs for Resource Allocation Service (RAS).

KPI	Report Year	Target	RP1	RP2	RP3	RP4	Total	Goal Supported
Mean rating of community member satisfaction with allocations process	RY 6	4 of 5 / qtr	4.1	4.2	4.3[1]	4.3	4.3	Sustain – Provide excellent user support
	RY 5	4 of 5 / qtr	4.4	4.3	4.4	4.3	4.3	
	RY 4	4 of 5 / qtr	4.2	4.3	4.4	4.3	4.3	
	RY 3	4 of 5 / qtr	4.1	4.1	4.2	4.4	4.2	
	RY 2	4 of 5 / qtr	4.1	4.0	4.1	3.9	4.0	
	RY 1	4 of 5 / qtr	*	4.0	4.0	4.0	4.0	
	Definition/Description: Aggregate mean rating of user satisfaction across 10 facets of allocation policies and procedures related to the submission, review, and administration of allocation requests on a scale of 1 (not at all satisfied) - 5 (extremely satisfied). **Collection methodology:** Quarterly Post-Allocations Submission Survey of persons who have submitted allocation requests in the prior quarter.							
Mean rating of community member satisfaction with XRAS	RY 6	4 of 5 / qtr	4.1	4.2	4.2[1]	4.2	4.2	Sustain – Provide reliable, efficient, and secure infrastructure
	RY 5	4 of 5 / qtr	4.3	4.3	4.3	4.2	4.3	
	RY 4	4 of 5 / qtr	4.3	4.3	4.4	4.2	4.3	
	RY 3	4 of 5 / qtr	4.0	4.2	4.1	4.3	4.2	
	RY 2	4 of 5 / qtr	4.0	4.0	4.1	4.0	4.0	
	RY 1	4 of 5 / qtr	*	4.0	4.0	4.0	4.0	
	Definition/Description: Aggregate mean rating of user satisfaction with XRAS (XSEDE Resource Allocation System) across 8 facets of the user-facing submission process on a scale of 1 (not at all satisfied) - 5 (extremely satisfied). **Collection methodology:** Quarterly Post-Allocations Submission Survey of persons who have submitted allocation requests in the prior quarter							

[1] Due to an oversight, the RAS satisfaction survey was deployed too late to include results in IPR17. The RP3 value is now reported in this RY6 Annual Report.

7.1 RAS Director's Office (WBS 2.5.1)

The RAS Director's Office has been established to provide the necessary oversight to ensure the greatest efficiency and effectiveness of the RAS area. This oversight includes providing direction to the L3 management team, coordination of and participation in RAS planning activities and reports through the area's Project Manager, 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 RAS Director's Office also 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 will continue to manage and set direction for RAS activities and responsibilities. They will contribute to and attend bi-weekly Senior Management Team calls; contribute to the project-level plan, schedule, and budget; contribute to XSEDE IPR, annual, and other reports as required by the NSF; and attend XSEDE quarterly and annual meetings. Lastly, the Director's Office will advise the XSEDE PI on many issues, especially those relevant to this WBS area.

7.2 XSEDE Allocations Process & Policies (WBS 2.5.2)

Allocations enable the national open science community to easily gain access to XSEDE's advanced digital resources, allowing them to achieve their research and education goals.

7.3 Allocations, Accounting & 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.

8   Program Office (WBS 2.6)

The purpose of the Program Office (PgO) is to ensure critical project level functions are in place and operating effectively and efficiently. The oversight provided via the Project Office is necessary to provide consistent guidance and leadership to the L3 managers across the project. A common and consistent approach to managing projects and risks is provided by the Project Management, Reporting, and Risk Management (PM&R) team (§8.3), while Business Operations (§8.4) manages all financial functions and sub-awards. The crucial aspect of communications to all stakeholders is the focus of the External Relations team (§8.2). Finally, Strategy, Planning, Policy, Evaluation & Organizational Improvement (SP&E) (§8.5) focuses attention in precisely 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.

The success of the PgO depends on effective collaboration across all L2 areas of the project. The PgO conducts all administrative work for XSEDE, ensuring each project area is able to stay in operation and focused on the user-base. In addition, External Relations works with all L2 areas of the project to ensure that the user community is aware of the services offered by each area and to highlight project successes.

Key Performance Indicators for the Program Office are listed in the table below.

Table 8-1: KPIs for the Program Office.

KPI	Report Year	Target	RP1	RP2	RP3	RP4	Total	Goal Supported
Variance between relevant report submission and due date (days)	RY 6	0	0	0	0	0	0	Sustain — Operate an effective and productive virtual organization
	RY 5	0	0	0	0	0	0	
	RY 4	0	0	0	0	-1[4]	-1	
	RY 3	0	0	0	0	0	0	
	RY 2	0	0	0	0	0	0	
	RY 1	0	*	NA	0	0	0	
	Definition/Description: Variance in number of calendar days between report submission and due date for the previous reporting period. In accordance with NSF quarterly and annual reporting requirements, deadlines are determined together by the XSEDE PI and NSF Project Officer and then communicated to the XSEDE team to establish the reporting schedule used to calculate this metric. **Collection methodology:** The XSEDE PI tracks when the relevant document was submitted to FastLane and records the number of days between the due date and this date in a spreadsheet.							
Percentage of sub-award invoices processed within target duration	RY 6	90% / qtr	100	100	100	100	100	Sustain — Operate an effective and productive virtual organization
	RY 5	90% / qtr	92.6	90.2[5]	91.3	96.2	92.6	
	RY 4	95% / qtr	95.0	100.0	79.5	90.9	91.3	
	RY 3	95% / qtr	82.4	77.8	94.4	92.9	86.9	
	RY 2	95% / qtr	100.0	90.9	88.0	67.4	74.6	
	RY 1	90% / qtr	*	NA[1]	100.0	NA[2]	100	
	Definition/Description: Number of invoices processed within the target duration divided by the total number of invoices processed. Duration is determined by the number of calendar days from acceptance of submitted invoice to invoice paid. The target duration is less than 45 calendar days. **Collection methodology:** Data is logged and stored in the Business Operations master spreadsheet located on the Business Operations Google Drive folder.							
Percentage of recommendations addressed by relevant project areas within 90 days	RY 6	90% / yr	NA	100	NA[3]	NA[3]	100	Sustain – Operate an effective and productive virtual organization
	RY 5	90% / yr	100	90	100	NA[3]	97	
	RY 4	90% / yr	47.0	48.0	0.1	0	24	
	RY 3	90% / yr	46.0	74.0	0	62.0	61	
	RY 2	90% / qtr	23.0	15.0	37.0	49.0	31	
	RY 1	90% / qtr	*	NA[3]	100.0	57.0	67	
	Definition/Description: Percentage of recommendations made to XSEDE that were addressed (i.e. change action taken or decision for no change) by Level 2 program area managers. The percentage is calculated using recommendations from the XSEDE Advisory Board, NSF Review Panels, Service Provider Forum, User Advisory Committee, and the XSEDE Staff Climate Study conducted by the external evaluation team. **Collection methodology:** The number of key recommendations made according to the total number of recommendations recorded on the XSEDE Project-Wide Improvements & Recommendations Google Sheet, such as XAB, NSF, annual XSEDE Climate Study findings, and other SP&E recommendations. XSEDE staff, not the SP&E team, are accountable for entering information to track improvements and recommendations. **NOTE:** An improvement made is not necessarily a recommendation addressed, but any change made directly related to a recommendation is an improvement made and therefore should also be tracked in the XSEDE Project-Wide Improvements & Recommendations Google Sheet once fully implemented; it is OK to have duplication between Improvements fully implemented and Recommendations addressed.							
Grand (aggregate) mean of Staff Climate Study satisfaction items regarding content and accessibility of the XSEDE Staff Wiki	RY 6	3.9 of 5 / yr	-	4.0	-	-	4.0	Sustain — Operate an effective and productive virtual organization
	RY 5	3.9 of 5 / yr	-	3.9	-	-	3.9	
	RY 4	3.9 of 5 / yr	-	3.8	-	-	3.8	

	RY 3	3.5 of 5 / yr	-	3.9	-	-	3.9
	RY 2		*	*	*	*	*
	RY 1		*	*	*	*	*

	Definition/Description: Aggregate mean rating of staff satisfaction with the available content and ability to access information relevant to their work via the XSEDE Staff Wiki as measured annually by the XSEDE Staff Climate Study on a scale of 1 (not at all satisfied) - 5 (extremely satisfied), items 1A and 1C. **Collection methodology:** A mean index score is generated from annual Staff Climate Study responses to all items within the "XSEDE Staff Wiki and Website" dimension of the study to determine aggregate mean.

Number of staff publications	RY 6	25 / yr	12	2	5	12	31	
	RY 5	50 / yr	2	16	11	16	45	
	RY 4	32 / yr	11	44	7	18	80	Sustain — Operate an innovative virtual organization
	RY 3	20 / yr	19	16	7	6	48	
	RY 2	20 / yr	2	6	0	1	9	
	RY 1	70 / yr	*	5	0	13	18	

	Definition/Description: Number of technical reports, presentations, and peer-reviewed publications authored or co-authored by XSEDE staff to date within the current reporting year. **Collection methodology:** When an XSEDE staff member has a publication, he or she enters the publication data into their profile on the XUP. XSEDE documents added to IDEALS by XSEDE staff are also included. This data is then summed for the appropriate quarter and reported.

Grand (aggregate) mean of Staff Climate Study awareness items regarding inclusion in XSEDE	RY 6	4.1 / yr	-	4.3	-	-	4.3	
	RY 5	4.1 / yr	-	4.3	-	-	4.3	
	RY 4	4.1 / yr	-	4.2	-	-	4.2	Sustain – Operate an innovative virtual organization
	RY 3	4.1 / yr	-	4.1	-	-	4.1	
	RY 2	*	*	4.3	*	*	4.3	
	RY 1	*	*	*	*	*	*	

	Definition/Description: Aggregate mean rating of staff perception and experience relating to inclusion in the project as measured annually by the XSEDE Staff Climate Study on a scale of 1 (low inclusion) - 5 (high inclusion). **Collection methodology:** A mean index score is generated from annual Staff Climate Study responses to items within the "Inclusion" dimension of the study. This score is then compared to the previous year to determine percent change on an annual basis.

Grand (aggregate) mean of Staff Climate Study awareness items regarding equity in XSEDE	RY 6	4.0 / yr	-	4.2	-	-	4.2	
	RY 5	4.0 / yr	-	4.4	-	-	4.4	
	RY 4	4.0 / yr	-	4.2	-	-	4.2	Sustain – Operate an innovative virtual organization
	RY 3	4.0 / yr	-	4.1	-	-	4.1	
	RY 2	*	*	*	*	*	*	
	RY 1	*	*	*	*	*	*	

	Definition/Description: Aggregate mean rating of staff perception and experience relating to diversity and equity in the project as measured annually by the XSEDE Staff Climate Study on a scale of 1 (low equity) - 5 (high equity). **Collection methodology:** A mean index score is generated from annual Staff Climate Study responses to items within the "diversity" dimension of the study. This score is then compared to the previous year to determine percent change on an annual basis.

Number of XSEDE-related media hits	RY 6	600 / yr	131	94	105	112	442	
	RY 5	325 / yr	624	467	326	121	1,538	
	RY 4	165 / yr	66	92	101	237	496	Deepen/ Extend — Raise awareness of the value of advanced digital services
	RY 3	169 / yr	23	29	54	60	166	
	RY 2	169 / yr	42	30	44	29	145	
	RY 1	147 / yr	*	32	30	18	80	

	Definition/Description: Number of stories in the media within the reporting period which mention "XSEDE" and/or "Extreme Science and Engineering Discovery Environment" by name as found using Cision. **Collection methodology:** These media hits (i.e. non-XSEDE hosted/sponsored articles, blog posts, etc .) are found using Cision. This number should not include social media hits, as those are tracked separately. It should also not include content published by wire services and news release distribution services, nor should it include technical journal publications.

- Data reported annually.

[1] Subaward institutions did not have XSEDE2 contracts in place yet, so no invoices had been issued.

[2] No subaward invoices received during this reporting period.

[3] No recommendations received during this reporting period.

[4] -1 indicates that the report was submitted one day early in this reporting period.

8.1 Project Office (WBS 2.6.1)

The Project Office has been established to provide the necessary oversight to ensure the greatest efficiency and effectiveness of the Program Office area and to establish responsibility for assuring advisory activities of the project occur. This oversight includes 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 also attends and supports the preparation of project-level reviews and activities. Importantly, the Project Office is responsible for ensuring that the XSEDE Advisory Board, the User Advisory Committee, and the SP Forum are functioning. The Project Office is 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 will advise the XSEDE PI on many issues, especially those relevant to this WBS area.

8.2 External Relations (WBS 2.6.2)

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

8.3 Project Management, Reporting, & Risk Management (WBS 2.6.3)

The Project Management, Reporting & Risk Management (PM&R) team enables an effective virtual organization through the application of project management principles; provides visibility to project progress, successes, and challenges; brings new ideas and management practices into the project; and disseminates lessons learned in XSEDE to other virtual organizations. Communication is critical to success in this highly distributed virtual organization.

8.4 Business Operations (WBS 2.6.4)

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

8.5 Strategic Planning, Policy & Evaluation (WBS 2.6.5)

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

XSEDE has engaged an independent Evaluation Team designed to provide XSEDE with information to guide program improvement and assess the impact of XSEDE services. Evaluations are 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.