2017 Oak Ridge Leadership Computing Facility User Survey

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Executive Summary

In an effort to promote continual improvement at the Oak Ridge Leadership Computing Facility (OLCF), users were sent a survey soliciting their feedback regarding their experience as a user of the facilities and support services.

Respondents

At the end of the nine-week survey period, 448 users completed the survey out of 1115 possible respondents, giving an overall response rate of 40.2%. Respondents' projects were supported by Director's Discretion (55%), INCITE (34%), ALCC (34%), and Other (2%) sources such as NOAA.

Findings Highlights

Overall Evaluation

The proportions of all respondents *satisfied*, *or very satisfied* with OLCF resources/services, ranged from 91% to 97% for "overall" evaluation items. Specifically, ratings for major categories of resources/services were 1) OLCF (96%; continuing a slow, but steady increase from 86% in 2007), 2) Compute Resources (95%), 3) Data Resources (91%), and 4) Support Services (92%). Thematic analysis of open-ended comments identified *computing power/performance* (58% of respondents) and *user technical support /staff* (33% of respondents) as the most valued OLCF qualities.

The table below indicates satisfaction (*satisfied* or *very satisfied*) ratings. The color scale indicates the relative magnitude of cell values: high-medium-low = green-yellow-red.

	All	PI	Non-PI	INCITE	DD	ALCC
Max *N* responding:	447	80	367	154	248	150
OLCF	**96%**	**94%**	**97%**	**95%**	**97%**	**97%**
Compute Resources	**95%**	**93%**	**95%**	**93%**	**95%**	**93%**
Titan	95%	94%	95%	95%	96%	92%
Eos	93%	90%	94%	92%	94%	93%
Rhea	94%	95%	93%	90%	94%	93%
Data Resources	**91%**	**90%**	**92%**	**91%**	**92%**	**87%**
Data Transfer Nodes	97%	95%	98%	98%	97%	100%
HPSS	93%	87%	95%	89%	94%	89%
Lustre/Spider	92%	90%	92%	91%	91%	89%
Support Services	**92%**	**91%**	**93%**	**92%**	**94%**	**92%**
User Assistance	96%	95%	97%	96%	97%	97%
Account Services	96%	97%	95%	97%	96%	98%
Data Analysis and Visualization Support Services	95%	100%	94%	90%	93%	100%
INCITE Liaison	96%	86%	98%	94%	96%	96%
Communication	93%	93%	93%	95%	93%	93%
Training	94%	93%	94%	95%	96%	93%
OLCF Website User Support information	94%	97%	93%	94%	94%	92%
OLCF Website	92%	92%	92%	93%	94%	91%

OLCF Systems, Data Resources, and Compute Resources

Titan, Eos, and Rhea are all used at similar rates compared to results from 2014-2016. Most users (75%) noted no changes in overall OLCF computing performance over the last year, while 22% cited improved performance; only 2% noted a decrease in performance compared to 2016. Overall satisfaction across the compute resources and data resources ranged from 92% (Lustre/Spider) to 97% (data transfer nodes) of users either *satisfied* or *very satisfied*. 88% of users were *satisfied* or *very satisfied* with project disk space, and notice for scheduled maintenance, ease of transferring data to and from OLCF, and bandwidth offered by the OLCF were rated this highly by more than 90% of users (95%, 92%, and 94%, respectively). Given the opportunity to rank the importance of potential future data services or features, the highest ranked options were *long-term data retention* (58%), *long-term data curation* (43%), and *access for your specific OLCF project members to your data over the web* (43%).

Support Services

The User Assistance Center (UAC) was the most highly utilized support service (56%), and nearly all users were satisfied with it (96%). This was followed by 22% using the Account Services, 22% with assigned INCITE Scientific Computing/Liaisons, and 5% using Data Analysis and Visualization support services. Satisfaction levels ranged from 92% for the OLCF website, to 96% for User Assistance, Account Services, and INCITE Liaisons.

Communication with Users

93% of respondents were overall *satisfied* or *very satisfied* with communication from OLCF. The communication activity that received the least positive rating was *announcements on the OLCF website* (89%). Nearly all respondents felt adequately informed about *OLCF changes* (98%), *events* (99%), and *current issues* (97%).

Training

94% of respondents were satisfied with OLCF training overall, with *monthly user conference calls* (83% satisfaction) receiving the lowest satisfaction rating among specific aspects of training. The most preferred ways of receiving training were via *online documentation* (74%), or in an *online training format* (60%). Most expressed no preference as to time of year (50%); among those with a preference, nearly two-thirds chose the summer. Respondents suggested 127 future training topics in 30 categories. The most frequently suggested topics were *GPU resources* (16%), *performance tools/performance monitoring* (13%), *debugging tools* (13%), and *parallelization/parallel profiling* (11%).

Web Site

31% of respondents indicated they visit the OLCF website (http://olcf.ornl.gov) once a week or more frequently. More than 9 in 10 respondents indicated they were satisfied with the OLCF Website (92%) and with user support information on the website (94%). S*oftware pages* were the lowest rated aspect of support (89% satisfaction) and *ease of navigation* was the lowest rated aspect of website usability (86% satisfaction).

Data Analysis, Visualization, and Workflow

More than 95% of respondents were *satisfied* or *very satisfied* with the analysis and visualization support services. At least three-quarters were satisfied with the technical aspects of data analysis and visualization support services, with satisfaction ranging from 78% for *sufficiency of tools* to 82% for *ability to perform project workflows* and *ability to perform data analysis.* With respect to workflow and analysis, the largest proportion of respondents (29%) analyzed all of their data "elsewhere" and the smallest proportion (11%) analyzed it all at OLCF. About 14% analyzed most of their data at OLCF.

Introduction

A survey was conducted to gather information about the users of the Oak Ridge Leadership Computing Facility (OLCF) at Oak Ridge National Laboratory (ORNL). The survey collected feedback about user needs, preferences, and experience with OLCF and its support capabilities. Attitudes and opinions on the performance, availability, and possible improvements of OLCF resources/services were also solicited. The survey was created by the Assessment and Evaluation team within Oak Ridge Associated Universities (ORAU), in collaboration with OLCF staff. OLCF staff also provided email addresses and data on the characteristics of OLCF users.

This report first briefly describes the data collection and analysis procedures. It then presents findings with respect to user characteristics, patterns of OLCF resource use, and satisfaction ratings of OLCF resources/services. The report also provides longitudinal comparisons of user responses from 2006 through 2017. Finally, recommendations for possible improvements are offered.

Data Collection and Analysis

Data Collection

The survey sampling frame was constituted by first collecting the names of individuals who had logged into an OLCF system between 1/1/2017 through 9/30/2017. OLCF staff and vendors as well as individuals with invalid email addresses were then removed from the list. Visitors to the OLCF website could also access the survey, and this resulted in the addition of 5 respondents to the user group. Overall, this process resulted in a sampling frame with 1115 OLCF users.

ORAU invited all OLCF users from this list to participate in the survey, which was hosted online beginning on October 4, 2017 and remained open for completion through December 5, 2017 (Appendix B: Survey Administration Timeline and Appendix C: Survey). A total of 448 users completed or partially completed the survey, resulting in a response rate of 40.2%. Figure 25, within Appendix B: Survey Administration Timeline, highlights the value of each reminder email in increasing the response rate.

The survey first asked respondents about their experience and patterns of use with OLCF resources/services, and then asked for their satisfaction with resources/services in the following main categories (bold) and subcategories (Appendix C: Survey):

OLCF (Overall)

OLCF Computing Resources

- Titan
- Eos
- Rhea

OLCF Data Resources

- Data Transfer Nodes (DTNs)
- HPSS
- Lustre/Spider

OLCF Support Services

- User Assistance
- Account Management
- INCITE Scientific Computing Liaison
- Communication with users
- Training
- OLCF Website
- Data analysis and visualization

Data Analysis

The findings section typically presents results summarized numerically that report responded levels of satisfaction. This is followed by a verbal summary of the open-ended comments from individuals that indicated being dissatisfied (via the scaled reply) with a resource or service (note: not all dissatisfied individuals supplied open-ended comments).

As noted, the survey assessed satisfaction with OLCF resources/services using a 5-point scale, from *Very Dissatisfied* (1) to *Very Satisfied* (5). These **closed-ended responses** were summarized using frequency distributions, proportions, means, and standard deviations. The proportion of respondents indicating either a 4 (*Satisfied*) or 5 *(Very satisfied)* on an item was also typically reported as %Sat to provide a summary measure. This measure was also used to indicate the relative satisfaction with resources/services within categories. Respondents that were *Very dissatisfied* or *Dissatisfied* with OLCF resources/services were asked to provide comments explaining their dissatisfaction (see below).

In order to better understand the types of OLCF users and how needs and preferences varied, closed-ended responses were frequently broken out by **principal investigator** (PI) status and by **project allocation**. Respondents were categorized according to the following project allocations:

INCITE The Department of Energy's Innovative and Novel Computational Impact on Theory and Experiment (INCITE) program aims to accelerate scientific discoveries and technological innovations by awarding, on a competitive basis, time on supercomputers to researchers with large-scale, computationally intensive projects that address "grand challenges" in science and engineering;

DD The National Center for Computational Sciences' Director's Discretion (DD) program is designed to give new researchers an opportunity to carry out a program of scalability and productivity enhancements to their scientific codes;

ALCC The Advanced Scientific Computing Research (ASCR) Leadership Computing Challenge (ALCC) program is open to scientists from the research community in national laboratories, academia and industry, and allocates up to 30% of the computational resources at National Energy Research Scientific Computing Center (NERSC) and the Leadership Computing Facilities at Argonne and Oak Ridge for special situations of interest to the Department's energy mission, with an emphasis on high-risk, high-payoff simulations; and

Other Other programs include the National Oceanic and Atmospheric Administration (NOAA), APOLLO, and General projects.

Finally, tables and figures will include one or more of the following data elements:

- *N* = Total number of respondents who answered the question
- *n* = Total number of respondents who answered the specific item in the question or who provided a specific response
- *M* = the arithmetic average of respondents' scores from 1 (*Very Dissatisfied)* to 5 (*Very Satisfied)*
- *SD* = Standard deviation (indicating average deviation from the mean)
- %Sat = percentage of respondents indicating 4 (*Satisfied*) or 5 (*Very Satisfied*) on satisfaction scales
- %Imp = percentage of respondents indicating 4 (*Very Important*) or 5 (*Extremely Important*) on importance scales

Color coding has been used in the report tables as below:

- Cell values in **green** are the highest %Sat values in the column
- Cell values in **red** are the lowest %Sat values in the column

This **color coding has not been applied** in cases where ratings are too similar or are identical in the column, or in cases where only three items are presented in a table.

As noted above, **open-ended responses** were typically information provided by respondents who were dissatisfied with a service/resource (i.e., responded as *Dissatisfied* or *Very Dissatisfied* on the satisfaction scale); other questions were open-ended invitations for suggestions or future needs. All open-ended responses were examined using categorical content analysis with complete thoughts in responses as the unit of analysis (note that percentages of response categories may add up to more than 100% when respondents provided multiple complete thoughts in a response).[1] Complete thoughts were sorted into categories for the purposes of counting, comparisons, and other forms of analysis.

Some response content categories were derived *a priori* from survey questions or OLCF website categories (e.g. *Data Management*). Other categories were developed inductively through an iterative process of grouping and regrouping similar content units (e.g., *Containers* or *Training and Tutorials*). Subcategories were elaborated as new relevant concepts or useful distinctions were identified, and are organized within major categories of closely-related concepts.

Table 1 provides a summary of major categories and subcategories used to organized open-ended replies. These are used to the extent possible, with variations as needed to accommodate differences in the focus of specific questions and year-to-year differences in users' specific and technical responses.

Examples of the most prominent themes are provided in the *Findings*, and all open-ended responses are provided in one of Appendices D-F.

[1] Complete thoughts (CTs) were simply response text that could stand alone as a meaningful reply to survey questions. CTs were not were limited to any specific grammatical unit and could vary from a single word, to a phrase, sentence fragment or complete sentence.

Table 1. *Major Categories and Subcategories Used to Organize Open-Ended Responses*

Access
Accounts
Allocations
Login-connect
Hardware Computing Resources
Performance Upgrade
Capacities
Architecture
GPU Resources
Stability/Reliability
Running Jobs
Containers
Workflow
Scheduling Policy
Queue Time
Wall/Run Time
Data Management
Data Retention/Purge Policy
Data Storage
Data Transfer
File Systems
Software
Libraries & Updates
Compilers
Debugging Tools
Development Tools
Visualization
Testing Capabilities
User Support
Documentation
User Guides
Tutorials
Training
Tech Support
Website
Communication
Example Additional Categories
Satisfaction
Miscellaneous
Survey Suggestions
Project Management/Planning

Findings

Respondents

Over 80% of respondents were **affiliated with** either a university or a DOE/Laboratory/ Government facility (Figure 1).

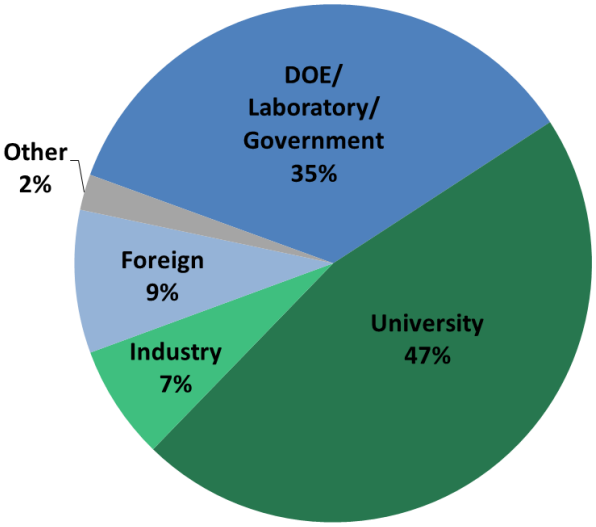

Figure 1. Respondent occupational affiliation (*N* = 448)

The distribution of OLCF users across **project allocations** is shown in Figure 2 and in greater detail in Table 2. The pool of survey respondents is generally representative of OLCF's distribution of users across various project lines. Note that the table categories are not exclusive (e.g., the INCITE category includes individuals assigned to INCITE, but who may also have been assigned to other projects). In contrast, Figure 3 provides the distribution of respondents across exclusive combinations of OLCF project allocations. Note that 77% of respondents reported a single project allocation (i.e., assignment to only INCITE, or only DD, or only ALCC).

Table 2. *Project Allocations by OLCF Users and Survey Respondents*

	Survey Respondents (*N* = 448)		**OLCF Users (*N* = 1115)**	
	Percentage	***n***	**Percentage**	***n***
INCITE	34%	154	33%	369
DD	55%	248	56%	622
ALCC	34%	151	30%	334
Other	2%	10	4%	45

Note: Percentages add to more than 100% as users are often affiliated with multiple projects.

The proportions of OLCF users and of 2017 survey respondents with PI status on at least one project are displayed in Figure 4. The survey respondent pool somewhat over-represents PIs. Throughout this report, tables separately report findings from respondents with PI status from those without PI status.

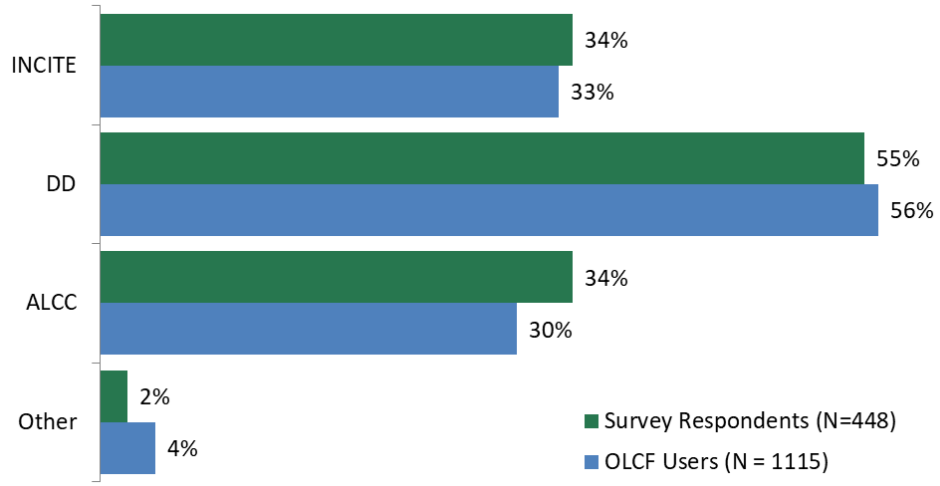

Figure 2. Project allocations for OLCF Users (*N* = 1115) and for Respondents (*N* = 448)

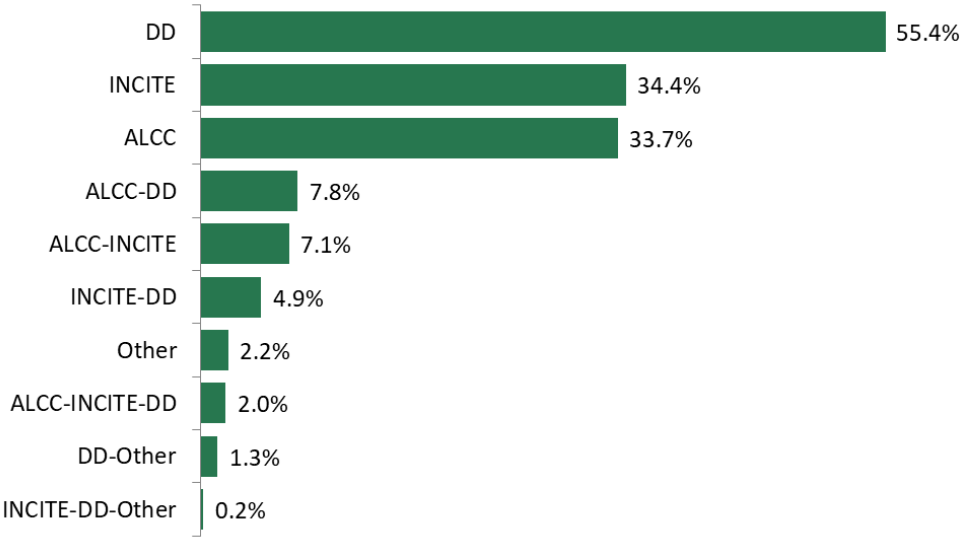

Figure 3. Respondent project allocations (*N* = 448)

Note: Percentages add to more than 100% as users are often affiliated with multiple projects.

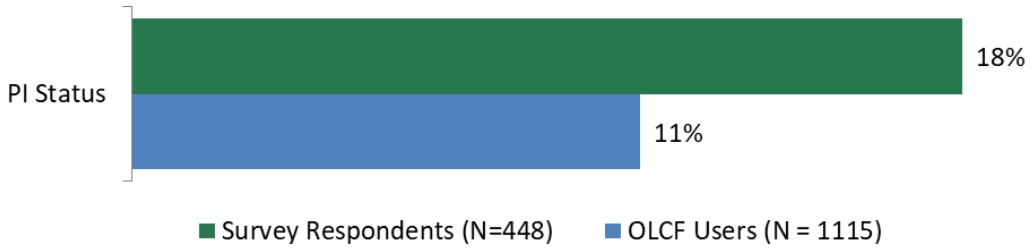

Figure 4. PI Status for OLCF Users (*N* = 1115) and for Respondents (*N* = 448)

Resource Utilization

Overall experience using the OLCF was relatively evenly distributed across years of use. The largest proportion of respondents (close to one-half) had used the OLCF for more than 2 years (Figure 5).

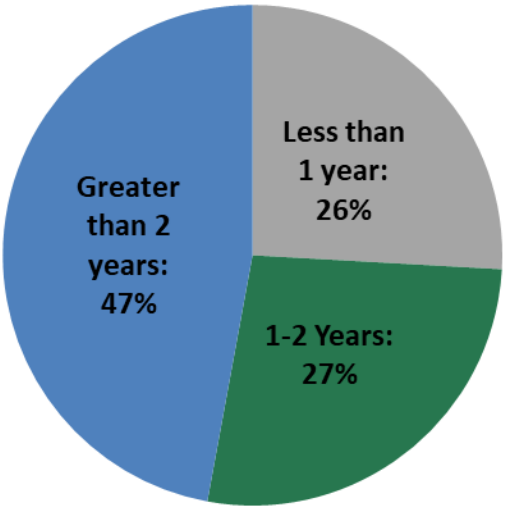

Figure 5. Experience using the OLCF (*N* = 448)

More specifically, respondents were asked to indicate **which OLCF HPC resources they utilized** during the 2017 calendar year. For all categories, the largest proportions of respondents indicated using Titan. For most categories, Eos was utilized by the smallest proportion. The exceptions were PIs, who utilized Rhea slightly less frequently than Eos (Table 3).

Proportions of respondents **utilizing OLCF support services** during 2017 are presented in Table 4. The largest number of respondents indicated using the User Assistance Center while the smallest proportion utilized Data Analysis and Visualization Support Services.

The sections below report respondent **satisfaction ratings for OLCF resources/services** in four main categories (Overall Satisfaction, Computing Resources, Data Resources, and Support Services) and their subcategories.

Table 3. *HPC Resources Used by PI status, Project Allocation and Overall Totals*

	PI Status		INCITE		DD		ALCC		Total	
	n	**% Users**	***n***	**% Users**	***n***	**% Users**	***n***	**% Users**	***n***	**% Users**
Titan	80	**83%**	154	**84%**	245	**78%**	150	**81%**	444	**78%**
Eos	80	26%	154	**18%**	243	**20%**	150	**19%**	442	**20%**
Rhea	80	**25%**	154	21%	243	28%	150	21%	442	22%
Data Transfer Nodes	79	52%	152	39%	242	50%	150	38%	439	41%
HPSS	79	39%	152	30%	242	29%	150	23%	439	26%
Lustre/Spider	79	67%	152	66%	242	55%	150	61%	439	56%

Note: Users add up to more than 100% because some used more than one system.

Table 4. *Support Services Used by PI Status, Project Allocation and Overall Totals*

	PI Status		INCITE		DD		ALCC		Total	
	n	**% Users**	***n***	**% Users**	***n***	**% Users**	***n***	**% Users**	***n***	**% Users**
User Assistance Center	78	**74%**	150	**55%**	239	**64%**	149	**47%**	433	**56%**
Account Management	78	38%	150	21%	238	24%	149	27%	432	22%
INCITE Scientific Computing Liaison	78	23%	150	51%	237	12%	148	22%	430	22%
Data Analysis and Visualization Support Services	77	**6%**	148	**7%**	237	**7%**	146	**4%**	426	**5%**

Note: Users add up to more than 100% because some used more than one system.

Overall Satisfaction

Users were asked to rate their **"overall" satisfaction with the OLCF**, and then with OLCF Compute Resources, Data Resources, and Support Services. In these responses individuals were not asked to consider the specific resources/services in a category, but rather report their general sense of satisfaction with the category. First, most respondents reported being *very satisfied* in this overall sense for all categories of resources/services (Figure 6).

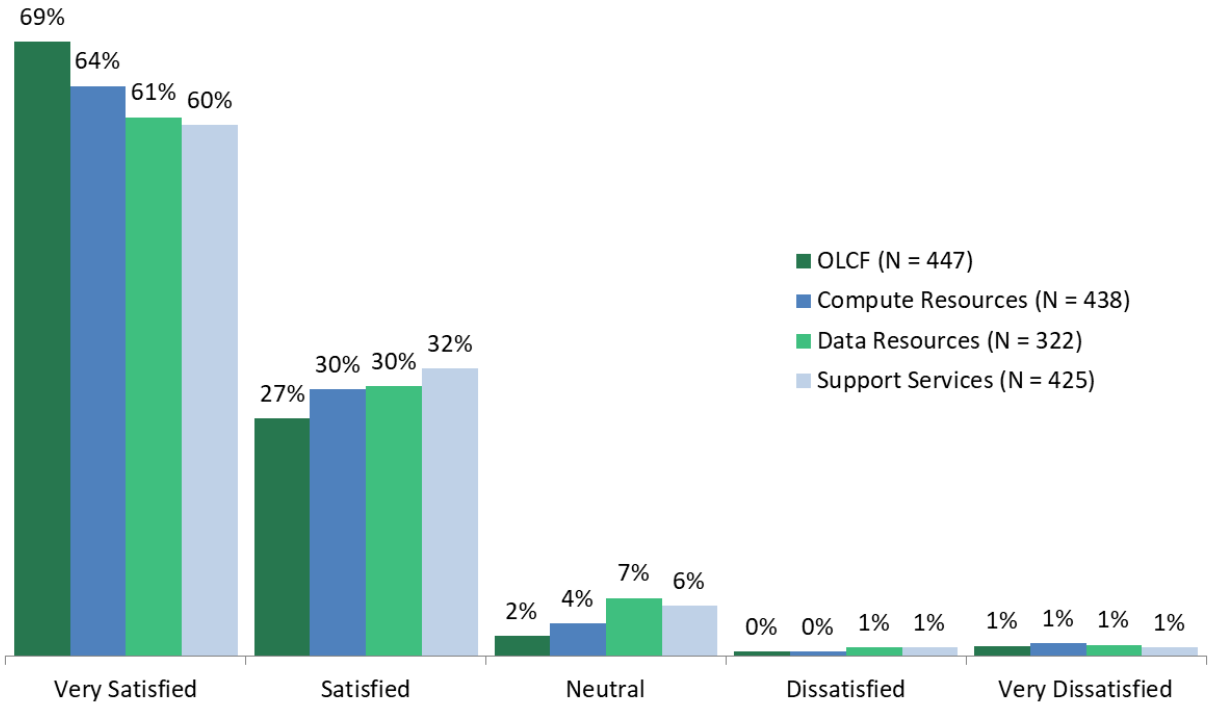

Figure 6. "Overall" Satisfaction with OLCF and its major resources/services (*N* = 447)

Table 5 summarizes descriptive statistics for these overall satisfaction ratings for all respondents and broken down by PI status, while Table 6 reports satisfaction statistics across project allocations. The tables also include ratings of **specific compute resources** (i.e., Titan, Eos, and Rhea), data resources (i.e., Data Transfer Nodes, HPSS, and Lustre/Spider), and **support services** (i.e., User Assistance, Account Services, Data Analysis and Visualization Support Services, INCITE Liaison, Communication, Training, and aspects of the Website). Across 18 items and all categories of respondents, the tables show that:

- *%Sat* ranged from 86% to 100%,
- Means ranged from 4.3 to 4.8, and
- SDs ranged from 0.50 to 0.97. There tended to be greater variation in responses (larger SDs) among PIs than in other categories.

Table 5. *Overall Satisfaction with OLCF and Its Major Resources/Services by PI Status and Totals*

	PI Status				Non-PI Status				Total			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
OLCF	**80**	**4.7**	**0.81**	**94%**	**367**	**4.6**	**0.63**	**97%**	**447**	**4.6**	**0.66**	**96%**
Compute Resources	**76**	**4.6**	**0.80**	**93%**	**362**	**4.5**	**0.70**	**95%**	**438**	**4.6**	**0.72**	**95%**
Titan	66	4.5	0.73	94%	276	4.4	0.60	95%	342	4.4	0.63	95%
Eos	21	4.6	0.97	90%	67	4.4	0.61	94%	88	4.5	0.71	93%
Rhea	20	4.5	0.95	95%	76	4.5	0.62	93%	96	4.5	0.70	94%
Data Resources	**68**	**4.5**	**0.82**	**90%**	**254**	**4.5**	**0.75**	**92%**	**322**	**4.5**	**0.77**	**91%**
Data Transfer Nodes	41	4.6	0.59	95%	141	4.5	0.54	98%	182	4.5	0.55	97%
HPSS	31	4.3	0.91	87%	81	4.4	0.59	95%	112	4.4	0.69	93%
Lustre/Spider	52	4.3	0.79	90%	191	4.4	0.69	92%	243	4.4	0.71	92%
Support Services	**78**	**4.6**	**0.86**	**91%**	**347**	**4.5**	**0.70**	**93%**	**425**	**4.5**	**0.73**	**92%**
User Assistance	58	4.6	0.65	95%	183	4.6	0.60	97%	241	4.6	0.61	96%
Account Services	30	4.6	0.56	97%	64	4.6	0.81	95%	94	4.6	0.73	96%
Data Analysis and Visualization Support Services	4	4.8	0.50	100%	18	4.3	0.57	94%	22	4.4	0.58	95%
INCITE Liaison	14	4.4	0.76	86%	53	4.7	0.51	98%	67	4.6	0.57	96%
Communication	76	4.4	0.72	93%	343	4.4	0.64	93%	419	4.4	0.66	93%
Training	73	4.4	0.71	93%	319	4.3	0.62	94%	392	4.3	0.64	94%
OLCF Website User Support information	76	4.4	0.66	97%	335	4.4	0.63	93%	411	4.4	0.63	94%
OLCF Website	77	4.4	0.73	92%	332	4.4	0.62	92%	409	4.4	0.64	92%
Min	**4**	**4.3**	**0.50**	**86%**	**18**	**4.3**	**0.51**	**92%**	**22**	**4.3**	**0.55**	**91%**
Max	**80**	**4.8**	**0.97**	**100%**	**367**	**4.7**	**0.81**	**98%**	**447**	**4.6**	**0.77**	**97%**

Table 6. *Overall Satisfaction with OLCF and its Major Resources/Services by Project Allocation*

	INCITE				DD				ALCC			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
OLCF	**154**	**4.6**	**0.69**	**95%**	**248**	**4.7**	**0.66**	**97%**	**150**	**4.6**	**0.58**	**97%**
Compute Resources	**153**	**4.5**	**0.74**	**93%**	**242**	**4.6**	**0.69**	**95%**	**147**	**4.4**	**0.69**	**93%**
Titan	128	4.4	0.64	95%	188	4.4	0.61	96%	120	4.3	0.63	92%
Eos	26	4.6	0.64	92%	49	4.4	0.76	94%	27	4.4	0.64	93%
Rhea	31	4.4	0.67	90%	67	4.5	0.72	94%	30	4.5	0.63	93%
Data Resources	**105**	**4.4**	**0.80**	**91%**	**196**	**4.5**	**0.75**	**92%**	**106**	**4.4**	**0.79**	**87%**
Data Transfer Nodes	60	4.6	0.53	98%	120	4.5	0.56	97%	57	4.5	0.50	100%
HPSS	45	4.3	0.82	89%	70	4.3	0.59	94%	35	4.3	0.87	89%
Lustre/Spider	98	4.3	0.80	91%	131	4.3	0.70	91%	91	4.3	0.75	89%
Support Services	**147**	**4.5**	**0.72**	**92%**	**240**	**4.5**	**0.73**	**94%**	**139**	**4.5**	**0.70**	**92%**
User Assistance	82	4.6	0.66	96%	151	4.6	0.58	97%	70	4.6	0.55	97%
Account Services	31	4.6	0.81	97%	56	4.6	0.71	96%	40	4.7	0.53	98%
Data Analysis and Visualization Support Services	10	4.4	0.70	90%	15	4.3	0.62	93%	6	4.3	0.52	100%
INCITE Liaison	51	4.6	0.61	94%	26	4.6	0.57	96%	25	4.6	0.58	96%
Communication	146	4.4	0.65	95%	232	4.4	0.65	93%	144	4.4	0.66	93%
Training	129	4.3	0.70	95%	223	4.4	0.59	96%	135	4.3	0.64	93%
OLCF Website User Support information	141	4.4	0.66	94%	231	4.4	0.61	94%	139	4.3	0.66	92%
OLCF Website	140	4.4	0.67	93%	230	4.4	0.59	94%	138	4.3	0.68	91%
Min	**10**	**4.3**	**0.53**	**89%**	**15**	**4.3**	**0.56**	**91%**	**6**	**4.3**	**0.50**	**87%**
Max	**154**	**4.6**	**0.82**	**98%**	**248**	**4.7**	**0.76**	**97%**	**150**	**4.7**	**0.87**	**100%**

Only 11 respondents reported reasons for **dissatisfaction with the OLCF overall or with its major resources/services.** Individuals cited problems with *stability or reliability* (*n* = 2), *data storage* (*n* = 2), and *user guides* (*n* = 2):

Stability/Reliability	*"I only work on Titan and I routinely set up multiple ssh connections as well as an sshfs connection so I can use a modern text editor. These connections fail multiple times every day! And the fact that I have to use the RSA to reopen makes it tedious. I probably have to enter an RSA token a dozen times per day on average. Additionally, my sshfs connection is problematic…"* *"Sometimes go out of service and never explains why. Problem hasn't been solved for at least 2 years."*
Data Storage	*"We could use an easier (automatic) process for non-purge space on Lustre (PROJWORK) because we have data files that need to live there for our runs. HPSS does not support any export controlled/sensitive data storage."* *"On Titan, there is no place where I can put files that is both accessible to all nodes (head, staging, and compute) and is not purged. This makes certain kinds of automated scripting much more complicated. I don't need a lot of space; I just need a place that the compute nodes can get do where the files won't disappear every couple of weeks."*
User Guides	*"I'm a Summitdev user, that being said I understand that the machine is in a beta phase. Yet, the documentation online is not up-to-date. Information concerning the job manager are not up-to-date."* *"OLCF admins seem more reluctant than Argonne and NERSC admins to update software modules."*

Two users expressed satisfaction in the comments they provided, while other users were unhappy with navigating documentation on the OLCF website, accessing the system, and decreased performance of Lustre. All open-ended responses are provided in (Appendix E: User Dissatisfaction Explanations).

Finally, respondents described what they perceived to be **"the best qualities of OLCF."** Thematic analysis of user responses identified *computing power/performance* (58%) and *user tech support/staff* (33%) as the most valued qualities of the OLCF (Table 7; see Appendix D: Best Qualities of the OLCF for all responses by category; *N* = 388). Many illustrative examples praised multiple elements of OLCF:

> *"A comprehensive system with the right balance of hardware, software resources, very proficient and helpful staff. I've been a user for 7 years and its standards have never dipped."*

"You have competent, long-term staff and you are constantly improving. For example, the new added services (Jupyter, ParaView, Visit as before ...) add a dramatic increase in productivity for our daily workflows. In addition, your data services (ADIOS) and visualization teams are amazing and the overall support (help tickets, trainings, involvement in open community projects, etc.) is very satisfactory. OLCF is the shining example how a HPC system should be administrated. Thank you so much!"

"Professional, reliable, capable - systems, facilities and staff."

"The wide range of compute resources accessible through one file system, which allows for generation and analysis of unforeseeably huge data sets employing bleeding edge HPC technologies. Fantastic technological and administrative support, and appreciation for scientific needs of the research groups."

"OLCF provides top of the line compute resources to carry on our scientific mission. These resources are backed up by a highly capable and talented team providing training and technical support to the users to allow us to utilize OLCF resources efficiently and to place us in a good position for writing successful INCITE and ALCC proposals. The team is sharply focused, and is proactive, in proposing solutions for us to meet and exceed our scientific and computational milestones with the tools at their disposal and discretion, such as for example tweaking queue priorities etc. The OLCF truly values our success [. . .] Keep up the excellent work OLCF."

While appreciation for the power and performance of the facilities may not come as a surprise, the relatively high frequency of positive references to OLCF User Support is perhaps more unexpected. These responses were re-examined, first excluding individuals that mentioned **only** computing performance as the best quality (removing 100 responses). The relative frequency of comments reported by this group (*N* = 288), excluding references to computing power/performance is shown in the last column of Table 7. *Tech support/staff* is prominent as the perceived best OLCF quality when the responses are examined in this way, but there is significant spread across categories and variety in responses.

For example:

Tech Support/Staff	*"The support staff is always very responsive and are able to resolve issues quickly and effectively. The computing resources are world class. The training offered by OLCF has changed the trajectory of my career."* *"The liaison program and the support staff bring a significant edge over other computational centers."* *"The staff are very willing to engage with us when we have ideas for code development or testing. All of our interactions thus far have been very fruitful."* *"Fast and friendly helpline responses."*

	"Overall, support is very efficient and the extremely complex and state of the art resources are managed very effectively."
Computing Performance	*"Access to OLCF's vast HPC resources has allowed me to perform research that would otherwise be impossible at my company."* *"Number 1 in computing power, number 1 in storage, number 1 in on-site analysis capacity (eos+rhea); therefore science you can't do anywhere else."* *"Large number of resources; ability to run simulations that are not feasible to run anywhere else. Experts in HPC computing."* *"Variety of clusters to meet specific user and job needs."* *"Best for large-scale system access, performance benchmarking and analysis".*

Table 7. *Best Qualities of OLCF (ordered by % of all respondents, high to low)*

	All Responses (*N* = 388)	**Responses Excluding Computing Performance (*N* = 288)**
Computing power-resources	58%	n/a
Tech Support/Staff	33%	44%
Accessibility	10%	13%
Queue time	8%	11%
System documentation	8%	11%
Stability/Reliability	8%	10%
Availability	7%	10%
Overall satisfaction	6%	8%
Resource management	5%	7%
Supports scientific research	5%	6%
Data storage	4%	5%
Software Libraries & Development	4%	5%
Communication	3%	5%
Ease of use	3%	4%
Training/Tutorials	3%	4%
Customer-focused	3%	3%
Scheduling policy	2%	3%
Data transfer	2%	2%
Allocations	1%	1%

Note: Users add up to more than 100% because many provided more than one theme in their response.

Compute and Data Resources

Respondents provide satisfaction ratings for several specific computing and data resources features:

- notice given prior to scheduled maintenance
- project disk space
- ease of transferring data to/from the OLCF
- bandwidth

Table 8 reports satisfaction for these features by PI status and overall, and Table 9 reports ratings by project allocation. The highest satisfaction rating (all respondents) was for *notice given prior to scheduled maintenance* (95% satisfied), and the lowest overall mean rating was for *project disk space* (88% satisfied).

Of the 16 respondents that reported reasons for **dissatisfaction with one or more aspects of the OLCF compute and data resources,** the majority of complaints had to do with *data storage* (*n* = 7), *data transfer* (*n* = 3), and *data retention or purge policy* (*n* = 3). All open-ended responses are provided in Appendix E: User Dissatisfaction Explanations.

Data Storage	*"More home directory space would be nice."* *"My 'neutral' on project disk space is because the default of 100 TB is quite low, from my perspective. However, the OLCF has been able to easily increase it for my project, which is much appreciated."* *"Project directory size (area that is backed up, not purged) not always sufficient for large projects. Keeping all data on scratch not great idea, transferring back/forth to HPSS not always optimal."* *"More quota would facilitate post-processing tasks.* *"…additionally, disk space seemed to be a recurring problem for the project I was on. That said, the project allocation was shared between many individuals, and it's possible that other users on the project were using excessive space.* *"Data purging should be more transparent; or non-purge space needs to be larger.*
Data Transfer	*"It takes forever to scp data to/from titan."* *"File transfer is slower then what I would like."*

	"We need a moderate SDMZ to make transfer from Titan's Lustre (Atlas) to other storage locations at ORNL faster and easier for moderate data."
Data Retention or Purge Policy	"*Disk space itself is fine, but the automatic removal of old files has caused major headaches for me on more than one occasion.*" "*While adequate disk space is provided, the data on the WORK directories in Titan gets deleted if a user had not worked on it for a time period. It would be good if you can increase the duration before the data gets deleted. Ideally I would have liked to have had this data not be deleted or have a limit to the size of the data that if you keep under it will not be deleted.*" "*Data purging should be more transparent; or non-purge space needs to be larger.*"

Table 8. *Descriptive Statistics for Aspects of the OLCF HPC Compute and Data Resources by PI Status and Overall Totals*

	PI Status				Non-PI Status				Total			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Notice given prior to scheduled maintenance	80	4.7	0.64	**98%**	363	4.6	0.66	**94%**	443	4.6	0.66	**95%**
Project disk space	79	4.5	0.73	**91%**	362	4.4	0.80	**88%**	441	4.4	0.79	**88%**
Ease of transferring data to/from the OLCF	78	4.5	0.72	94%	352	4.4	0.72	91%	430	4.4	0.72	92%
Bandwidth offered by the OLCF	79	4.5	0.75	97%	349	4.5	0.69	93%	428	4.5	0.70	94%

Table 9. *Descriptive Statistics for Aspects of the OLCF HPC Compute and Data Resources by Project Allocation*

	INCITE				DD				ALCC			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Notice given prior to scheduled maintenance	153	4.6	0.67	**93%**	245	4.6	0.66	**96%**	149	4.6	0.56	**97%**
Project disk space	152	4.4	0.86	**85%**	246	4.5	0.75	**91%**	148	4.4	0.77	**89%**
Ease of transferring data to/from the OLCF	146	4.4	0.65	92%	240	4.4	0.73	93%	145	4.4	0.71	90%
Bandwidth offered by the OLCF	147	4.5	0.70	92%	239	4.5	0.71	95%	141	4.5	0.64	94%

In addition, respondents were asked to indicate their opinion regarding the **performance of computing and data resources compared to the previous year.** Overall, 22.4% reported *improvements*, just 2.1% perceived *decreases in performance*, and 75.5% reported *no change* (Figure 7). Some differences in these perceptions were observed across years of using the OLCF. Less experienced users (those with less than 1 year, or 1-2 years' experience) were less likely to report seeing a change over the last year, while more experienced users (more than 2 years' experience) were more likely to report an improvement in performance.

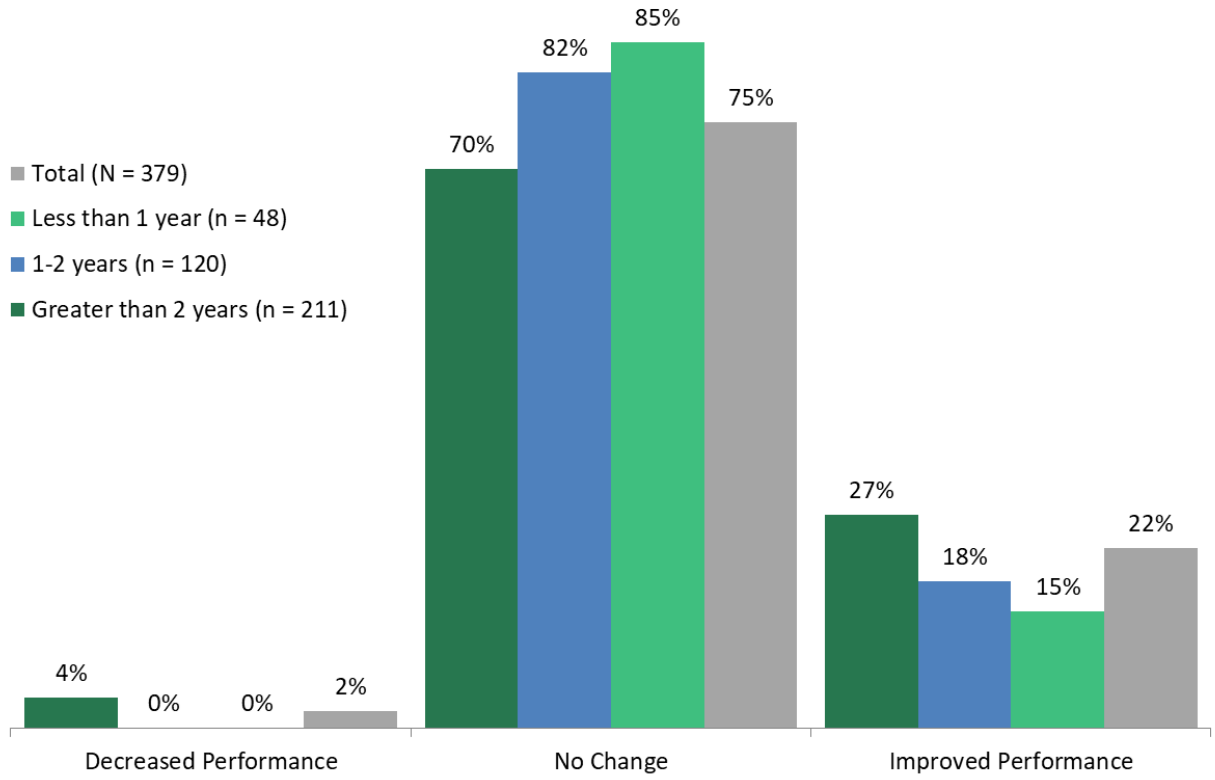

Figure 7. Perceived changes from 2017 computing/data resources performance by years using OLCF (*N* = 379)

Among the 8 respondents that provided comments **describing decreased performance,** *stability/reliability* was the most prominent theme with more than half of individuals reporting increased node failures or other forms of instability:

> *"Encountered many GPU failures on Titan."*
>
> *"Failures with GPUs have caused jobs that use almost the full machine to fail, even when not using the GPUs."*
>
> "*Titan has become less stable over the years, leading to a number of failed jobs. However, the OLCF is doing everything they can to mitigate this.*"

All open-ended responses are provided in Appendix E: User Dissatisfaction Explanations.

Compute Resources

Titan

Titan was used by 78% of respondents during the 2017 calendar year (*N* = 444). Titan users were asked to provide satisfaction ratings for multiple aspects of the system, and descriptive statistics of these ratings are shown in Table 10, which also reports satisfaction by PI status. 95% of all respondents were either *satisfied* or *very satisfied* with the system. Table 11 summarizes these satisfaction statistics by project allocation.

The *frequency of scheduled outages* and the *I/O performance* were the highest rated specific aspects, and the aspects rated in the lowest quartile of percent satisfaction were (in descending order):

- *Batch wait time* and *Performance tools*
- *Data analysis software* and *Debugging tools*

There were 45 Titan users who reported at least one reason for **dissatisfaction with Titan**. A third of these users (*n* = 15) were unhappy with the level of *stability/reliability* they had been experiencing on the system. For example:

> *"Titan has become very unstable for large jobs."*

> *"Those frequent node failures early in January 2017 were a bit frustrating."*

Nearly another third of these users (*n* = 13) were unhappy with the *performance* of the system or indicated a need for *performance upgrades*. For example:

> *"It would be nice if updated versions of various python packages were installed as modules on the system, namely matplotlib 2.1 and numpy 1.12. The current modules are very out-of-date."*

All open-ended responses are provided in Appendix E: User Dissatisfaction Explanations.

Table 10. *Satisfaction Ratings of Titan by PI Status and Overall*

	PI Status				Non-PI Status				Total			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Batch wait time	66	4.2	0.84	85%	272	4.1	0.85	83%	338	4.2	0.85	83%
Batch queue structure	65	4.2	0.77	88%	271	4.2	0.73	87%	336	4.2	0.74	87%
Job success rate	65	4.3	0.95	88%	273	4.2	0.83	88%	338	4.3	0.86	88%
Frequency of scheduled outages	66	4.3	0.85	91%	269	4.3	0.66	89%	335	4.3	0.70	90%
Frequency of unanticipated outages	65	4.3	0.82	86%	263	4.3	0.70	87%	328	4.3	0.72	87%
Performance tools	49	4.0	0.95	76%	192	4.3	0.70	85%	241	4.2	0.76	83%
Debugging tools	45	4.0	0.89	**71%**	178	4.2	0.78	**81%**	223	4.1	0.80	**79%**
Data analysis software	38	4.1	0.82	**71%**	147	4.2	0.75	82%	185	4.1	0.76	**79%**
Software/libraries	62	4.3	0.76	89%	266	4.2	0.79	86%	328	4.3	0.78	87%
Programming environment	62	4.2	0.82	90%	263	4.3	0.74	87%	325	4.3	0.76	88%
Scratch configuration	64	4.3	0.80	89%	251	4.3	0.72	88%	315	4.3	0.74	88%
I/O performance	65	4.3	0.82	88%	257	4.3	0.68	91%	322	4.3	0.71	90%
Overall satisfaction with Titan	66	4.5	0.73	**94%**	276	4.4	0.60	**95%**	342	4.4	0.63	**95%**

Table 11. *Satisfaction Ratings of Titan by Project Allocation*

	INCITE				DD				ALCC			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Batch wait time	125	4.0	0.98	**78%**	186	4.1	0.83	83%	117	4.1	0.86	83%
Batch queue structure	125	4.1	0.82	84%	186	4.2	0.74	85%	116	4.2	0.71	91%
Job success rate	126	4.2	0.90	83%	186	4.3	0.86	88%	116	4.0	0.91	82%
Frequency of scheduled outages	125	4.3	0.73	88%	184	4.3	0.71	89%	117	4.2	0.71	89%
Frequency of unanticipated outages	124	4.2	0.77	85%	180	4.3	0.71	87%	115	4.2	0.71	88%
Performance tools	85	4.2	0.79	80%	145	4.1	0.79	81%	78	4.1	0.79	78%
Debugging tools	82	4.2	0.73	80%	131	4.0	0.81	**76%**	78	4.1	0.84	76%
Data analysis software	68	4.1	0.79	**78%**	113	4.1	0.75	81%	62	4.0	0.79	**74%**
Software/libraries	124	4.3	0.78	86%	179	4.2	0.78	85%	114	4.2	0.84	83%
Programming environment	127	4.3	0.82	87%	177	4.3	0.72	88%	114	4.1	0.84	82%
Scratch configuration	125	4.2	0.84	84%	172	4.3	0.68	90%	110	4.2	0.73	87%
I/O performance	121	4.3	0.75	88%	178	4.3	0.71	89%	114	4.1	0.75	86%
Overall satisfaction with Titan	128	4.4	0.64	**95%**	188	4.4	0.61	**96%**	120	4.3	0.63	**92%**

Eos

Eos was used by 20% of respondents during the 2017 calendar year (*N* = 442). Eos users were asked to provide satisfaction ratings for multiple aspects of the system, and descriptive statistics of these ratings are shown in Table 12, which also reports satisfaction statistics by PI status. Over 90% of all respondents were either *satisfied* or *very satisfied* with the system. Table 13 summarizes these satisfaction statistics by project allocation.

The *Job Success Rate* was the highest rated specific aspect, and the features rated in the lowest quartile of percent satisfaction were (in descending order):

- *Debugging tools*
- *Performance tools*
- *Data analysis software*

Only three Eos users reported **reasons for dissatisfaction**. Two of these users were dissatisfied with *queue time* and the other user was unhappy with *data retention and the purge policy:*

> *"Very difficult to get jobs in the ~1000 core range through the queue (multi-day wait times). Often will go to Titan for this (few hours), but our software does not use GPUs and the processors on Titan are half as fast as Eos. Despite this we get higher throughput on Titan."*
>
> *"Would prefer faster turnaround on jobs, but it's the nature of the system and to be expected."*
>
> *"Scratch purge seems to be applied inconsistently, such that sometimes I'm surprised which files are there (or not there) based on when I remember last accessing them. Policy of removing scratch files but leaving directory structure is not useful."*

Table 12. *Satisfaction Ratings of Eos by PI Status and Overall*

	PI Status				Non-PI Status				Total			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Batch wait time	20	4.6	1.00	90%	68	4.2	0.87	87%	88	4.3	0.90	88%
Batch queue structure	20	4.6	0.94	**95%**	66	4.4	0.70	91%	86	4.5	0.76	92%
Job success rate	21	4.7	0.91	**95%**	67	4.5	0.61	**97%**	88	4.6	0.69	**97%**
Frequency of scheduled outages	21	4.5	0.98	90%	67	4.4	0.63	93%	88	4.4	0.72	92%
Frequency of unanticipated outages	21	4.5	0.98	90%	66	4.3	0.69	88%	87	4.4	0.77	89%
Performance tools	13	4.2	1.17	85%	41	4.3	0.78	80%	54	4.3	0.87	81%
Debugging tools	13	4.2	1.21	77%	37	4.3	0.73	84%	50	4.2	0.87	82%
Data analysis software	12	4.3	0.87	**75%**	41	4.2	0.78	**78%**	53	4.2	0.79	**77%**
Software/libraries	19	4.6	0.69	89%	65	4.3	0.67	89%	84	4.4	0.68	89%
Programming environment	17	4.8	0.56	94%	63	4.4	0.61	94%	80	4.5	0.62	94%
Scratch configuration	17	4.5	1.01	94%	60	4.3	0.79	87%	77	4.3	0.84	88%
I/O performance	21	4.6	0.93	**95%**	67	4.3	0.70	90%	88	4.4	0.76	91%
Overall satisfaction with Eos	21	4.6	0.97	90%	67	4.4	0.61	94%	88	4.5	0.71	93%

Table 13. *Satisfaction Ratings of Eos by Project Allocation*

	INCITE				DD				ALCC			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Batch wait time	27	4.4	0.89	89%	48	4.2	0.96	85%	28	4.4	0.74	93%
Batch queue structure	27	4.5	0.80	89%	47	4.3	0.89	87%	27	4.6	0.51	**100%**
Job success rate	26	4.6	0.75	92%	49	4.5	0.79	**96%**	27	4.6	0.50	**100%**
Frequency of scheduled outages	26	4.5	0.65	92%	49	4.4	0.81	90%	27	4.3	0.59	93%
Frequency of unanticipated outages	26	4.4	0.75	85%	48	4.4	0.84	88%	27	4.3	0.61	93%
Performance tools	16	4.3	0.87	**75%**	29	4.1	0.95	79%	18	4.3	0.75	83%
Debugging tools	15	4.3	0.82	80%	26	4.1	0.99	77%	18	4.3	0.67	89%
Data analysis software	16	4.4	0.72	88%	31	4.1	0.81	**74%**	15	4.2	0.77	**80%**
Software/libraries	26	4.5	0.65	92%	45	4.4	0.71	87%	26	4.4	0.57	96%
Programming environment	24	4.6	0.58	**96%**	42	4.5	0.63	93%	27	4.4	0.56	96%
Scratch configuration	26	4.4	0.94	85%	39	4.3	0.89	90%	26	4.3	0.78	88%
I/O performance	26	4.5	0.65	92%	49	4.3	0.83	88%	27	4.3	0.71	93%
Overall satisfaction with Eos	26	4.6	0.64	92%	49	4.4	0.76	94%	27	4.4	0.64	93%

Rhea

Rhea was used by 22% of respondents during the 2017 calendar year (*N* = 442). Rhea users were asked to provide satisfaction ratings for multiple aspects of the system, and descriptive statistics of these ratings are shown in Table 14, which also reports satisfaction statistics by PI status. Over 90% of all respondents were either *satisfied* or *very satisfied* with the system. Table 15 summarizes these satisfaction statistics by project allocation.

The *I/O performance* was the highest rated specific aspect, and the aspects rated in the lowest quartile of percent satisfaction were (in descending order):

- *Software/libraries* and *Data analysis software*
- *Performance tools*
- *Debugging tools*

The most common themes among the small number of Rhea users (*N* = 11) that expressed **reasons for dissatisfaction** were *performance or performance upgrades* (*n* = 4). See Appendix E: User Dissatisfaction Explanations for all replies by category.

> "*I use Rhea for interactive sessions with VisIt on large data sets (> 100 GB). I can typically get good turnaround and performance with 1 node / 16 cores, but would like to be able to get 2 nodes and better performance of VisIt. VisIt seems to have trouble running on more than 32 cores.*"

> "*It would be nice if updated versions of various python packages were installed as modules on the system, namely matplotlib 2.1 and numpy 1.12. The current modules are very out-of-date.*"

> "*A newer version of Paraview installed as a module with GPU support would be nice, but that is a minor complaint.*"

> "*It would be nice to have CUDA 9.0 and associated driver software installed on 'rhea' to facilitate use of state-of-the-art software techniques on the large memory GPU-accelerated nodes of 'rhea'. To my knowledge there is no roadblock to this type of software environment update except for performing required testing and validation on the device drivers, since all previous CUDA toolkit versions can be used with a current driver.*"

Table 14. *Descriptive Statistics for Satisfaction Ratings of Rhea by PI Status and Overall Totals*

	PI Status				Non-PI Status				Total			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Batch wait time	19	4.6	0.96	**95%**	77	4.4	0.78	91%	96	4.4	0.82	92%
Batch queue structure	18	4.4	0.98	94%	76	4.3	0.72	91%	94	4.3	0.77	91%
Job success rate	18	4.6	0.70	89%	76	4.5	0.58	**96%**	94	4.5	0.60	95%
Frequency of scheduled outages	20	4.5	0.69	90%	74	4.3	0.67	89%	94	4.4	0.67	89%
Frequency of unanticipated outages	20	4.6	0.60	**95%**	73	4.3	0.68	88%	93	4.4	0.67	89%
Performance tools	12	4.2	1.19	83%	45	4.3	0.76	**82%**	57	4.3	0.86	82%
Debugging tools	11	3.9	1.22	**73%**	45	4.3	0.76	**82%**	56	4.2	0.87	**80%**
Data analysis software	13	4.3	0.75	85%	59	4.3	0.83	83%	72	4.3	0.81	83%
Software/libraries	18	4.1	1.23	83%	72	4.2	0.88	83%	90	4.2	0.95	83%
Programming environment	16	4.3	1.01	94%	70	4.3	0.77	90%	86	4.3	0.81	91%
Scratch configuration	17	4.3	0.99	94%	67	4.4	0.70	91%	84	4.4	0.76	92%
I/O performance	19	4.4	0.76	**95%**	76	4.4	0.57	**96%**	95	4.4	0.61	**96%**
Overall satisfaction with Rhea	20	4.5	0.95	**95%**	76	4.5	0.62	93%	96	4.5	0.70	94%

Table 15. *Descriptive Statistics for Satisfaction Ratings of Rhea by Project Allocation*

	INCITE				DD				ALCC			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Batch wait time	32	4.4	0.67	91%	66	4.4	0.84	92%	31	4.4	0.92	94%
Batch queue structure	31	4.3	0.60	94%	65	4.4	0.74	92%	30	4.3	0.84	90%
Job success rate	31	4.5	0.57	**97%**	65	4.5	0.56	**97%**	29	4.6	0.63	93%
Frequency of scheduled outages	30	4.2	0.73	83%	67	4.4	0.67	90%	28	4.4	0.63	93%
Frequency of unanticipated outages	30	4.2	0.71	83%	67	4.4	0.65	91%	27	4.4	0.64	93%
Performance tools	15	4.1	0.80	**73%**	47	4.3	0.87	85%	12	4.3	0.78	83%
Debugging tools	15	4.2	0.86	**73%**	46	4.2	0.87	**83%**	13	4.2	0.80	**77%**
Data analysis software	24	4.0	0.93	75%	53	4.4	0.79	85%	22	4.4	0.85	86%
Software/libraries	30	4.0	1.02	77%	63	4.2	0.94	86%	28	4.1	1.05	79%
Programming environment	29	4.1	0.88	83%	61	4.4	0.74	**97%**	27	4.1	0.83	85%
Scratch configuration	29	4.2	0.79	86%	58	4.4	0.79	93%	25	4.3	0.63	92%
I/O performance	30	4.3	0.66	90%	67	4.4	0.61	**97%**	29	4.4	0.57	**97%**
Overall satisfaction with Rhea	31	4.4	0.67	90%	67	4.5	0.72	94%	30	4.5	0.63	93%

Data Resources

Data Transfer Nodes

DTNs were used by 41% of respondents during the 2017 calendar year (*N* = 439), and 97% were either *satisfied* or *very satisfied* with the DTNs. Satisfaction did not vary substantially by PI Status or project allocation. There were **no users who indicated they were dissatisfied** with DTNs, but two users who rated their satisfaction as *Neutral* provided the following comments:

> *"Too slow."*

> *"Whenever I transfer data to and from ORNL with a data transfer node, the transfer rate is about 3 KiB/sec, which takes a very long time for large files. I've been told that this slow speed is partially due to my company's firewall, but 3 KiB/sec is much slower than the rates published on the ORNL website."*

HPSS

HPSS was used by 26% of respondents during the 2017 calendar year (*N* = 439). HPSS users were asked to provide satisfaction ratings for multiple aspects of the system, and descriptive statistics of these ratings are shown in Table 16, which also reports satisfaction statistics by PI status. 93% of respondents were overall either *satisfied* or *very satisfied* with the system. Three items all received the highest rating within HPSS: the *frequency of scheduled outages, the frequency of unscheduled outages,* and *the ability to store files.* The aspects rated in the lowest quartile of percent satisfaction were (in descending order):

- *hsi interface*
- *htar interface*

Table 17 summarizes these satisfaction statistics by project allocation.

Of the four respondents that reported **reasons for dissatisfaction** with HPSS, all mentioned htar or hsi limitations or inconveniences:

> *"htar does not have the same capability of tar, for example tar u, which allows me to update a tar file. As a result, I can't use htar."*

> *"I find both the hsi and htar interfaces to be very opaque. It's too easy to overwrite data accidentally. That combined with the time it takes to store and retrieve my datasets means I don't always archive as frequently as I should, and I've been burned by the lustre file sweeper a couple of times as a result."*

> *"Other facilities offer to use Globus to store and retrieve files which is much more convenient than hsi."*

> *"htar, while seemingly a "good idea" with some handy features and benefits, has limitations on individual file sizes that preclude its use for us, and lacks a few control options with regard to checksum file usage and access. We were discouraged by OLCF staff from using it anyway."*

Table 16. *Satisfaction Ratings of HPSS by PI Status and Overall*

	PI Status				Non-PI Status				Total			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
hsi interface	30	4.2	1.03	80%	80	4.3	0.73	86%	110	4.3	0.82	85%
htar interface	29	4.1	1.05	**76%**	72	4.2	0.78	**83%**	101	4.2	0.86	**81%**
Ability to store files	31	4.5	0.89	90%	81	4.5	0.59	95%	112	4.5	0.68	**94%**
Ability to retrieve files	30	4.4	0.90	90%	81	4.4	0.61	94%	111	4.4	0.69	93%
Reliability (data integrity)	30	4.5	0.86	**93%**	77	4.5	0.62	94%	107	4.5	0.69	93%
Time to store files	30	4.2	1.03	80%	81	4.4	0.63	93%	111	4.3	0.76	89%
Time to retrieve files	30	4.2	0.96	80%	80	4.3	0.64	90%	110	4.3	0.73	87%
Frequency of scheduled outages	30	4.3	0.92	87%	78	4.4	0.57	**96%**	108	4.4	0.68	**94%**
Frequency of unanticipated outages	30	4.4	0.89	90%	78	4.4	0.59	95%	108	4.4	0.68	**94%**
Overall satisfaction with HPSS	31	4.3	0.91	87%	81	4.4	0.59	95%	112	4.4	0.69	93%

Table 17. *Satisfaction Ratings of HPSS by Project Allocation*

	INCITE				DD				ALCC			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
hsi interface	44	4.2	0.91	84%	69	4.2	0.79	83%	35	4.2	1.02	77%
htar interface	37	4.1	0.95	**81%**	67	4.1	0.81	**81%**	29	4.0	1.02	**69%**
Ability to store files	45	4.4	0.81	**91%**	70	4.5	0.61	**94%**	35	4.5	0.82	**94%**
Ability to retrieve files	45	4.4	0.81	**91%**	69	4.4	0.62	93%	35	4.4	0.81	**94%**
Reliability (data integrity)	44	4.4	0.85	89%	67	4.5	0.64	93%	33	4.5	0.87	91%
Time to store files	45	4.2	0.85	84%	69	4.3	0.71	88%	35	4.3	0.96	86%
Time to retrieve files	45	4.2	0.82	84%	69	4.2	0.68	86%	34	4.2	0.84	88%
Frequency of scheduled outages	45	4.2	0.77	**91%**	68	4.4	0.62	93%	33	4.2	0.87	88%
Frequency of unanticipated outages	45	4.3	0.78	**91%**	68	4.4	0.62	93%	33	4.3	0.85	91%
Overall satisfaction with HPSS	45	4.3	0.82	89%	70	4.3	0.59	**94%**	35	4.3	0.87	89%

Lustre/Spider Scratch Filesystem

Lustre/Spider was used by 56% of respondents during the 2017 calendar year (*N* = 439). Lustre/Spider users were asked to provide satisfaction ratings for multiple aspects of the system, and descriptive statistics of these ratings are shown in Table 18, which also reports satisfaction statistics by PI status. 92% of respondents were overall either *satisfied* or *very satisfied* with the system. The *Reliability (data integrity)* was the highest rated Lustre/Spider feature, and the lowest rated features were the *File and directory operations* and *I/O bandwidth*. Table 19 summarizes these satisfaction statistics by project allocation.

There were 9 users who **indicated dissatisfaction** with at least one aspect of the Lustre/Spider Scratch Filesystem and most comments were concerned either with *performance* or with the *data retention/purge policy*. For example:

> *"Regular directory operations on Lustre is often very slow."*
>
> *"Interactive use can be very slow. Our application can't achieve very high I/O bandwidth, although we are working on this."*
>
> *"I suspect Lustre is what makes Titan sluggish."*
>
> *"It is purged too often and I have been losing a lot of my work!"*

See Appendix E: User Dissatisfaction Explanations for all replies by category.

Table 18. *Satisfaction Ratings of Lustre/Spider Scratch Filesystem by PI Status and Overall*

	PI Status				Non-PI Status				Total			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Size	52	4.5	0.78	**92%**	191	4.5	0.61	94%	243	4.5	0.65	93%
I/O bandwidth	52	4.3	0.83	90%	191	4.4	0.67	92%	243	4.4	0.71	91%
File and directory operations	52	4.2	0.92	**83%**	191	4.3	0.74	**91%**	243	4.3	0.78	**89%**
Reliability	52	4.4	0.78	**92%**	190	4.5	0.66	**96%**	242	4.5	0.68	**95%**
Frequency of scheduled outages	51	4.4	0.78	**92%**	185	4.4	0.63	93%	236	4.4	0.66	93%
Frequency of unanticipated outages	51	4.4	0.78	**92%**	182	4.4	0.65	92%	233	4.4	0.68	92%
Overall satisfaction with Lustre/Spider	52	4.3	0.79	90%	191	4.4	0.69	92%	243	4.4	0.71	92%

Table 19. *Satisfaction Ratings of Lustre/Spider Scratch Filesystem by Project Allocation*

	INCITE				DD				ALCC			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Size	98	4.5	0.68	**95%**	131	4.4	0.65	92%	91	4.4	0.70	**93%**
I/O bandwidth	98	4.4	0.72	94%	131	4.3	0.68	**88%**	91	4.2	0.79	89%
File and directory operations	98	4.2	0.92	**86%**	131	4.3	0.78	**88%**	91	4.2	0.78	**88%**
Reliability	98	4.4	0.77	**95%**	130	4.5	0.68	**95%**	91	4.4	0.74	92%
Frequency of scheduled outages	94	4.4	0.69	94%	126	4.4	0.64	93%	88	4.3	0.72	92%
Frequency of unanticipated outages	93	4.3	0.71	91%	124	4.4	0.66	92%	88	4.3	0.73	92%
Overall satisfaction with Lustre/Spider	98	4.3	0.80	91%	131	4.3	0.70	91%	91	4.3	0.75	89%

Support Services

Figure 8 shows how frequently respondents **submitted queries** to OLCF in 2017. Half submitted between 1 and 5, while **one-third had not submitted any queries at all.**

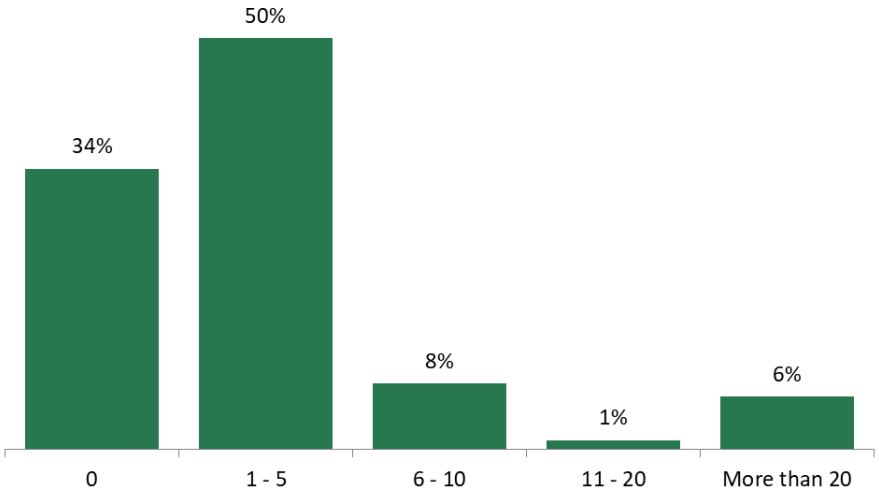

Figure 8. Distribution of number of queries submitted to OLCF in 2017 (*N* = 433)

User Assistance Center

Nearly all respondents that used the OLCF User Assistance (96%) were either *satisfied* or *very satisfied* (Table 20 and Table 21). Four respondents reported **reasons for dissatisfaction**:

Table 20. *Satisfaction Ratings of the User Assistance by PI Status and Overall*

	PI Status				Non-PI Status				Total			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Speed of initial response to queries	58	4.6	0.68	**93%**	182	4.6	0.64	95%	240	4.6	0.65	95%
Speed of final resolution to queries	58	4.6	0.63	**93%**	181	4.6	0.67	94%	239	4.6	0.66	94%
Quality of technical information	58	4.6	0.59	95%	179	4.5	0.72	**92%**	237	4.6	0.69	**93%**
Response to special requests (i.e., scheduling exceptions, quota increases, software installations, etc.)	50	4.6	0.73	**96%**	147	4.5	0.73	**92%**	197	4.5	0.73	**93%**
Overall support from User Assistance	58	4.6	0.65	95%	183	4.6	0.60	**97%**	241	4.6	0.61	**96%**

Table 21. *Satisfaction Ratings of the User Assistance by Project Allocation*

	INCITE				DD				ALCC			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Speed of initial response to queries	82	4.7	0.69	94%	150	4.6	0.63	95%	70	4.6	0.57	96%
Speed of final resolution to queries	82	4.6	0.73	94%	149	4.5	0.61	94%	70	4.5	0.63	96%
Quality of technical information	81	4.6	0.74	**91%**	149	4.6	0.65	95%	69	4.5	0.63	**93%**
Response to special requests (i.e., scheduling exceptions, quota increases, software installations, etc.)	70	4.5	0.83	**91%**	123	4.5	0.68	**93%**	54	4.6	0.63	96%
Overall support from User Assistance	82	4.6	0.66	**96%**	151	4.6	0.58	**97%**	70	4.6	0.55	**97%**

Account Management

22% of users utilized Account Management services in 2017 (*N* = 432). Users were asked to rate their satisfaction with two aspects of Account Management as well as provide an overall rating. Descriptive statistics for ratings by PI status and overall and by project allocation are shown in Table 22 and Table 23. Across categories of users, mean ratings for *speed of responses to account management queries*, *effectiveness of response to account management queries*, and *overall account services* were similar (all means between 4.5 and 4.7, with satisfaction percentages from 95% to 98%).

Two respondents reported these reasons for **dissatisfaction: "***Took too long for initial account setup,"* and *"Once logged in, the website will not load. I sent an email and never got an answer back."*

Table 22. *Descriptive Statistics for Satisfaction Ratings of Account Management by PI Status and Overall Totals*

	PI Status (*N* = 30)			Non-PI Status (*N* = 64)			Total (*N* = 94)		
	M	***SD***	**%Sat**	***M***	***SD***	**%Sat**	***M***	***SD***	**%Sat**
Speed of responses to queries	4.6	0.56	97%	4.6	0.85	95%	4.6	0.77	96%
Effectiveness of response to queries	4.6	0.56	97%	4.7	0.68	97%[1]	4.6	0.64	97%[2]
Overall support from accounts team	4.6	0.56	97%	4.6	0.81	95%	4.6	0.73	96%

[1]n = 63; [2]n= 93

Table 23. *Descriptive Statistics for Satisfaction Ratings of Account Management by Project Allocation*

	INCITE (*N* = 31)			DD (*N* = 56)			ALCC (*N* = 40)		
	M	***SD***	**%Sat**	***M***	***SD***	**%Sat**	***M***	***SD***	**%Sat**
Speed of responses to queries	4.6	0.81	97%	4.6	0.76	96%	4.7	0.53	98%
Effectiveness of response to queries	4.5	0.81	97%	4.6	0.53	98%[1]	4.7	0.53	98%
Overall support from accounts team	4.6	0.81	97%	4.6	0.71	96%	4.7	0.53	98%

[1]n = 55

INCITE Scientific Computing Liaisons

Just over a fifth (22%) of users (*N* = 430) indicated that their project has an assigned INCITE scientific computing liaison and Table 24 shows that 96% of respondents were overall either s*atisfied* or v*ery satisfied* with their liaison. PIs, however, were less satisfied than non-PIs across all aspects of INCITE Liaisons. When divided by project allocation, results tended to follow the overall trends (Table 25).

There were no users who indicated they were dissatisfied with INCITE liaisons, but one user who rated their satisfaction as *Neutral* provided the following comment:

> *"Some of the liaisons are just clearly overloaded. The more savvy you are, the less support you get - (squeaky wheels get more grease)."*

Table 24. *Descriptive Statistics for Satisfaction Ratings of INCITE Liaisons by PI Status and Overall Totals*

	PI Status				Non-PI Status				Total			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Speed of initial response to queries	14	4.5	0.65	93%	53	4.7	0.49	98%	67	4.7	0.53	97%
Speed of final resolution to queries	14	4.5	0.76	86%	52	4.7	0.51	98%	66	4.7	0.57	95%
Quality of technical support	14	4.4	0.76	86%	51	4.7	0.50	98%	65	4.6	0.57	95%
Response to special requests	14	4.4	0.76	86%	49	4.7	0.60	94%	63	4.6	0.64	92%
Overall support from your INCITE Scientific Computing Liaison	14	4.4	0.76	86%	53	4.7	0.51	98%	67	4.6	0.57	96%

Table 25. *Descriptive Statistics for Satisfaction Ratings of INCITE Liaisons by Project Allocation*

	INCITE				DD				ALCC			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Speed of initial response to queries	51	4.6	0.56	96%	26	4.7	0.55	96%	26	4.7	0.49	100%
Speed of final resolution to queries	50	4.6	0.60	94%	26	4.6	0.57	96%	25	4.6	0.58	96%
Quality of technical support	49	4.6	0.61	94%	26	4.6	0.57	96%	25	4.6	0.58	96%
Response to special requests	47	4.6	0.65	91%	25	4.4	0.77	84%	24	4.5	0.59	96%
Overall support from your INCITE Scientific Computing Liaison	51	4.6	0.61	94%	26	4.6	0.57	96%	25	4.6	0.58	96%

Communication with Users

As seen in Table 26 nearly all respondents (93%) were either *satisfied* or *very satisfied* with overall OLCF communication. Ratings for announcements on the OLCF website were lower than for email announcements in almost all categories of users (Table 26 and Table 27). One **dissatisfied respondent** provided this explanation: "*Will be good to have more details about changes of software stack in email."*

Table 26. *Satisfaction Ratings of Communication by PI Status and Overall Totals*

	PI Status				Non-PI Status				Total			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
E-mail announcements	75	4.5	0.74	92%	345	4.5	0.66	93%	420	4.5	0.67	93%
Announcements on the OLCF website	74	4.4	0.80	86%	301	4.4	0.68	90%	375	4.4	0.71	89%
Overall communication	76	4.4	0.72	93%	343	4.4	0.64	93%	419	4.4	0.66	93%

Table 27. *Satisfaction Ratings of Communications by Project Allocation*

	INCITE				DD				ALCC			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
E-mail announcements	146	4.5	0.68	93%	232	4.5	0.66	94%	145	4.4	0.73	90%
Announcements on the OLCF website	132	4.3	0.73	87%	211	4.4	0.70	90%	129	4.3	0.70	90%
Overall communication	146	4.4	0.65	95%	232	4.4	0.65	93%	144	4.4	0.66	93%

In addition, nearly all of the 430 users that responded felt **well informed** about OLCF *changes* (98%), *events* (99%), and *current issues* (97%). One user who indicated they were **not well informed** about OLCF changes commented, *"Changes regarding summit have been slow to trickle out."*

Five respondents provided feedback on communication about current issues:

"Usually this information came with some delay."

"Sometimes they delete files without informing. I would like to be informed."

"I don't think I ever heard a reason why those node failures last winter occurred, or what was done to fix it."

"A known issues list is always useful."

"Demands on my time preclude time to stay informed."

Training

Users were asked to provide satisfaction ratings for their overall satisfaction with OLCF training and five specific training aspects. 94% of respondents were overall either *satisfied* or *very satisfied* with the system. The *Getting Started Guide* was the highest rated specific aspect, while the *monthly user conference calls* were the lowest rated feature. This pattern was also observed regardless of PI status or project allocation (Table 28 and Table 29).

Table 28. *Satisfaction Ratings of Training Aspects by PI Status and Overall Totals*

	PI Status				Non-PI Status				Total			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Getting Started Guide	71	4.4	0.72	**93%**	319	4.4	0.62	**95%**	390	4.4	0.64	**94%**
Web tutorials	64	4.3	0.73	92%	269	4.3	0.66	91%	333	4.3	0.67	92%
Training events	48	4.4	0.67	90%	217	4.3	0.67	91%	265	4.3	0.67	91%
Archived training event slides	49	4.3	0.72	86%	227	4.3	0.72	87%	276	4.3	0.72	87%
Monthly user conference calls	44	4.2	0.76	**80%**	174	4.2	0.74	**84%**	218	4.2	0.74	**83%**
Overall satisfaction with OLCF training	73	4.4	0.71	**93%**	319	4.3	0.62	94%	392	4.3	0.64	**94%**

Table 29. *Satisfaction Ratings of Training Aspects by Project Allocation*

	INCITE				DD				ALCC			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Getting Started Guide	131	4.4	0.71	**95%**	220	4.4	0.59	95%	130	4.3	0.67	92%
Web tutorials	111	4.3	0.74	93%	191	4.3	0.62	92%	105	4.3	0.68	91%
Training events	92	4.3	0.71	91%	153	4.3	0.64	91%	87	4.3	0.62	92%
Archived training event slides	96	4.2	0.79	85%	155	4.3	0.67	88%	94	4.3	0.69	86%
Monthly user conference calls	71	4.2	0.80	**82%**	132	4.2	0.69	**85%**	74	4.2	0.72	**84%**
Overall satisfaction with OLCF training	129	4.3	0.70	**95%**	223	4.4	0.59	**96%**	135	4.3	0.64	**93%**

Two respondents who were **dissatisfied with training** provided the following comments: *"Why not record the audio for the archived training events?" and "I am only dissatisfied because of the lack of help and available knowledge around running molecular dynamics simulations on Titan."*

Respondents also reported their preferences with respect to **mode and timing of training**:

- The most popular modes of training were *online documentation* and *online training* (Figure 9)
- Although respondents had the option to suggest another mode of training that was not listed, no respondents did so.
- Most expressed *no preference* as to time of year (50%, *N* = 430), and among those with a preference, nearly two-thirds chose the summer (Figure 10).

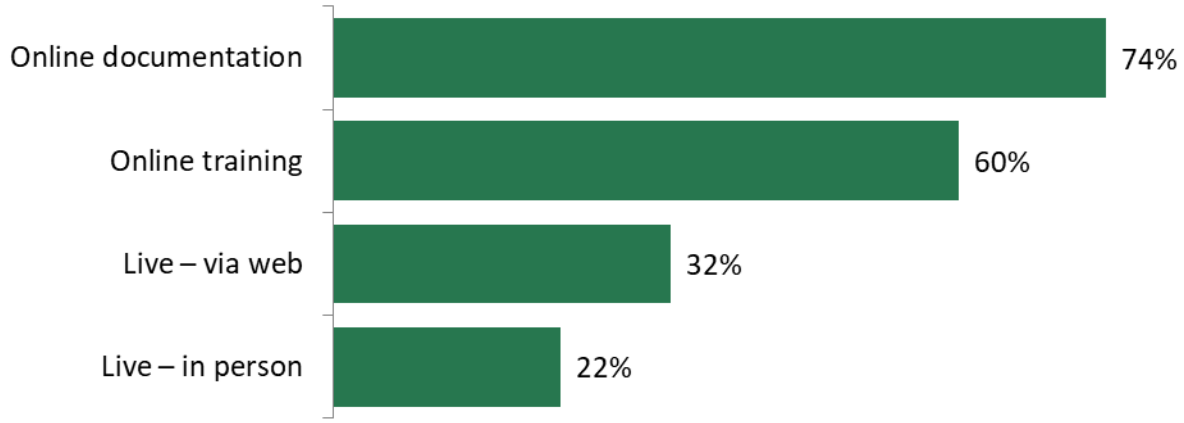

Figure 9. Training preferences of OLCF users (*N* =430)

Note: Percentages add to more than 100% because users could indicate multiple preferences.

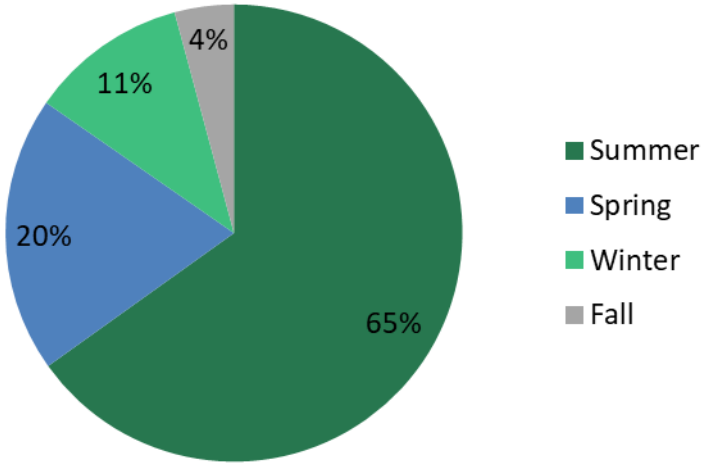

Figure 10. Most convenient time to attend a training event (*N* = 430), disregarding the 50% of respondents who indicated no preference

Finally, 127 respondents suggested future **training topics** in 30 categories (Table 30). The most frequently suggested topics were *GPU programming, performance tools/performance monitoring, debugging tools, parallelization*, and *Summit* (16%, 13%, 13%, 11%, and 9%, respectively). See Appendix F: User Suggestions for Improvement for all topic suggestions organized by category.

Table 30. *Users' Suggestions for Training Topics (N = 127)*

Topic	***n***	**Percentage**
GPU resources	20	16%
Performance tools/performance monitoring	17	13%
Debugging tools	16	13%
Parallelization/Parallel Profiling	14	11%
Summit	11	9%
Architecture	9	7%
Basic/Introductory training	9	7%
CUDA	7	6%
Coding/Code Optimization	7	6%
HPC resources	6	5%
OpenMP	6	5%
MPI	6	5%
OpenACC	5	4%
Satisfied with available training	4	3%
Molecular dynamics	4	3%
Data management and analysis	4	3%
CPU	3	2%
I/O	3	2%
Using containers	3	2%
Hackathon	3	2%
Machine learning	3	2%
Data Transfer	3	2%
Compiling	3	2%
Deep learning	3	2%
Visualization	3	2%
Configuration of personal software	2	2%
Artificial intelligence	2	2%
FPGA	2	2%
Scheduling policy	2	2%
Other	23	18%

Note: Users add up to more than 100% because some provided more than one theme in their response.

OLCF Website

Before indicating their satisfaction with various aspects of the website, users were asked how frequently they visit the OLCF website (http://olcf.ornl.gov), as displayed in Figure 11. The majority of users visit the website *monthly or less*, but no respondents indicated that they have never visited the site.

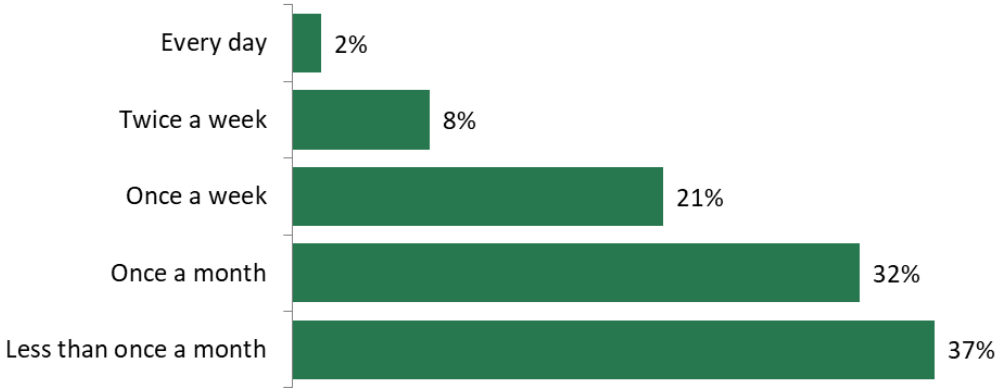

Figure 11. Frequency with which OLCF users visit the OLCF website (*N* =419)

Users rated general aspects of the website, as well as specific aspects of User Support resources available through the site. First, 94% of respondents were either s*atisfied* or v*ery satisfied* overall with the website support information (Table 31 and Table 32).

Table 31. *Descriptive Statistics for Satisfaction Ratings of Aspects of User Support on the OLCF Website by PI Status and Overall Totals*

	PI Status				Non-PI Status				Total			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
System user guides	75	4.4	0.75	93%	331	4.4	0.65	92%	406	4.4	0.67	93%
Software pages	72	4.3	0.77	90%	306	4.3	0.72	**87%**	378	4.3	0.73	**87%**
OLCF system status	74	4.4	0.62	96%	310	4.4	0.65	91%	384	4.4	0.65	92%
My OLCF	65	4.3	0.67	**89%**	278	4.3	0.69	90%	343	4.3	0.68	90%
Overall rating of User Support info	76	4.4	0.66	**97%**	335	4.4	0.63	**93%**	411	4.4	0.63	**94%**

Table 32. *Descriptive Statistics for Satisfaction Ratings of Aspects of User Support on the OLCF Website by Project Allocation*

	INCITE				DD				ALCC			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
System user guides	140	4.5	0.70	**94%**	228	4.4	0.66	92%	138	4.3	0.71	91%
Software pages	131	4.3	0.72	**91%**	211	4.2	0.74	**87%**	129	4.2	0.76	**85%**
OLCF system status	132	4.4	0.68	**91%**	217	4.4	0.62	93%	126	4.4	0.62	**93%**
My OLCF	119	4.4	0.67	92%	197	4.3	0.70	89%	117	4.3	0.66	90%
Overall rating of User Support info	141	4.4	0.66	**94%**	231	4.4	0.61	**94%**	139	4.3	0.66	92%

There were seven users who reported explanations for their **dissatisfaction with one or more aspects of website user assistance**. The most common complaint *was information that was difficult to find or interpret* (*n* = 3; see Appendix E: User Dissatisfaction Explanations for all comments by category).

> *"Section on compiling custom codes for GPUs was a bit confusing. Wondering if it would be possible to have some clear examples with some actual example pieces of software (not just the short snippets shown in the manual online)."*
>
> *"System status is a bit hard to find."*

Users were also asked to provide overall satisfaction ratings for the OLCF Website, and then specifically for several **usability** qualities: a) ease of navigation, b) accuracy of information, and c) timeliness of information. Table 33 shows that 92% of all respondents were either *satisfied* or *very satisfied* overall with the website. Table 34 summarizes these satisfaction statistics by project allocation. *Ease of navigation* was consistently the lowest-rated aspect of the website.

Table 33. *Satisfaction Ratings of OLCF Website by PI Status and Overall Totals*

	PI Status				Non-PI Status				Total			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Ease of navigation	77	4.3	0.80	**88%**	331	4.3	0.71	**86%**	408	4.3	0.73	**86%**
Accuracy of information	77	4.4	0.78	91%	332	4.4	0.65	**92%**	409	4.4	0.67	**92%**
Timeliness of information	75	4.4	0.73	**92%**	323	4.4	0.64	**92%**	398	4.4	0.65	**92%**
Overall satisfaction with the OLCF website	77	4.4	0.73	**92%**	332	4.4	0.62	**92%**	409	4.4	0.64	**92%**

Table 34. *Satisfaction Ratings of OLCF Website by Project Allocation*

	INCITE				DD				ALCC			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Ease of navigation	139	4.3	0.71	**89%**	230	4.3	0.70	**87%**	138	4.2	0.80	**82%**
Accuracy of information	140	4.4	0.73	90%	230	4.4	0.66	93%	138	4.3	0.70	**92%**
Timeliness of information	136	4.4	0.70	91%	226	4.4	0.63	92%	134	4.3	0.69	90%
Overall satisfaction with the OLCF website	140	4.4	0.67	**93%**	230	4.4	0.59	**94%**	138	4.3	0.68	91%

There were seven users who reported explanations for **their dissatisfaction with the website in an overall sense or with the usability of the website**. Complaints were equally divided between two overarching themes: *difficulty finding information* and *outdated information* on the site (see Appendix E: User Dissatisfaction Explanations for all comments by category).

Data Analysis and Visualization

Data analysis and visualization services were used by 5% (23 of 426) of respondents during the 2017 calendar year. Service users were asked for overall satisfaction ratings and ratings for multiple specific aspects of the data analysis and visualization support services (Table 35 and Table 36). Table 35 shows that 95% of respondents were overall either *satisfied* or *very satisfied* with the support they received. Responses from PIs differed somewhat from responses from non-PIs, although only 4 PIs responded. Satisfaction with support across the project allocations ranged from 80% to 100% (Table 36).

Satisfaction with several specific aspects of data analysis, visualization and workflow are summarized in Table 37 and Table 38 which show that satisfaction ranged

- from 78% to 82% across all respondents,
- from 74% to 79% for PIs, and
- from 70% to 87% across project allocations.

Users consistently gave the lowest ratings to the *sufficiency of available tools* for carrying out data analysis and visualization.

Table 35. *Descriptive Statistics for Satisfaction Ratings for Data Analysis and Visualization Support Services by PI Status and Overall Totals*

	PI Status				Non-PI Status				Total			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Speed of initial response to queries	4	4.5	1.00	75%	18	4.2	0.71	83%	22	4.2	0.75	82%
Speed of final resolution to queries	4	4.8	0.50	100%	18	4.2	0.71	83%	22	4.3	0.70	86%
Quality of technical support	4	5.0	0.00	100%	18	4.3	0.57	94%	22	4.4	0.59	95%
Overall support from the data analysis and visualization support personnel	4	4.8	0.50	100%	18	4.3	0.57	94%	22	4.4	0.58	95%

Table 36. *Descriptive Statistics for Satisfaction Ratings for Data Analysis and Visualization Support Services by Project Allocation*

	INCITE				DD				ALCC			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Speed of initial response to queries	10	4.3	0.82	80%	15	4.2	0.77	80%	6	4.2	0.75	83%
Speed of final resolution to queries	10	4.4	0.70	90%	15	4.3	0.70	87%	6	4.2	0.75	83%
Quality of technical support	10	4.5	0.71	90%	15	4.4	0.63	93%	6	4.3	0.52	100%
Overall support from the data analysis and visualization support personnel	10	4.4	0.70	90%	15	4.3	0.62	93%	6	4.3	0.52	100%

Table 37. *Descriptive Statistics for Satisfaction Ratings for Data Analysis, Visualization and Workflow by PI Status and Overall Totals*

	PI Status				Non-PI Status				Total			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Ability to perform data analysis	36	4.0	0.91	75%	155	4.2	0.73	**84%**	191	4.2	0.77	**82%**
Ability to perform project workflows	34	4.2	0.94	**79%**	146	4.1	0.74	83%	180	4.1	0.78	**82%**
Sufficiency of the OLCF hardware for your data analysis, visualization, and workflow needs	39	4.1	0.89	77%	157	4.2	0.71	82%	196	4.2	0.75	81%
Sufficiency of tools for your data analysis, visualization, and workflow needs	39	4.0	0.89	**74%**	159	4.1	0.79	**79%**	198	4.1	0.81	**78%**

Table 38. *Descriptive Statistics for Satisfaction Ratings for Data Analysis and Visualization, and Workflow by Project Allocation*

	INCITE				DD				ALCC			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Ability to perform data analysis	71	4.3	0.77	**87%**	116	4.2	0.70	**85%**	68	3.9	0.89	71%
Ability to perform project workflows	71	4.2	0.82	85%	107	4.1	0.70	83%	61	4.0	0.92	**74%**
Sufficiency of the OLCF hardware for your data analysis, visualization, and workflow needs	74	4.2	0.78	85%	117	4.2	0.70	82%	69	4.0	0.83	72%
Sufficiency of tools for your data analysis, visualization, and workflow needs	75	4.1	0.84	**81%**	118	4.1	0.75	**80%**	70	3.9	0.88	**70%**

Users were then asked to indicate where they analyze data produced by OLCF jobs. Figure 12 shows that the largest proportion of users analyzed all of their data "elsewhere" and the smallest proportion analyzed it all at OLCF.

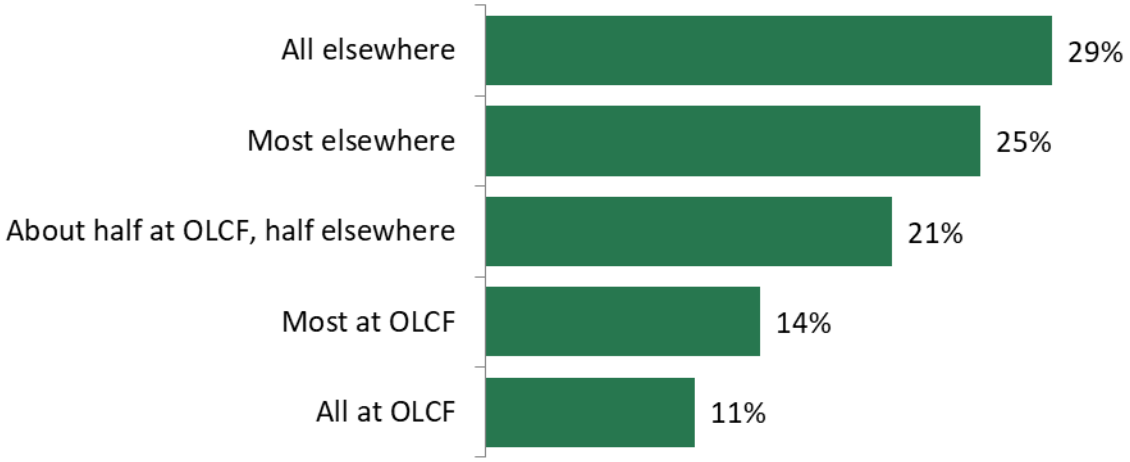

Figure 12. Locations for analysis of data produced by OLCF jobs (*N* = 355)

Data Services/Feature Priorities

In this section of the survey, users were asked to rate **the importance of 16 different data services/features**. While several of the options have been assessed before, four new options were added and were ranked by users for the first time on the 2017 survey; three items from the 2016 survey were removed.

Table 39 shows the *%Imp* (the percentage of respondents indicating *very important* or *extremely important*) for all respondents and broken down by both PI status and project allocation (color scale indicates relative magnitude: high-med-low = green-yellow-red). The table is sorted from top to bottom from the most important to the least important services/features. Examination of the table shows that regardless of respondent category, the **consistently most valued item** was *long-term data retention* (*%Imp* ranging from 53% to 69%). Generally, the **least valued item** was *Interactive analysis and/or integrated simulation including data from other experimental facilities* (ranging from 14% to 20%), with some distinctions by project allocation.

Table 40 and Table 41 show the same findings, but with greater detail, displaying not only *%Imp* but *M* and *SD* as well. *%Imp* ranged across all respondent categories from 13% to 69%. The rank-ordered importance of services/features across all respondents was mirrored very closely across PI status and project allocations, as above. Many of the items were consistently ranked as unimportant by 60%-80% of all respondents. In future years, some of the options in this question could be selected from the responses to the previous year's survey to focus this investigation on highly relevant features.

Table 39. *Data Service/Feature Importance (%Imp) Rankings*

	Total (*N* = 421)	PI (*N* = 77)	Non-PI (*N* = 344)	INCITE (*N* = 148)	DD (*N* = 233)	ALCC (*N* = 144)
Long-term data retention	58%	69%	56%	64%	59%	53%
Long-term data curation	43%	47%	43%	45%	46%	34%
Access for your specific OLCF project members to your data over the web	43%	39%	43%	43%	45%	40%
Access for collaborators to your data over the web	37%	30%	38%	37%	39%	33%
Access to databases at the OLCF	30%	30%	30%	30%	32%	22%
Out-of-the-box workflow tools/libraries	33%	29%	34%	29%	34%	28%
Remote visualization capability	34%	29%	35%	35%	33%	35%
The availability of utilizing Jupyter/IPython Notebook	26%	26%	26%	24%	29%	22%
General public access to your data over the web	20%	22%	20%	17%	24%	15%
Data management tools	28%	21%	30%	31%	30%	22%
Access to a large shared-memory system for data analysis & visualization	31%	21%	33%	32%	30%	29%
The availability of utilizing containers	22%	21%	22%	14%	28%	21%
Dedicated workflow machines	25%	19%	26%	26%	27%	18%
Access to a system with GPUs specifically for data analysis & visualization	25%	19%	27%	22%	28%	21%
Analysis and visualization assistance from the OLCF	19%	14%	21%	20%	21%	14%
Interactive analysis and/or integrated simulation including data from other experimental facilities	18%	14%	19%	18%	20%	13%
Min	**18%**	**14%**	**19%**	**14%**	**20%**	**13%**
Max	**58%**	**69%**	**56%**	**64%**	**59%**	**53%**

Table 40. *Data Service/Feature Importance by PI Status and Total (rank ordered by Total %Imp, high to low)*

	PI Status (*N* = 77)			Non-PI Status (*N* = 344)			Total (*N* = 421)		
	M	***SD***	**%Imp**	***M***	***SD***	**%Imp**	***M***	***SD***	**%Imp**
Long-term data retention	3.8	1.22	**69%**	3.5	1.10	**56%**	3.6	1.13	**58%**
Long-term data curation	3.2	1.35	47%	3.2	1.19	43%	3.2	1.22	43%
Access for your specific OLCF project members to your data over the web	2.9	1.45	39%	3.1	1.25	43%	3.1	1.29	43%
Access for collaborators to your data over the web	2.6	1.46	30%	2.9	1.24	38%	2.8	1.29	37%
Access to databases at the OLCF	2.7	1.43	30%	2.7	1.26	30%	2.7	1.29	30%
Out-of-the-box workflow tools/libraries	2.8	1.30	29%	2.9	1.23	34%	2.9	1.25	33%
Remote visualization capability	2.7	1.36	29%	2.8	1.30	35%	2.8	1.31	34%
The availability of utilizing Jupyter/IPython Notebook	2.5	1.40	26%	2.6	1.28	26%	2.6	1.30	26%
General public access to your data over the web	2.1	1.40	22%	2.3	1.22	20%	2.3	1.26	20%
Data management tools	2.6	1.23	21%	2.8	1.15	30%	2.8	1.17	28%
Access to a large shared-memory system for data analysis & visualization	2.7	1.20	21%	2.8	1.26	33%	2.8	1.25	31%
The availability of utilizing containers	2.4	1.34	21%	2.5	1.24	22%	2.5	1.26	22%
Dedicated workflow machines	2.5	1.29	19%	2.6	1.21	26%	2.6	1.22	25%
Access to a system with GPUs specifically for data analysis & visualization	2.5	1.28	19%	2.6	1.28	27%	2.6	1.28	25%
Analysis and visualization assistance from the OLCF	2.2	1.25	**14%**	2.5	1.22	21%	2.4	1.23	19%
Interactive analysis and/or integrated simulation including data from other experimental facilities	2.1	1.25	**14%**	2.4	1.21	**19%**	2.3	1.22	**18%**

Table 41. *Data Service/Feature Importance by Project Allocation*

	INCITE (*N* = 148)			DD (*N* = 233)			ALCC (*N* = 144)		
	M	***SD***	**%Imp**	***M***	***SD***	**%Imp**	***M***	***SD***	**%Imp**
Long-term data retention	3.6	1.13	**64%**	3.6	1.14	**59%**	3.5	1.13	**53%**
Long-term data curation	3.2	1.24	45%	3.2	1.24	46%	3.1	1.15	34%
Access for your specific OLCF project members to your data over the web	3.1	1.32	43%	3.1	1.30	45%	3.1	1.31	40%
Access for collaborators to your data over the web	2.9	1.26	37%	2.9	1.31	39%	2.8	1.28	33%
Access to databases at the OLCF	2.6	1.31	30%	2.8	1.30	32%	2.5	1.22	22%
Out-of-the-box workflow tools/libraries	2.7	1.22	29%	3.0	1.22	34%	2.7	1.24	28%
Remote visualization capability	2.8	1.40	35%	2.8	1.26	33%	2.9	1.27	35%
The availability of utilizing Jupyter/IPython Notebook	2.5	1.29	24%	2.7	1.33	29%	2.4	1.24	22%
General public access to your data over the web	2.4	1.18	17%	2.3	1.32	24%	2.2	1.16	15%
Data management tools	2.8	1.19	31%	2.9	1.16	30%	2.7	1.13	22%
Access to a large shared-memory system for data analysis & visualization	2.8	1.30	32%	2.8	1.20	30%	2.8	1.23	29%
The availability of utilizing containers	2.2	1.12	**14%**	2.7	1.31	28%	2.4	1.25	21%
Dedicated workflow machines	2.5	1.25	26%	2.7	1.22	27%	2.5	1.15	18%
Access to a system with GPUs specifically for data analysis & visualization	2.5	1.26	22%	2.7	1.27	28%	2.5	1.22	21%
Analysis and visualization assistance from the OLCF	2.4	1.27	20%	2.5	1.23	21%	2.3	1.11	14%
Interactive analysis and/or integrated simulation including data from other experimental facilities	2.3	1.24	18%	2.4	1.26	**20%**	2.2	1.12	**13%**

Longitudinal Comparisons of User Responses

This section reviews the results from the 2006 through 2017 OLCF User Surveys. In some cases this effort has been complicated by changes to the survey items over time, and these are noted throughout.

OLCF Users

Figure 15 shows that **length of time using OLCF** (i.e. experience as an OLCF user) reported by most survey respondents has changed substantially between 2006 and 2017. Prior to 2009, about half of respondents reported using OLCF less than one year, and this category comprised the largest proportion of users. However, between 2009 and 2011, the largest proportion of users indicated having greater than two years of experience at OLCF. In 2012, user experience shifted back to the largest proportion of users reporting using OLCF less than one year. From 2013 to present, users who have been with OLCF for more than 2 years once again make up the greatest proportion of users, and about half of respondents are in that category.

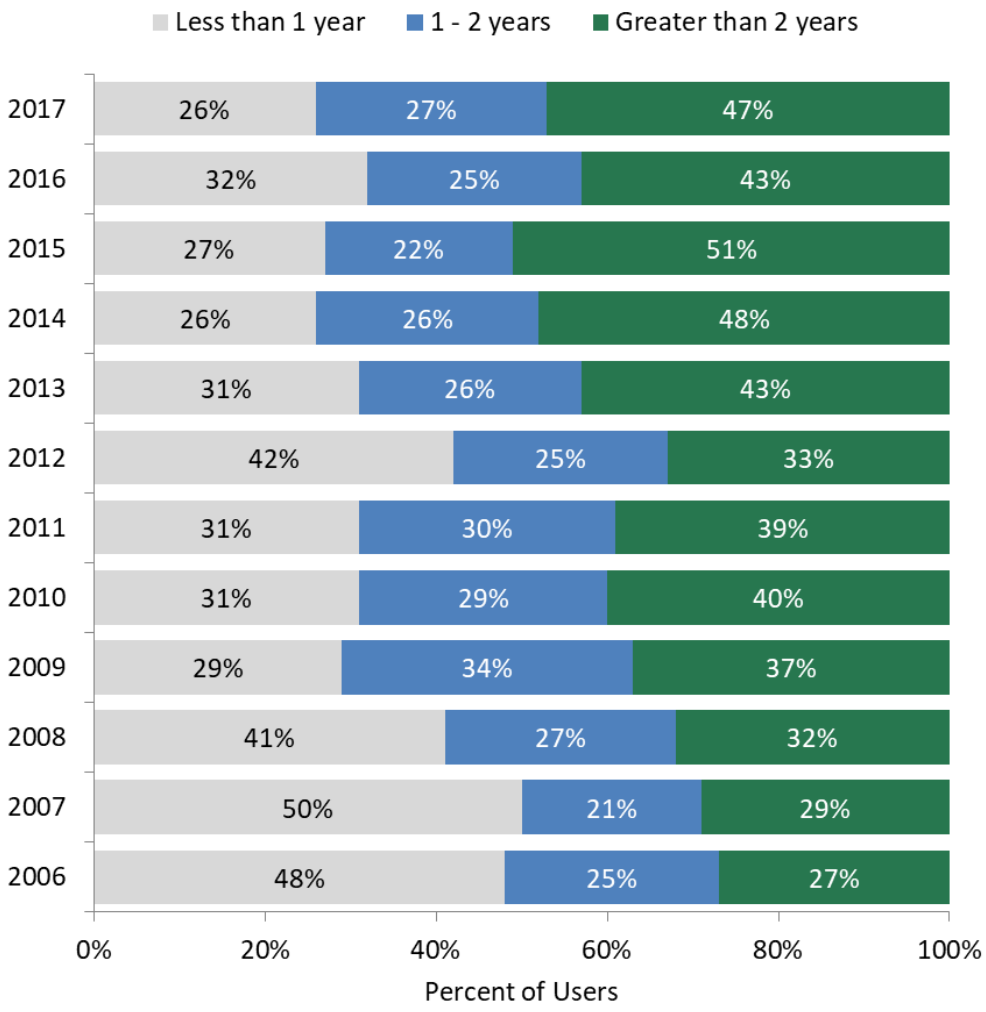

Figure 15. User years of experience with OLCF, 2006-2017.

With respect to **project classifications** (Figure 16), *survey respondent* data is available from 2007 to the present year, and OLCF data for *the entire pool of OLCF users* is available from 2014 to present. The figure shows these side-by-side and indicates that the distribution of respondents has tracked the overall potential sample well.

Generally,

- INCITE projects have shown a downward trend in share of both the respondent and the user pool.
- Director's Discretion projects remained relatively constant between 2007 and 2011 for respondents, and have generally trended upward since 2012.
- ASCR Leadership Computing Challenge (ALCC) supported projects began in 2010 and supported only 2% of respondents, but grew significantly from there. This group has changed little since 2014, making up approximately one-third of the OLCF pool.

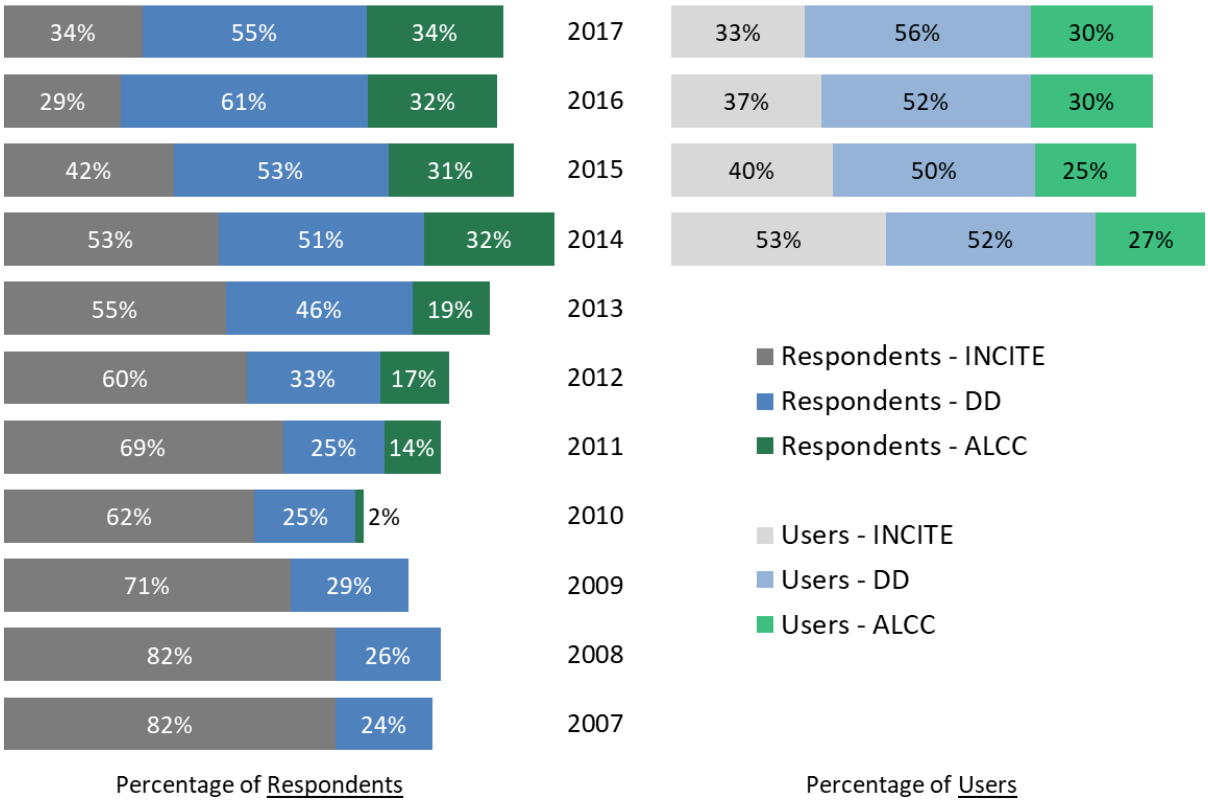

Figure 16. Respondent project allocations, 2007-2017, and OLCF user project allocations, 2014-2017
Note: Percentage total to more than 100% as users are often affiliated with multiple projects.

Please note that the 2014 and 2015 data values in Figure 16 have been corrected in this report.

Computer Systems Utilization

A significant change from 2007 to 2008 was the removal of the Hawk system and the addition of the Lens system to the survey. In 2009, the IBM BlueGene/P (Eugene) and Development (Smoky) platforms were added. In 2011, the IBM BlueGene/P (Eugene) was decommissioned. On March 8th of 2011 the XT4 Jaguar was decommissioned, and on September 13th of 2012 the XT5 Jaguar was transitioned to Titan. On January 8th of 2014, the Rhea system was made available to users with accounts on INCITE- or ALCC-supported projects and to users with Director's Discretion projects upon request. Shortly thereafter, on March 3rd of 2014, the Eos system was made available to all OLCF projects and prioritized as a support resource for projects running or preparing to run production and leadership capability jobs on Titan.

A large majority of the respondents in the first seven years used a Jaguar system. The percentage of Jaguar users increased each year since 2006; however since its transition to Titan, usage of the system has dropped from 2012 (97% using XT5 Jaguar PF) to 2017 (78% using Titan).

The visualization system (Lens) increased its percentage of users by 10% from 2008-2010 (20% to 30%), decreased by 5% in 2011 (25%), remained relatively stable at 26% in 2013, and was removed from the survey in 2014. The percentage of users who accessed the HPSS data storage system remained stable from 2006 to 2008 (32-34%), spiked in 2009 (38%), remained stable from 2010-2013 (35-37%), dropped to (33%) in 2014, remained stable in 2015 (34%), and dropped substantially to 26% in both 2016 and 2017. The Lustre/Atlas storage platform (referred to in the 2017 survey as Lustre/Spider for better name recognition among users) has trended downward over the last several years, and that continued in 2017 with a drop to 56% from 2016's usage rate of 67%.

Refer to Table 46 for systems usage over the past ten years.

Table 46. *Utilization of Compute Systems, 2006-2017*

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
X1E Phoenix	54%	29%	14%	-	-	-	-	-	-	-	-	-
XT3	73%	-	-	-	-	-	-	-	-	-	-	-
XT4 Jaguar		86%	92%	75%	78%	55%						-
XT5 Jaguar PF	-	-	-	74%	80%	94%	97%	-	-	-	-	-
Titan	-	-	-	-	-	-	-	85%	83%	84%	82%	78%
Eos	-	-	-	-	-	-	-	-	26%	21%	21%	20%
Rhea	-	-	-	-	-	-	-	-	20%	17%	24%	22%
Hawk	7%	7%	-	-	-	-	-	-	-	-	-	
Data Transfer Nodes	-	-	-	-	-	-	-	-	-	40%	33%	41%
HPSS	34%	32%	34%	38%	36%	37%	35%	35%	33%	34%	26%	26%
IBM BlueGene/P (Eugene)	-	-	-	11%	-	-	-	-	-	-	-	-
Development (Smoky)	-	-	-	5%	7%	5%	-	-	-	-	-	
Lustre/Atlas	-	-	-	-	-	-	45%	47%	77%	70%	67%	-
Lustre/Spider	-	-	-	-	-	-	-	-	-	-	-	56%
Lens	-	-	20%	29%	30%	25%	27%	26%	-	-	-	-

Note: Percentages total to more than 100% because users often utilize more than one system.

Support Services Utilization

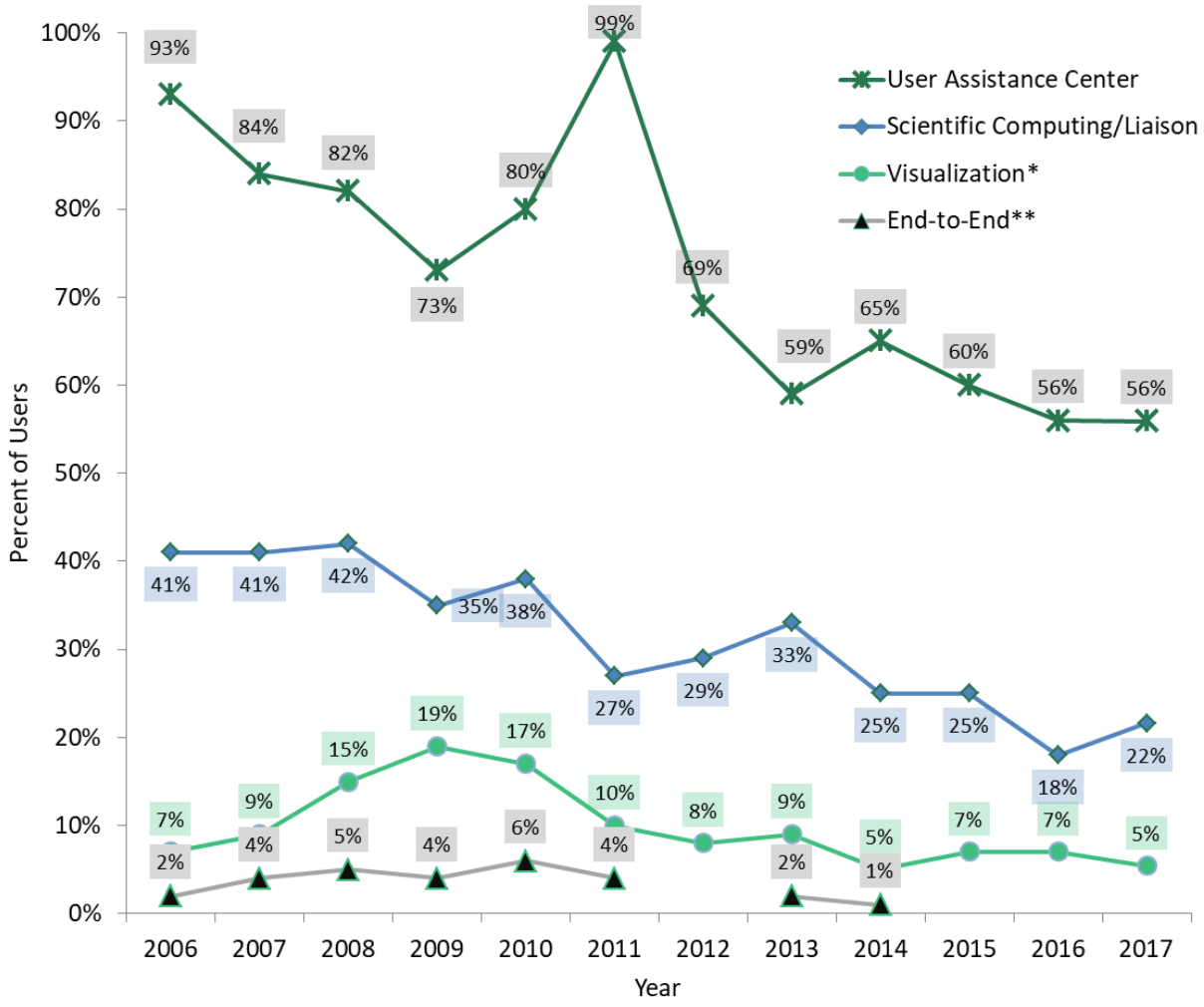

Figure 17. Utilization of support services, 2006-2017.

Notes:

*In 2017, users reported their usage of "Data Analysis and Visualization Support Services."

** End-to-End was not included in the 2012, or 2015-2017 surveys.

Figure 17 shows a drop in use of the User Assistance Center from 93% to 73% between 2006 and 2009, a large increase from 2009 to 2011 (+26 percentage points to 99%), a substantial decrease back to well below the 2009 level in 2015 (60%) and a further drop in 2016 (56%), with 2017 holding steady at 56%. Use of the scientific computing/liaison has decreased from 42% in 2008 to 27% in 2011, slightly increased to 33% in 2013, and dropped again to 25% for both 2014 and 2015, and dropped again in 2016 (18%) before rising to 22% in 2017. Use of data analysis and visualization support services saw a relatively large increase of 12 percentage points from 2006 to 2009 and a substantial decrease from 2009 to 2014 (-14 percentage points). Use of these services increased slightly in 2015 to 7%, and remained there in 2016, before dropping again to the 2014 level of 5% in 2017.

Use of end-to-end remained relatively stable between 2006 and 2011, but was not included in the survey in 2012. In 2013, end-to-end was added back to the survey and reported to be used by 2% of users as it was originally in 2006. In 2014, end-to-end use decreased by 1 percentage point to 1%. End-to-end was dropped from the survey again from 2015 through 2017.

Satisfaction with OLCF Overall

With regard to **overall satisfaction with OLCF**, the percent of *very satisfied* respondents has shown a nearly uninterrupted trend upward since 2007 in which the proportion has more than doubled to 69% in 2017 (Figure 18). The exceptions to this trend were moderate decreases in 2011 and 2012. The overall proportion of users indicating satisfaction (*satisfied* and *very satisfied* responses) has grown as well, from 91% in 2012 to 95-97% in each year from 2013 to 2017.

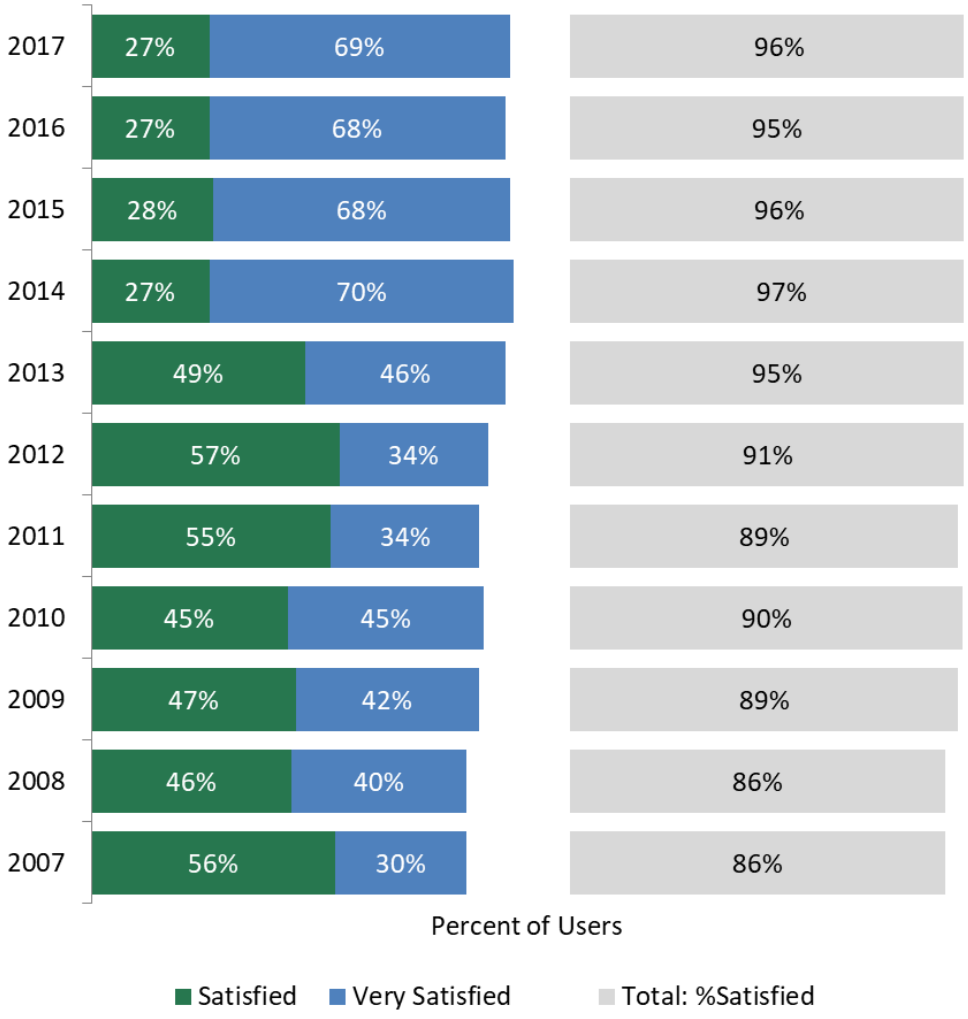

Figure 18. Proportion of respondents reporting being *satisfied* and *very satisfied* overall with OLCF, and the total of %Sat users.

Satisfaction with Compute Resources

Users were also asked to respond to a variety of questions about their opinions of the performance of the supercomputer systems of OLCF. First, respondents rated their satisfaction with the **ease of transferring data to/from OLCF**. The mean response to this question has grown since 2006 (3.8) and has been relatively stable at about 4.3 since 2014 (Figure 19).

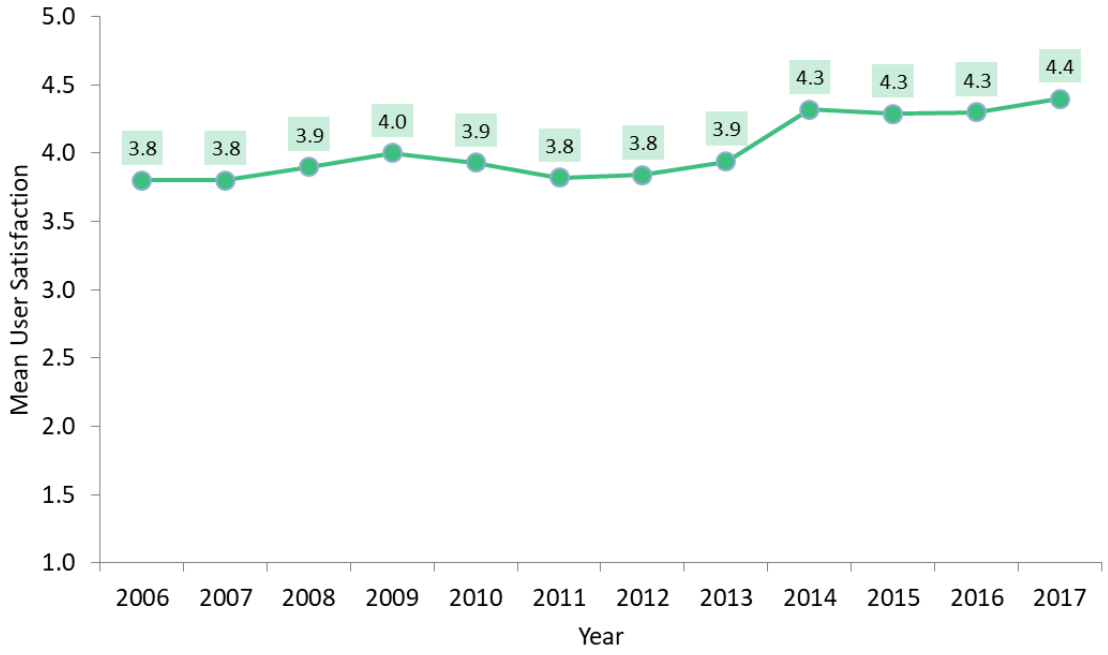

Figure 19. Ease of transferring data to and from OLCF, 2006 to 2017.
Note: Rating scale: 1 = Very Dissatisfied to 5 = Very Satisfied.

Users were also asked whether **sufficient notice was given prior to scheduled maintenance**. The responses in 2006 and 2007 were 97% and 98% "yes," respectively; however, this percentage dropped to 93% in 2009. In 2010 the survey changed, and users were asked to rate their satisfaction with the notice given prior to scheduled maintenance on a scale of 1 (*Very dissatisfied*) to 5 (*Very satisfied*) rather than a simple "yes" or "no." The mean response to this question has trended upward from 4.3 to 4.6 with a peak of 4.7 in 2014 (Figure 20).

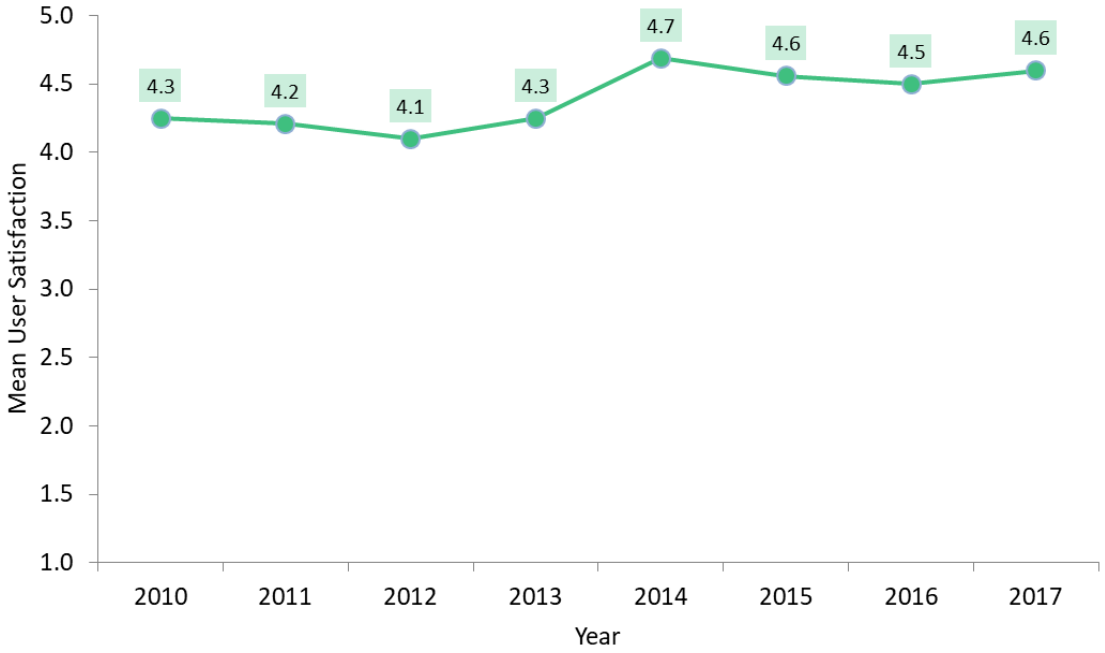

Figure 20. Sufficiency of notice given prior to scheduled maintenance, 2010 to 2017.
Note: Rating scale: 1 = Very Dissatisfied to 5 = Very Satisfied.

To gain further insight, each year through 2009, users were asked if **the level of scheduled and unanticipated outages** were acceptable (yes or no). The percentage of respondents indicating they felt the level of unanticipated outages was acceptable dropped from 68% in 2007 to 56% in 2008, but rose to 59% in 2009. Respondents who indicated they felt the frequency of scheduled outages was acceptable remained relatively stable from 2007 to 2008 (79% to 78%), but increased in 2009 (to 84%).

In 2011, the survey was changed to ask users to rate their satisfaction with the frequency of scheduled and unscheduled outages on a scale of 1 (*Very dissatisfied*) to 5 (*Very satisfied*) for each machine. User satisfaction with the frequency of scheduled Jaguar XT5 outages was unchanged from 2011 to 2012 (mean satisfaction = 3.6), while the mean satisfaction with the frequency of unscheduled (unanticipated) Jaguar XT5 outages was slightly better in 2012 (3.7) than in 2011 (3.5). Between 2013 and 2017, the mean satisfaction with the frequency of outages on Titan was relatively stable with modest increases, but (Figure 21), but these satisfaction scores were higher than the previous Jaguar system (see Table 46 for further history on use of systems over time). Since 2015, users have been just as satisfied with the frequency of *unscheduled* outages as with the frequency of anticipated, *scheduled* outages.

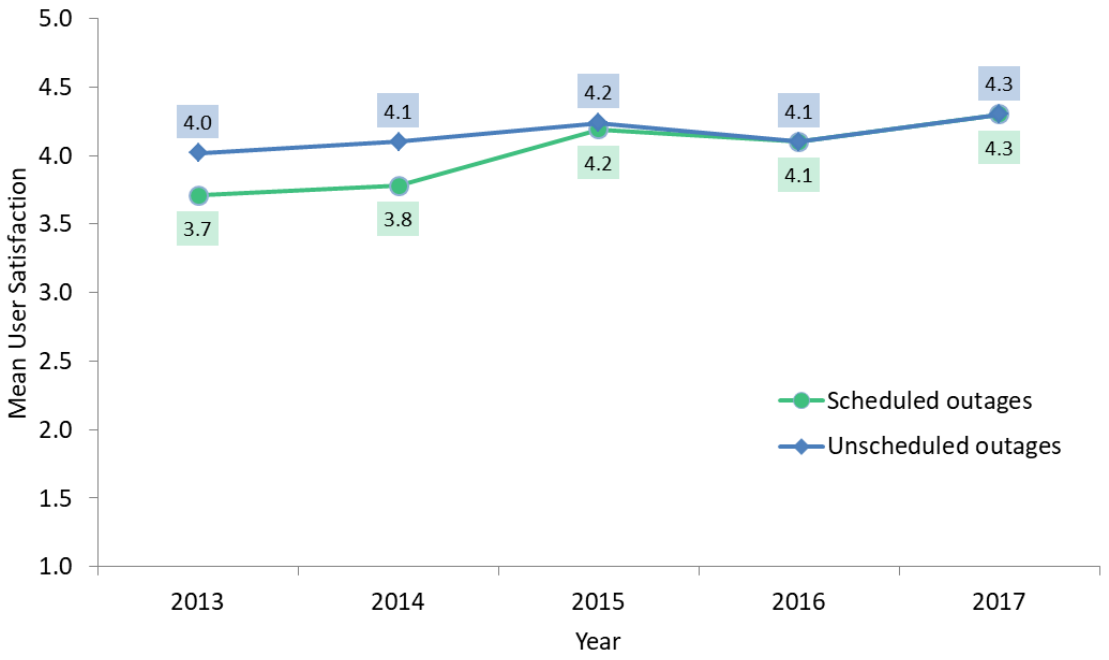

Figure 21. Mean satisfaction with the frequency of Titan scheduled and unscheduled outages, 2013-2017

Note: Rating scale: 1 = Very Dissatisfied to 5 = Very Satisfied.

Satisfaction regarding **sufficiency of project disk space** showed almost a 30 percentage point increase from 2007 to 2009 in the proportions indicating that their space was sufficient (Figure 22).

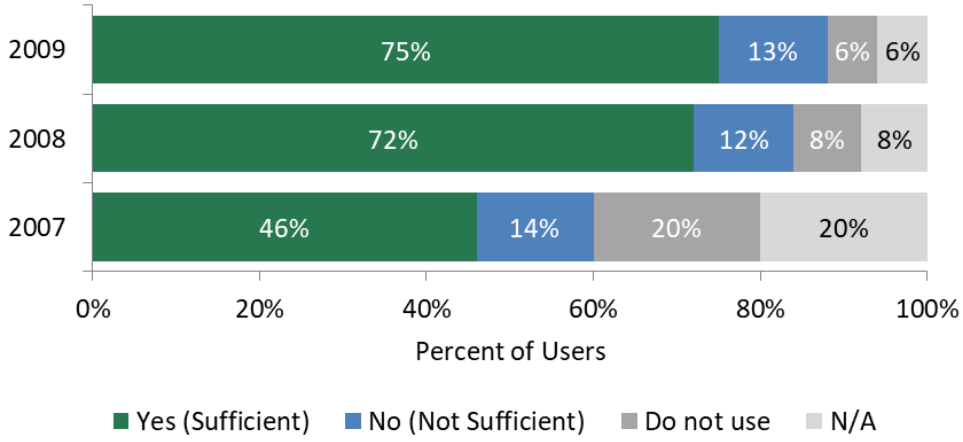

Figure 22. Reported sufficiency of the project disk space quota, 2007-2009

In 2010, this question was changed to utilize a point scale of 1 (*Very dissatisfied*) to 5 (*Very satisfied*). The mean rating remained stable from 2010 to 2013, and then increased in 2014; since then, the mean rating has been stable at this increased level (Figure 23).

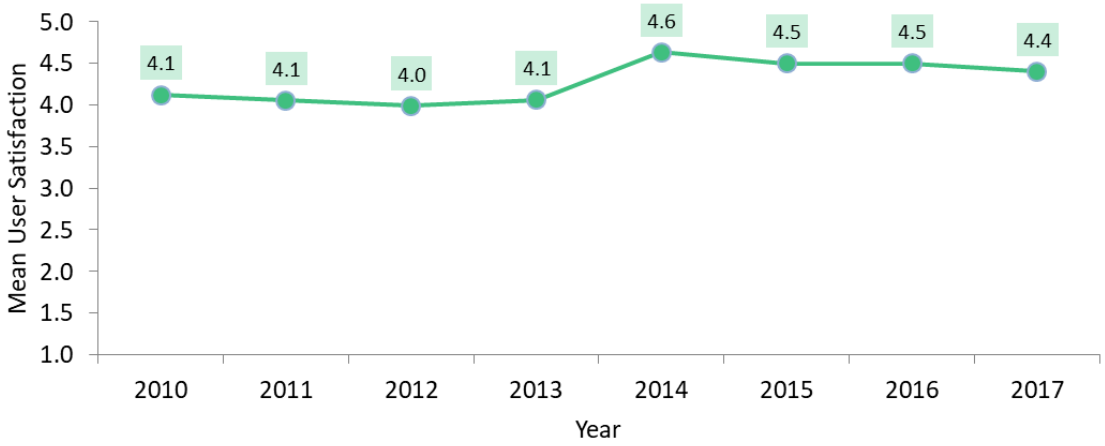

Figure 23. Mean satisfaction with the sufficiency of the project disk space quota, 2010-2017
Note: Rating scale: 1 = Very Dissatisfied to 5 = Very Satisfied.

User evaluation of the **XT3/XT4 platforms** revealed similar ratings after an overall increase from the 2006 survey (when the XT3 system was the latest platform) to the 2007 survey (XT4), but has decreased slightly since then (Table 47). The evaluation of the retired platform, the XT5, showed that users' satisfaction with the accessibility/usability of the batch queue system remained relatively stable from 2009 to 2011. In 2012, scratch disk size/performance and interface with HPSS were removed from this question (Table 48). Satisfaction ratings for accessibility/usability of the batch queue system and overall system performance remained relatively stable through the transition from XT5 to Titan.

The aspects of Titan evaluated on the survey received similar ratings in from 2014 to 2017 (Table 49). The proportions of respondents who were *satisfied* or *very satisfied* exceeded 80% for almost every rated dimension. The rare exceptions to this are highlighted in red text in Table 49, and there are some commonalities in these areas of concern from year to year.

Table 47. *Comparison of Evaluation of XT3/XT4 Jaguar, 2006-2011*

	Mean Rating					
	2006	**2007**	**2008**	**2009**	**2010**	**2011**
Scratch disk size/performance	3.4	**4.1**	**4.1**	4.0	**4.2**	**3.8**/3.7
Interface with HPSS	**4.0**	4.0	3.9	4.0	3.8	3.7
Accessibility/usability of batch queue system	3.6	4.0	4.0	**4.1**	4.0	**3.8/3.8**
Throughput/turnaround time of batch queue system	**3.1**	**3.7**	**3.6**	3.8	**3.7**	**3.6**
Overall system performance	3.3	4.0	3.9	4.0	4.0	**3.8**

Note: Scratch disk size/performance and accessibility/usability of the batch queue system were each separated into two survey items in 2011.

Table 48. *Comparison of Evaluation of XT5 Jaguar PF/Titan, 2009-2013*

	Mean Rating				
	2009	**2010**	**2011**	**2012**	**2013***
Scratch disk size/performance	**3.9**	**4.2**	**4.1**/3.9	NA	NA
Interface with HPSS	4.0	3.8	3.8	NA	NA
Accessibility/usability of batch queue system	**4.1**	3.9	4.0/4.0	4.2/4.2	4.1/4.1
Throughput/turnaround time of batch queue system	**3.9**	**3.7**	**3.7**	NA	NA
Overall system performance	**4.1**	4.0	4.0	4.2	4.1

Note: Scratch disk size/performance and accessibility/usability of the batch queue system were each separated into two survey items in 2011.

*From 2013 forward users rated Titan.

Table 49. *Evaluation of Titan 2014-2017*

	2014				2015				2016				2017			
	N	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**	***N***	***M***	***SD***	**%Sat**
Batch wait time	254	4.1	0.78	83%	254	4.0	0.83	80%	290	3.9	0.89	**72%**	338	4.2	0.85	83%
Batch queue structure	254	4.2	0.80	86%	253	4.2	0.71	87%	290	4.0	0.82	81%	336	4.2	0.74	87%
Job success rate	255	4.4	0.68	91%	255	4.4	0.69	90%	293	4.2	0.88	85%	338	4.3	0.86	88%
Frequency of scheduled outages	258	4.1	0.78	80%	252	4.2	0.74	84%	292	4.1	0.75	80%	335	4.3	0.70	90%
Frequency of unscheduled (unanticipated) outages	249	4.4	0.74	86%	245	4.2	0.69	86%	282	4.1	0.78	81%	328	4.3	0.72	87%
Performance tools	176	4.2	0.71	85%	177	4.3	0.72	87%	205	4.2	0.73	86%	241	4.2	0.76	83%
Debugging tools	170	4.4	0.83	**77%**	162	4.2	0.74	82%	191	4.2	0.71	85%	223	4.1	0.80	**79%**
Data analysis software	141	4.2	0.78	**79%**	148	4.0	0.75	**77%**	171	4.1	0.79	80%	185	4.1	0.76	**79%**
Software/libraries	241	4.4	0.72	91%	237	4.3	0.74	89%	271	4.3	0.75	87%	328	4.3	0.78	87%
Programming environment	237	4.4	0.68	92%	232	4.3	0.74	88%	263	4.3	0.70	90%	325	4.3	0.76	88%
Scratch configuration	243	4.3	0.67	90%	239	4.3	0.68	88%	265	4.2	0.73	86%	315	4.3	0.74	88%
I/O performance	243	4.2	0.80	84%	242	4.2	0.71	86%	269	4.2	0.79	84%	322	4.3	0.71	90%
Overall satisfaction with Titan	257	4.5	0.58	**96%**	257	4.5	0.55	**97%**	299	4.4	0.69	**93%**	342	4.4	0.63	**95%**

Satisfaction with Support Services

The proportion of respondents that reporting making **no inquiries to the User Assistance Center** (UAC) has varied over the years, but the majority have always reported making from 1 to 5 inquiries in a year (from 50% to 63%; Figure 24). Users reporting no inquiries to the UAC have also made up a substantial proportion, ranging from a low of 22% in 2008 to a high of 34% in 2013 and 2017. The proportion making more than 20 inquiries has never been greater than 6%. UAC users have rated the service similarly over the years, with mean satisfaction ratings of various aspects ranging between 4.1 and 4.7 (Table 50). Ratings for all service dimensions in 2017 were as high as or higher than previous years with exception of 2014, and with the exception of the 2017 rating for responses to special requests.

The most complete data with respect to satisfaction with the OLCF website(s) is available for timeliness of site information, the ease of finding information (i.e., site organization), the accuracy of information, and the OLCF system status information (note that in 2013, the Users' website was moved to a page within the main website). Mean satisfaction ratings have varied between 3.8 and 4.5, with slight increasing trends for all of these site dimensions (Table 51).

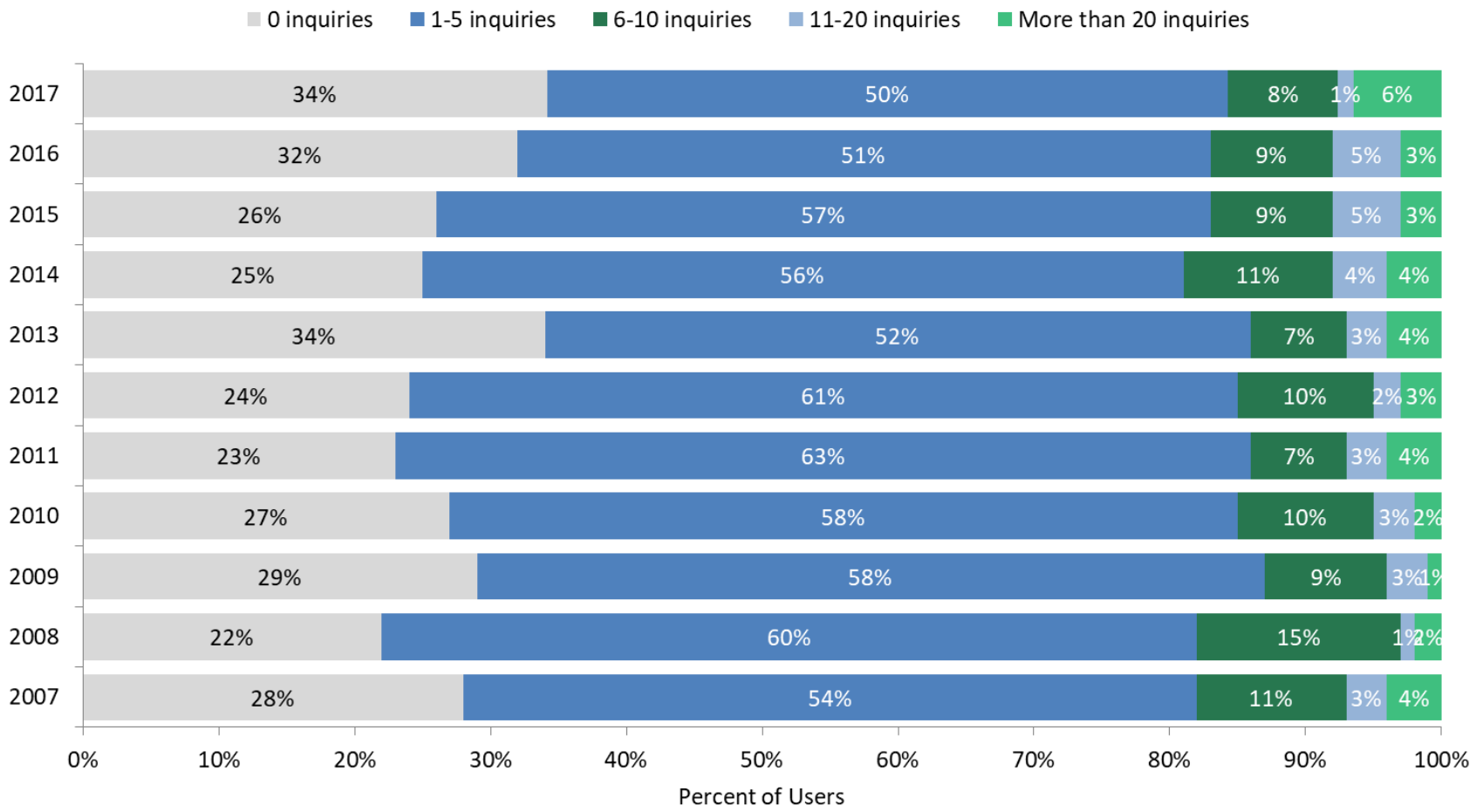

Figure 24. Proportions of respondents reporting various frequencies of User Assistance Center queries, 2007-2017

Suggested Improvements for HPC Resources

Table 52 presents a summary of the types of suggestions made by users to **increase the quality of their experience using data and compute resources**. The categories with the highest relative proportion of users contributing to them are in green/bold type.

Note that because this question is open-ended, some users who do not have a suggestion may still use the available space to indicate overall satisfaction, while other satisfied users may skip the question or enter a minor suggestion. As a result, the percentage of users indicating satisfaction is not easily comparable across years and is not representative of overall satisfaction.

The table shows that just three suggestion categories have appeared (as the most often suggested) more than once, and that none of these have appeared for more than two consecutive years:

- Queuing policy/faster queues (2009, 2010, 2015),
- Reliability/stability/uptime of systems (2007, 2008), and
- Miscellaneous/Other (2012, 2013, 2016).

In short, this pattern suggests that OLCF staff members are highly responsive to user suggestions, as users' areas of concern do not persist through the next year. The *queuing policy* is consistently mentioned by a significant fraction of users, while concerns about *performance* ebb and flow from year to year. The *miscellaneous/other category* is expected to come up each year as there are always users who provide unique feedback that does not fall easily into other categories. Other categories reflect topics that OLCF staff members should be able to address or that ongoing maintenance, upgrades, and resource additions will address over time.

Table 52. *Suggestions for How the OLCF Staff Can Improve Users' Computing Experience, 2007-2017*

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016†	2017
Satisfied	16%	12%	10%	8%	31%	15%	26%	21%	41%	33%	34%
Queuing policy/faster queues	6%	12%	**16%**	**22%**	0%	9%	17%	9%*	**11%**	9%	11%
Updates to data retention/purge policy and procedures	0%	0%	3%	6%	3%	15%	0%	5%	10%	6%	6%
Make more tools available	0%	0%	0%	0%	0%	0%	4%	8%	8%	4%	**18%**
File systems and data transfer	2%	2%	0%	3%	0%	0%	0%	**13%**	6%	4%	3%
Performance	0%	0%	8%	5%	0%	21%	9%	10%	5%	5%	12%
Miscellaneous/Other	17%	7%	5%	5%	8%	**30%**	**26%**	9%	4%	**11%**	4%
Improve storage/Memory	5%	0%	5%	8%	9%	0%	0%	3%	4%	4%	7%
More documentation	4%	4%	0%	0%	3%	6%	0%	11%	4%	4%	7%
Reliability/stability/uptime of systems	**25%**	**17%**	7%	16%	0%	15%	13%	3%	3%	6%	3%
Training/Instructional resources	0%	0%	8%	5%	0%	0%	0%	0%	2%	1%	2%
Support issues	6%	6%	0%	5%	8%	15%	4%	7%	1%	1%	1%
Software issues	16%	5%	6%	8%	10%	6%	0%	7%	0%	4%	5%
Administrative issues	2%	5%	0%	2%	11%	0%	0%	0%	0%	7%	5%
More attention to small jobs	0%	6%	0%	0%	0%	0%	0%	0%*	0%	3%	3%
Improve debugging	0%	5%	5%	0%	0%	0%	0%	0%	0%	1%	n/a
Allow more computing time/walltime	0%	4%	4%	10%	0%	0%	0%	0%*	0%	3%	11%
Install better compilers	0%	2%	0%	0%	0%	0%	0%	0%	0%	1%	n/a
GPU Resources	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2%	4%
Don't know	0%	0%	8%	0%	0%	0%	0%	0%	0%	n/a	n/a
Help with codes	0%	0%	8%	0%	0%	0%	0%	0%	0%	n/a	n/a
Maintenance	0%	0%	6%	0%	0%	0%	0%	0%	0%	n/a	2%
Not applicable**	0%	0%	7%	12%	**13%**	**0%**	0%	0%	n/a	n/a	n/a

Note: In 2012, this question was changed to "Please describe how the OLCF can improve your computing experience." In 2014, this question was changed to "Please describe how the OLCF can improve your experience using any of the HPC resources (i.e., Titan, Eos, Rhea, DTNs, HPSS, Lustre/Spider) and/or tell us if any additional resources are needed."

*This theme was combined with 'queuing policy/faster queues' and 'allow more computing time/walltime' in 2014 as 'Review queue and walltime policies.'

**"Not applicable" responses were not included in this table from 2014 forward.

†Please note that the 2016 data values in Table 52 have been corrected in the 2017 report based on a re-examination of the 2016 open-ended responses.

Appendices

Appendix B: Survey Administration Timeline

Survey Timeline	Date	Day	# of Responses	% of Responses (*N* = 448)	Cumulative %age of Responses	Description of Reminder
Day 1	4-Oct	Wed	8	1.8%	1.8%	Initial survey invitation email sent from Ashley Barker, Group Leader, User Assistance and Outreach, NCCS
Day 2	5-Oct	Thurs	35	7.8%	9.6%	
Day 3	6-Oct	Fri	12	2.7%	12.3%	
Day 4	7-Oct	Sat	2	0.4%	12.7%	
Day 5	8-Oct	Sun	3	0.7%	13.4%	
Day 6	9-Oct	Mon	7	1.6%	15.0%	
Day 7	10-Oct	Tues	4	0.9%	15.8%	
Day 8	11-Oct	Wed	3	0.7%	16.5%	
Day 9	12-Oct	Thurs	1	0.2%	16.7%	
Day 10	13-Oct	Fri	2	0.4%	17.2%	
Day 13	16-Oct	Mon	1	0.2%	17.4%	
Day 14	17-Oct	Tues	2	0.4%	17.9%	
Day 15	18-Oct	Wed	2	0.4%	18.3%	
Day 16	19-Oct	Thurs	44	9.8%	28.1%	Reminder email sent to users who had not responded from Sonya Mowery on behalf of Jack Wells, Director of Science, OLCF, ORNL
Day 17	20-Oct	Fri	29	6.5%	34.6%	
Day 18	21-Oct	Sat	2	0.4%	35.0%	
Day 19	22-Oct	Sun	1	0.2%	35.3%	
Day 20	23-Oct	Mon	8	1.8%	37.1%	
Day 21	24-Oct	Tues	5	1.1%	38.2%	
Day 22	25-Oct	Wed	9	2.0%	40.2%	
Day 23	26-Oct	Thurs	3	0.7%	40.8%	
Day 24	27-Oct	Fri	1	0.2%	41.1%	
Day 25	28-Oct	Sat	1	0.2%	41.3%	
Day 27	30-Oct	Mon	31	6.9%	48.2%	Reminder email sent to users who had not responded from Ashley Barker, Group Leader, User Assistance and Outreach, NCCS
Day 28	31-Oct	Tues	16	3.6%	51.8%	
Day 29	1-Nov	Wed	5	1.1%	52.9%	
Day 30	2-Nov	Thurs	16	3.6%	56.5%	
Day 31	3-Nov	Fri	3	0.7%	57.1%	
Day 32	4-Nov	Sat	1	0.2%	57.4%	
Day 33	5-Nov	Sun	3	0.7%	58.0%	
Day 34	6-Nov	Mon	29	6.5%	64.5%	Reminder email sent to users who had not responded from the OLCF User Group Executive Council
Day 35	7-Nov	Tues	11	2.5%	67.0%	
Day 36	8-Nov	Wed	1	0.2%	67.2%	
Day 37	9-Nov	Thurs	4	0.9%	68.1%	
Day 38	10-Nov	Fri	4	0.9%	69.0%	
Day 39	11-Nov	Sat	3	0.7%	69.6%	
Day 40	12-Nov	Sun	1	0.2%	69.9%	
Day 41	13-Nov	Mon	2	0.4%	70.3%	

Survey Timeline	Date	Day	# of Responses	% of Responses (*N* = 448)	Cumulative %age of Responses	Description of Reminder
Day 42	14-Nov	Tues	1	0.2%	70.5%	
Day 43	15-Nov	Wed	62	13.8%	84.4%	Reminder emails sent to PI's and users who had not responded from Ashley Barker, Group Leader, User Assistance and Outreach, NCCS
Day 44	16-Nov	Thurs	9	2.0%	86.4%	
Day 45	17-Nov	Fri	2	0.4%	86.8%	
Day 46	18-Nov	Sat	1	0.2%	87.1%	
Day 47	19-Nov	Sun	4	0.9%	87.9%	
Day 48	20-Nov	Mon	1	0.2%	88.2%	
Day 50	22-Nov	Wed	11	2.5%	90.6%	Reminder emails sent to users who had not responded from Ashley Barker, Group Leader, User Assistance and Outreach, NCCS
Day 51	23-Nov	Thurs	2	0.4%	91.1%	
Day 53	25-Nov	Sat	2	0.4%	91.5%	
Day 54	26-Nov	Sun	1	0.2%	91.7%	
Day 55	27-Nov	Mon	25	5.6%	97.3%	
Day 56	28-Nov	Tues	7	1.6%	98.9%	
Day 57	29-Nov	Wed	2	0.4%	99.3%	
Day 61	3-Dec	Sun	1	0.2%	99.6%	
Day 63	5-Dec	Tues	2	0.4%	100.0%	

Note. Days during which no OLCF users responded to the survey are not included.

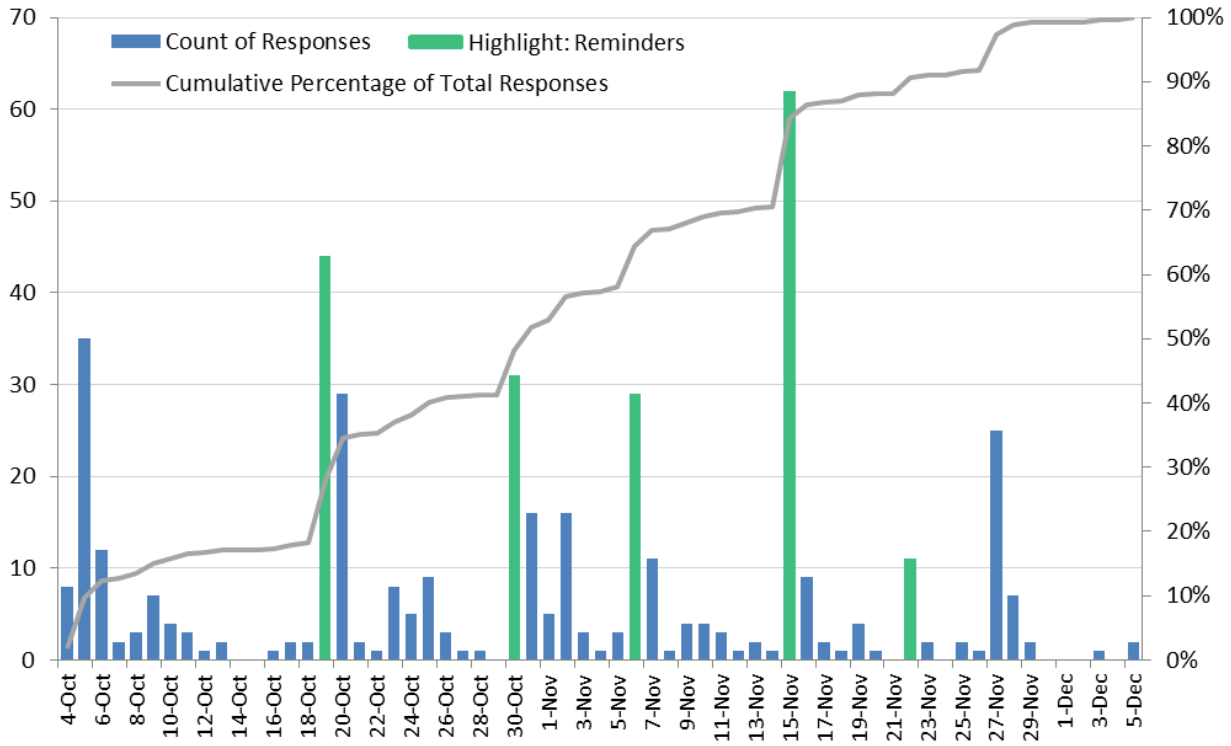

Figure 25. 2017 user survey responses over time with reminder dates highlighted

Appendix C: Survey

Key:
* - Question is required
Blue – Only visible by those who make selection to a previous question
Green – Identifies where a skip is occurring
[Text box] – open-ended question

OLCF 2017 User Survey

This survey is conducted by Oak Ridge Institute of Science and Education (ORISE) staff to provide the Oak Ridge Leadership Computing Facility (OLCF) with valuable information. Your name will not be associated with any responses given unless you grant specific permission to ORISE to share the data. Thank you in advance for your time and feedback.

Section I: User Demographics

1. Name and username* [Text box]
   First name:_____
   Last name:_____
   Username: _____

2. E-mail address: *

3. The OLCF takes your feedback very seriously. In some cases, it might be necessary for OLCF staff to contact you for more information in order to address specific issues indicated in your survey responses. If this situation arises, please indicate below if you grant your permission for ORISE to release your identity to OLCF staff. *
   - Yes, ORISE can release my name to OLCF staff.
   - No, ORISE cannot release my name to OLCF staff.

4. How long have you been an OLCF user? *
   - Less than 1 year
   - 1-2 years
   - Greater than 2 years

Section II: Overall Satisfaction with the OLCF

5. Rate your satisfaction with the following: *	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
Overall satisfaction with the OLCF						
Overall satisfaction with OLCF compute resources (Titan, Rhea, and Eos)						
Overall satisfaction with OLCF data resources (Spider, HPSS, DTNs, etc.)						
Overall satisfaction with OLCF services (support, training, communications, website, etc.)						

6. If you rated any of the item(s) in the previous question with “Very dissatisfied” or “Dissatisfied,” please explain your rating. [Text box]

Section III: OLCF HPC Resources

7. Please rate your overall satisfaction with the following aspects of OLCF HPC compute and data resources: *	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
Sufficient notice given prior to scheduled maintenance						
Sufficient project disk space						
Ease of transferring data to/from the OLCF						
Bandwidth offered by the OLCF						

8. If you rated any aspect(s) of OLCF computer and data resources in the previous question with "Very dissatisfied" or "Dissatisfied", please explain your rating. [Text box]

9. Compared to the previous year, which of the following statements best reflects your opinion regarding the performance of OLCF compute and data resources?*
   - I have noted overall improvements in the performance of OLCF compute and data systems.
   - The performance of OLCF compute and data systems is about the same as it was last year.
   - I have noted overall decreases in performance of the OLCF compute and data systems.

10. (If third option from previous question is selected) Please explain. * [Text box]

Online Survey Page 2

Titan

1. Did you utilize Titan during the 2017 calendar year? *
   - Yes
   - No (skip to question 4)

2. Rate your satisfaction with the following aspects of Titan: *	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
Batch wait time						
Batch queue structure						
Job success rate						
Frequency of scheduled outages						
Frequency of (unanticipated) unscheduled outages						
Performance tools						
Debugging tools						
Data analysis software						
Software/libraries						
Programming environment						
Scratch configuration						
I/O performance						
Overall satisfaction with Titan						

3. If you rated any aspect(s) of Titan in the previous question with "Very dissatisfied" or "Dissatisfied," please explain your rating. [Text box]

Eos

4. Did you utilize Eos during the 2017 calendar year? *
   - Yes
   - No (skip to question 7)

5. Rate your satisfaction with the following aspects of Eos: *	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
Batch wait time						
Batch queue structure						
Job success rate						
Frequency of scheduled outages						
Frequency of (unanticipated) unscheduled outages						
Performance tools						
Debugging tools						
Data analysis software						
Software/libraries						
Programming environment						
Scratch configuration						
I/O performance						
Overall satisfaction with Eos						

6. If you rated aspect(s) of Eos in the previous question with "Very dissatisfied" or "Dissatisfied," please explain your rating. [Text box]

Rhea

7. Did you utilize Rhea during the 2017 calendar year? *
   - Yes
   - No (skip to question #1 – Data transfer nodes)

8. Rate your satisfaction with the following aspects of Rhea: *	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
Batch wait time						
Batch queue structure						
Job success rate						
Frequency of scheduled outages						
Frequency of (unanticipated) unscheduled outages						
Performance tools						
Debugging tools						
Data analysis software						
Software/libraries						
Programming environment						
Scratch configuration						
I/O performance						
Overall satisfaction with Rhea						

9. If you rated aspect(s) of Rhea in the previous question with "Very dissatisfied" or "Dissatisfied," please explain your rating. [Text box]

Survey Page 3

Data Transfer Nodes

1. Did you utilize Data Transfer Nodes during the 2017 calendar year? *
   - Yes
   - No (skip to question 4)

2. Rate your satisfaction using Data Transfer Nodes during the 2017 calendar year. *
   a. Very satisfied
   b. Satisfied
   c. Neutral
   d. Dissatisfied
   e. Very dissatisfied

3. If you rated the Data Transfer Nodes in the previous question with "Very dissatisfied" or "Dissatisfied," please explain your rating. [Text box]

HPSS

4. Did you utilize HPSS during the 2017 calendar year? *
   a. Yes
   b. No (skip to question 7)

5. If you utilized HPSS during the 2017 calendar year, rate your satisfaction with the following aspects: *	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
hsi interface						
htar interface						
Ability to store files						
Ability to retrieve files						
Reliability (data integrity)						
Time to store files						
Time to retrieve files						
Frequency of scheduled outages						
Frequency of (unanticipated) unscheduled outages						
Overall satisfaction with HPSS						

6. If you rated aspect(s) of HPSS in the previous question with "Very dissatisfied" or "Dissatisfied," please explain your rating. [Text box]

Lustre/Spider Scratch Filesystem

7. Did you utilize Lustre/Spider Scratch Filesystem during the 2017 calendar year? *
   a. Yes
   b. No (skip to question 10)

8. If you utilized Lustre/Spider Scratch Filesystem during the 2017 calendar year, rate your satisfaction with the following aspects: *	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
Size						
I/O bandwidth						
File and directory operations						
Reliability (data integrity)						
Frequency of scheduled outages						
Frequency of (unanticipated) unscheduled outages						
Overall satisfaction with Lustre/Spider filesystem						

9. If you rated any of the item(s) in the previous question with "Very dissatisfied" or "Dissatisfied," please explain your rating. [Text box]

Improving HPC Resources

10. Please describe how the OLCF can improve your experience using any of the HPC resources (i.e., Titan, Eos, Rhea, DTNs, HPSS, Lustre/Spider) and/or tell us if any additional resources are needed. *

Survey Page 4

Section IV: OLCF Services

1. Approximately how many total queries have you submitted (via phone or email) to the OLCF during the 2017 calendar year?*
   - 0
   - 1-5
   - 6-10
   - 11-20
   - Greater than 20

User Assistance

2. Have you utilized the User Assistance Center (help@olcf.ornl.gov or (865)241-6536) during the 2017 calendar year? *
   - Yes
   - No (skip to question 5)

3. Rate your satisfaction with the following aspects of the User Assistance (help@olcf.ornl.gov or (865)241-6536): *	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
Speed of initial response to queries						
Speed of final resolution to queries						
Quality of technical information						
Response to special requests (e.g., scheduling exceptions, quota increases, software installations, etc.)						
Overall support from user assistance						

4. If you rated any of the item(s) in the previous question with "Very dissatisfied" or "Dissatisfied," please explain your rating. [Text box]

Account Management

5. Have you utilized Account Management services during the 2017 calendar year? *

- Yes
- No (skip to question 8)

6. Rate your satisfaction with the following aspects of Accounts and Allocations: *	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
Speed of responses to account management queries						
Effectiveness of response to account management queries						
Overall support from accounts team						

7. If you rated any of the item(s) in the previous question with "Very dissatisfied" or "Dissatisfied," please explain your rating. [Text box]

INCITE Scientific Computing Liaisons

8. Does your project have an assigned INCITE Scientific Computing Liaison? *
   - Yes
   - No (skip to question 11)

9. Rate your satisfaction with the following aspects of your INCITE Scientific Computing Liaison:*	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
Speed of initial response to queries						
Speed of final resolution to queries						
Quality of technical support						
Response to special requests (e.g., scheduling exceptions, quota increases, software installations, etc.)						
Overall support from your INCITE Scientific Computing Liaison						

10. If you rated any of the item(s) in the previous question with "Very dissatisfied" or "Dissatisfied," please explain your rating. [Text box]

Communication

11. Rate your satisfaction with the following aspects of communications which relate to how the OLCF keeps you informed of changes, events, and current issues: *	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
E-mail announcements						
Announcements on the OLCF website						
Overall communications						

12. If you rated any of the item(s) in the previous question with "Very dissatisfied" or "Dissatisfied," please explain your rating. [Text box]

13. Do you feel adequately informed about: *	Yes	No	Please explain
OLCF changes			[Text box]
OLCF events			[Text box]
Current issues			[Text box]

Training

14. How do you prefer to receive training? **(Check all that apply.)*
    - Live – in person
    - Live – via web
    - Online training
    - Online documentation
    - Other, please specify [Text box]

15. What is the most convenient time of year to attend a training event? *
    - Spring
    - Summer
    - Fall
    - Winter
    - No preference

16. What training topic(s) would you like to see offered in the future? [Text box]

17. Rate your satisfaction with the following aspects of Training: *	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
Getting Started Guide: https://www.olcf.ornl.gov/support/getting-started/						
Web Tutorials: https://www.olcf.ornl.gov/support/tutorials/						
Training Events: https://www.olcf.ornl.gov/support/training-events/						
Archived Training Event Slides: https://www.olcf.ornl.gov/support/training-events/						
Monthly User Conference Calls: https://www.olcf.ornl.gov/about-olcf/oug/						
Overall satisfaction with OLCF training						

18. If you rated any of the item(s) in the previous question with "Very dissatisfied" or "Dissatisfied," please explain your rating. [Text box]

OLCF Website

19. How often do you visit the OLCF Website, http://olcf.ornl.gov? *
    - Every day
    - Twice a week
    - Once a week
    - Once a month
    - Less than once a month
    - I have never visited the OLCF website (skip to question 24)

20. Rate your satisfaction with the following User Support aspects of the OLCF Website, https://www.olcf.ornl.gov/support/:*	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
System user guides: https://www.olcf.ornl.gov/support/system-user-guides/						
Software pages: https://www.olcf.ornl.gov/support/software/						
OLCF system status: https://www.olcf.ornl.gov/support/						
My OLCF: http://users.nccs.gov						
Overall rating of User Support information on the OLCF website						

21. If you rated any of the item(s) in the previous question with "Very dissatisfied" or "Dissatisfied," please explain your rating. [Text box]

22. Rate your satisfaction with the following aspects of the OLCF Website, http://olcf.ornl.gov: *	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
Ease of navigation						
Accuracy of information						
Timeliness of information						
Overall satisfaction with the OLCF website						

23. If you rated any of the item(s) in the previous question with "Very dissatisfied" or "Dissatisfied," please explain your rating. [Text box]

24. What additional services or information would you like to have available on the OLCF website? [Text box]

Data Analysis, Visualization, and Workflow

25. Have you utilized data analysis and visualization support services during the 2017 calendar year? *
    - Yes
    - No (skip to question 26)

26. Rate your satisfaction with the following aspects of data analysis and visualization support services: *	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
Speed of responses to queries						
Speed of final resolution to queries						
Quality of technical support						
Overall support from the data analysis and visualization support personnel						

27. Rate your satisfaction with the following aspects of data analysis, visualization, and workflow: *	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Not applicable
Ability to perform data analysis						
Ability to perform project workflows						

Sufficiency of the OLCF hardware for your data analysis, visualization, and workflow needs						
Sufficiency of tools for your data analysis, visualization, and workflow needs						

28. Where do you analyze data produced by your OLCF jobs? *
    - All at OLCF
    - All elsewhere
    - About half at OLCF, half elsewhere
    - Most at OLCF
    - Most elsewhere
    - I don't need data analysis

29. How important are each of the following aspects of data to you? *	Not at all important	Slightly important	Somewhat important	Very important	Extremely important
General public access to your data over the web					
Access for collaborators to your data over the web					
Access for your specific OLCF project members to your data over the web					
Long-term data retention					
Long-term data curation					
Access to databases at the OLCF					
Out-of-the-box workflow tools/libraries					
Dedicated workflow machines					
Data management tools					
Analysis and visualization assistance from the OLCF					
Access to a large shared-memory system for data analysis & visualization					
Access to a system with GPUs specifically for data analysis & visualization					
Remote visualization capability					
The availability of utilizing containers					
The availability of utilizing Jupyter/IPython Notebook					
Interactive analysis and/or integrated simulation including data from other experimental facilities					

30. What additional data analysis, visualization, and/or workflow services would you like the OLCF to provide? [Text box]

Survey Page 5

Section V: Final Thoughts

1. What do you think are the best qualities of the OLCF? *[Text box]

2. What additional services, resources, and/or other improvements are needed to enhance your experience at the OLCF? *[Text box]

3. If there is anything important to you that is not covered in this survey, please tell us about it here. [Text box]