

Introduction

A general survey of all users of the Oak Ridge Leadership Computing Facility (OLCF) at Oak Ridge National Laboratory (ORNL) in 2013 was launched on the Internet October 2, 2013 and remained open for participation through December 09, 2013. Information was collected about the various users, the user experience with OLCF, and the OLCF support capabilities. Attitudes and opinions on the performance, availability, and possible improvements for OLCF and its staff were also solicited.

The survey was created with contributions from OLCF staff and the Oak Ridge Institute for Science and Education (ORISE). The survey was hosted online by ORISE.

ORISE sent e-mails to an OLCF user distribution list provided by OLCF staff. Users on the list included individuals who applied for, and were approved for an OLCF account between January 1, 2013 and September 23, 2013. After an initial e-mail was sent to the user base, it was determined that 136 of the e-mail addresses were not valid and 9 of the e-mail addresses belonged to users who had not used the OLCF services within the past 12 months or were new users who had not yet had the opportunity to use the OLCF. Over the nine weeks, reminder emails and OLCF Web site postings were sent to users from the Director of Science at the OLCF and the OLCF Project Director. Each reminder message appealed in a different way to the users expressing why the survey was being conducted, the importance of the feedback provided, and the use of any responses in a positive manner to support OLCF. 367 users completed the survey out of 1,232 possible respondents (excluding the 136 invalid email addresses and the 9 e-mail addresses that belonged to users who had not used the OLCF services within the past 12 months or were new users who had not yet had the opportunity to use the OLCF), giving an overall response rate of 29.79%. The 2013 response rate (29.79%) is lower than the 2012 response rate (37.51%), but closer to the 2011 response rate (30.99%).

Executive Summary

User Demographics

- 91% (367) of survey respondents reported using one or more of the following systems: Titan (85%), Lustre/Widow scratch file system (47%), HPSS archival storage system (35%), and Lens (26%).
- Survey respondents' projects were supported by INCITE (55%), Director's Discretion (46%), ALCC (19%), and Other sources such as NOAA (0.27%).

Overall Evaluation

- Overall ratings for the Oak Ridge Leadership Computing Facility (OLCF) were positive, as 95% reported being "Satisfied" or "Very Satisfied" with OLCF overall. No users reported being "Dissatisfied" or "Very Dissatisfied.". On the scale of 1 = Very Dissatisfied to 5 = Very Satisfied, the mean rating was 4.41, a slight increase from 4.23 in 2012.
- With regard to overall satisfaction with OLCF, the percent of satisfied ("Satisfied" and "Very satisfied") respondents has slowly, but steadily increased from 2007 (86%) to 2013 (95%)
- In response to an open-ended question about the best qualities of OLCF, thematic analysis of user responses identified user support and assistance (found in 50% of responses), outstanding computing resources (found in 24% of responses), and

- performance (found in 19% of responses) as the respondents' top three choices.
- In addition to the best qualities of OLCF, respondents were asked what they felt OLCF could do to improve their computing experience. The most prevalent theme identified was that users were satisfied and did not have suggestions for improvement (26%). The second and third most prevalent themes were the changing the queuing policy or adding a second queue (18%) and more stability (13%).

User Assistance Evaluation

- For support services used, 59% of the 367 respondents reported using the User Assistance Center (UAC), followed by 33% using the Scientific Computing/Liaison service, 9% contacting Visualization staff, and 2% using End-to-End.
- Overall satisfaction with the user support services provided by the OLCF (i.e., UAC and Account Management) was high with an average response of 4.36 ($SD = 0.73$) on a rating scale of 1 = Very Dissatisfied to 5 = Very Satisfied. Mean ratings to questions of overall satisfaction with various aspects of user assistance ranged from 4.34 to 4.44.

Training and Education

- Mean ratings to questions of overall satisfaction with live, in-person OLCF training events was 4.32 on a rating scale of 1 = Very Dissatisfied to 5 = Very Satisfied. The majority of OLCF users said "Yes" (75%) or "Maybe" (23%) to the prospect of attending future OLCF training events in-person, based on their previous experience.
- Mean ratings to questions of overall satisfaction with live via Webcast OLCF training events was 4.17 on a rating scale of 1 = Very Dissatisfied to 5 = Very Satisfied. The majority of OLCF users said "Yes" (86%) or "Maybe" (14%) to the prospect of attending future OLCF training events via online Webcast, based on their previous experience.
- When presented with a list of training topics, respondents' most frequently requested topic was GPU Programming (61%), followed by Tuning and Optimization (49%), and Advanced MPI (46%).

OLCF Communications

- 86% of respondents who answered a question about their overall satisfaction with communications from the OLCF rated it as satisfied or very satisfied, while less than 1% (0.52%) indicated they were dissatisfied.
- Users were asked to rate communications methods on a scale from 1 = Not useful to 3 = Very useful. Respondents indicated the email message of the week was most useful (Mean = 2.46). A significant percentage of users found most types of communication methods useful, however Twitter was only found "somewhat useful" or "very useful" by 8% and 3% of users, respectively.

OLCF Web Sites

- Overall, respondents indicated they were moderately satisfied with the OLCF Web site ($M = 4.12$, $SD = 0.63$).
- Ninety-nine percent of respondents indicated that they had visited the <http://olcf.ornl.gov> Web site. Of these users (339), 32% indicated that they visit the

site once a week or more, 15 of whom indicated that they visit the site every day. Only four respondents indicated they had never visited the site.

OLCF Systems

- The majority of Titan users (87%) rated their overall satisfaction with Titan as “Satisfied” (57%) or “Very Satisfied” (30%) on the scale of 1 = Very Dissatisfied to 5 = Very Satisfied, with a mean rating of 4.16.
- 82% of HPSS users reported they were either “Satisfied” (56%) or “Very Satisfied” (26%) with HPSS overall on the scale of 1 = Very Dissatisfied to 5 = Very Satisfied, with a mean rating of 4.07.
- 85% of Lustre/Widow scratch filesystem users reported they were either “Satisfied” (60%) or “Very Satisfied” (24%) with the Lustre/Widow scratch filesystem overall on the scale of 1 = Very Dissatisfied to 5 = Very Satisfied, with a mean rating of 4.07.
- Regarding maintenance and outages, 90% indicated sufficient notice is given prior to scheduled maintenance.
- The majority also indicated that they are “Satisfied” or “Very Satisfied” with project disk space (81%), the bandwidth offered by the OLCF (82%), and the ease of transferring data to/from the OLCF (76%).

Data Analysis, Visualization, and Workflow

- When asked about contact with the visualization staff, the average rating across all aspects evaluated among all users was 4.02 ($SD = 0.83$).
- The average rating for “the sufficiency of the data analysis and visualization tools provided by OLCF” was the highest across project classifications among the aspects of visualization rated (Mean 4.05 to 4.15).

Looking to the Future

- Respondents were asked to select the area(s), which they felt OLCF could use improvement to enhance their experience at the OLCF, compute systems topped the list, with 39% of respondents selecting this option.
- Among the 270 respondents who run their own code, 41% percent (112) reported they have started using GPU programming technologies.
- 59% of respondents who do not currently use GPU programming technologies reported that they have started thinking about using them, with the majority reporting that they have started thinking about using either CUDA (51%) or OpenACC (50%).

Data Analysis and Findings

Data collected from the survey were analyzed using both quantitative and qualitative methods by the ORISE Survey Administrator, Dr. Erin Burr. The two fundamental goals that drove the collection and subsequent analysis were to understand the types of users and to understand their needs and preferences with the systems. Analysis included basic descriptive statistics and qualitative coding of responses to open-ended questions (using grounded theory). Examples of the top themes are presented. Please note that percentages of response categories may add up to more than 100% due to the allowance of multiple responses to some questions.

User Demographics

While the response rate is 29.79%, there is a good representative sample as shown below. Each segment

of users is represented (Tables 2-4). The majority of users reported using the Titan (85%, Table 1) and the User Assistance Center (59%, Table 2). OLCF has a relatively equally balanced distribution of users in terms of their length of time using the systems (Table 4).

Table 2. Systems Used ($n = 367$)

Systems	n	%
Titan	313	85%
Spider/Lustre file system	171	47%
HPSS	127	35%
Lens	97	26%
I have not used any of the systems	32	9%

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

Table 3. Support Services Used ($n = 367$)

Services	n	%
User Assistance Center	216	59%
Scientific Computing/Liaison	120	33%
Visualization Staff	32	9%
End-to-End	7	2%
I have not used any of the services yet.	81	22%

Note. Users add up to more than 100% because some use more than one service.

Table 4. Length of Time as an OLCF User ($n = 367$)

Years as an OLCF user	n	%
Greater than 2 years	114	31%
1 - 2 years	95	26%
Less than 1 year	158	43%

The OLCF provided data on the site types each user provided when creating accounts at the OLCF. The majority of respondents to the survey were associated with a university or academic institution (52%). Refer to Table 5 for other users' professional site types.

Table 5. User Site Type ($n = 367$)

Services	n	%
University	191	52%
DOE/Laboratory/Government	98	27%
Other	33	9%
Industry	27	7%
Foreign	18	5%

The most common project classification supporting respondents' research is INCITE (55%), with 42% of respondents reporting INCITE as the only type of project they have (Tables 6-7).

Table 6. User Classification, by Project Type ($n = 367$)

Project(s) classification	n	%
INCITE	202	55%
Director's Discretion	169	46%
ALCC	68	19%
Other	1	0.27%

Note. Users add up to more than 100% because some have more than one project type.

Table 7. User Classification, by Combination of Project Types ($n = 367$)

Project(s) classification	n	%
INCITE only	153	42%
Director's Discretion only	114	31%
ALCC only	37	10%
INCITE and Director's Discretion	31	8%
ALCC and Director's Discretion	13	4%
INCITE, ALCC, and Director's	10	3%
INCITE and ALCC	8	2%
Director's Discretion and Other	1	< 1%

Overall User Satisfaction with OLCF

Users were asked to rate their overall satisfaction with the OLCF. Table 8 contains descriptive statistics by project classification. Mean responses were between 4.39 and 4.44 showing a high degree of satisfaction with OLCF across project classifications (Table 8). Of the 338 users who responded to this item, a total of 95% (322 respondents) reported being “Satisfied” or “Very Satisfied” with OLCF overall and none (0%) reported being “Dissatisfied,” or “Very Dissatisfied” (Table 9).

Table 8. Overall OLCF Evaluation – Descriptive Statistics by Project Classification

Satisfaction with OLCF	n	Mean	Standard	Variance
INCITE	191	4.3	0.6	0.3
Director’s Discretion	153	4.4	0.5	0.3
ALCC	62	4.4	0.5	0.2
All Users	338	4.41	0.5	0.34

Note. Rating scale: 1 = Very Dissatisfied to 5 = Very Satisfied. All Users total is less than total for Project Classifications

because some have more than one project type.

Table 9. Overall OLCF Evaluation – Frequencies and Percentages by Project Classification

Satisfaction with OLCF	INCITE (n = 191)	Director’s Discretion (n = 153)	ALCC (n = 62)	All Users (n = 338)
	# (%)	# (%)	# (%)	# (%)
Very Satisfied	87 (46%)	74 (48%)	27 (44%)	157 (46%)
Satisfied	92 (48%)	72 (47%)	35 (56%)	164 (49%)
Neutral	12 (6%)	7 (5%)	0 (0%)	17 (5%)
Dissatisfied	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Very Dissatisfied	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Note. All Users total may be more than total for Project Classifications because some have more than one project type.

User Opinions of OLCF Services

In response to an open-ended question about the best qualities of OLCF, thematic analysis of user responses identified user support and assistance (found in 50% of responses), the outstanding quality of the computational resource (found in 24% of responses), and performance (found in 19% of responses) as the respondents’ top three choices (Table 10).

Table 10. Best Qualities of OLCF (n = 102)

Theme	n	%
User Support	51	50%
Outstanding Computing Resource	24	24%
Performance	19	19%
Stability	17	17%
Size of Systems/Computer Time	13	13%
Accessible	11	11%
Easy to Use	7	7%
Good Training	7	7%
Miscellaneous	6	6%
Good Online Documentation	5	5%
Software Libraries	3	3%
Good Policies	2	2%

Note. Users add up to more than 100% because some provided more than one quality.

In addition to the best qualities of OLCF, respondents were asked to select the area(s), which they felt OLCF could use improvement to enhance their experience at the OLCF (Table 11). Compute systems topped the list, with 39% of respondents selecting this option.

Table 11. Areas in Need of Improvement ($n = 191$)

What area(s) needs the most improvement to enhance your experience	n	%
Compute systems	75	39%
Training and education	59	31%
Web sites	47	25%
Data Analysis, Visualization, and Workflow	38	20%
Storage Systems	32	17%
User assistance	28	15%
Other	23	12%
Communications	11	6%

Note. Users add up to more than 100% because some provided more than one suggestion for improvement.

Twelve percent of respondents selected the response option, “Other” when asked what area(s) needs the most improvement to enhance their experience using the OLCF (Table 12). The most common response themes were that users were satisfied in general with the OLCF (43%) and the queue policies needs to be improved (17%). The rest of the comments were miscellaneous.

Table 12. Other Areas in Need of Improvement ($n = 23$)

Theme	n	%
Satisfied	10	43%
Queue policies	4	17%
Setting up new accounts	2	9%
Miscellaneous	7	30%

Note. Users add up to more than 100% because some provided more than one other area.

In response to a question regarding how OLCF could improve their computing experience, the most common response theme was that users were satisfied or couldn’t think of any suggestions (26%). This was followed by “Changes to the queuing policy/add second queue” (18%), “more stability,” (13%) and “improve performance” (9%; Table 13).

Table 13. Suggestions for Improvement to OLCF User Computing Experience ($n = 23$)

Theme	n	%
Satisfied	6	26%
Change queuing policy/add second queue	4	18%
More stability	3	13%
Improve performance	2	9%
Better support or more support staff	1	4%
More tools available	1	4%
Miscellaneous	6	26%

In response to a question regarding how OLCF could improve their experience at the OLCF, the most common response theme was “improve the queuing policy” (16%). This was followed by “improve user assistance/better communication/more staff” (15%), and “training requests” (13%). Refer to Table 14 for all themes identified.

Table 14. Suggestions for Improvement to Experience at the OLCF ($n = 68$)

Theme	n	%
Queuing policy improved	11	16%
Improve user assistance/better communication/more	10	15%
Training requests	9	13%
Better web site organization	8	12%
Stability	7	10%
Satisfied	7	10%
Performance	4	6%
Better documentation	3	4%
Make a second system available	3	4%
Tools needed	2	3%
Longer walltime needed	2	3%
Pin and token issues	2	3%
Purge policy	1	1%
More memory	1	1%
Miscellaneous	9	13%

User Assistance

Sixty-six percent of the respondents reported having had at least one interaction with the User Assistance Center (UAC) and its staff. The project classification with the highest percentage of users (76%) who had at least one interaction with the UAC was Director's Discretion projects (Table 15).

Table 15. Number of User Assistance Queries by Project Classification

Approximately how many total queries have you forwarded (via phone or e-mail) to the UAC this	INCITE (n = 104) # (%)	Director's Discretion (n = 67) # (%)	ALC (n = 67) # (%)	All Users (n = 231) # (%)
0	71 (37%)	38 (24%)	23 (34%)	118 (34%)
1-5	97 (50%)	94 (59%)	33 (49%)	184 (52%)
6-10	13 (7%)	10 (6%)	9 (13%)	24 (7%)
11-20	6 (3%)	10 (6%)	1 (1%)	13 (4%)
Greater than 20	7 (4%)	8 (5%)	1 (1%)	12 (3%)

Note. All Users total may be more than total for Project Classifications because some have more than one project type.

Eighty-nine percent of respondents (302) rated their overall satisfaction (on a rating scale of 1 = Very Dissatisfied to 5 = Very Satisfied) with OLCF user support services as "satisfied" or "very satisfied", while only 2% indicated they were "dissatisfied" or "very dissatisfied" ($M = 4.36$, $SD = 0.73$). Satisfaction with OLCF user support services was highest among users with INCITE projects ($M = 4.40$, $SD = 0.72$). Refer to Table 16 for users' satisfaction with OLCF user support services by project classification and Table 17 for a detailed breakdown of ratings for all users.

Table 16. Users' Average Level of Overall Satisfaction with OLCF User Support Services by Project Classification

Satisfaction with OLCF User Support	n	Mean	Standard
INCITE	185	4.4	0.7
Director's Discretion	158	4.3	0.7
ALCC	65	4.3	0.6
All Users	338	4.3	0.7

Note. Means and standard deviations based on a rating scale of 1 = Very Dissatisfied to 5 = Very Satisfied. All Users

total is less than total for Project Classifications because some have more than one project type.

Table 17. User Satisfaction with OLCF User Support Services by Project Classification

Satisfaction with OLCF User	n	1 = Very	2 =	3 =	4 =	5 = Very Satisfie
INCITE	185	0 (0%)	2 (1%)	19 (10%)	67 (36%)	97 (53%)
Director's Discretion	158	2 (1%)	0 (0%)	12 (8%)	70 (44%)	74 (47%)
ALCC	65	0 (0%)	0 (0%)	5 (8%)	35 (54%)	25 (38%)
All Users*	338	2 (>1%)	2 (>1%)	32 (9%)	137 (41%)	165 (49%)

*Note. All Users total may be more than total for Project Classifications because some have more than one project type.

Overall, users reported a high level of satisfaction with OLCF service in providing support and responding to needs. Mean ratings to questions of overall satisfaction with various aspects of user assistance ranged from 4.31 to 4.60. Refer to Table 18 for users' evaluation of various aspects of user assistance by project classification. When asked about the speed of initial response to queries, a majority of the users (88%) were "Satisfied" or "Very satisfied" (Table 19). Users who were dissatisfied with one or more of the user assistance items were asked to explain why they were dissatisfied. Among those who responded ($n = 7$), the predominant explanation provided was that they either received no response or received a delayed response (57%), the response quality was poor (29%), or the OLCF needs more staff (14%).

Table 18. User Assistance Evaluation by Project Classification

Overall, rate your satisfaction with the following aspects of	INCITE	Director's Discretion	ALCC	All Users
	M (SD)	M (SD)	M (SD)	M (SD)
Speed of initial response to queries	4.44 (0.90)	4.31 (0.98)	4.55 (0.72)	4.38 (0.94)
Speed of final resolution to queries	4.39 (0.89)	4.38 (0.89)	4.57 (0.62)	4.38 (0.90)
Quality of technical advice	4.42 (0.96)	4.47 (0.97)	4.60 (0.59)	4.44 (0.95)
Response to special requests (e.g., scheduling	4.46 (0.91)	4.34 (1.00)	4.57 (0.61)	4.39 (0.97)

Note. Means and standard deviations based on a rating scale of 1 = Very Dissatisfied to 5 = Very Satisfied.

Table 19. User Assistance Evaluation –All Users

Overall, rate your satisfaction with the following	n	1 = Very	2 = Dissatisfie	3 = Neutral	4 =	5 = Very	Not applicab
Speed of initial response to	247	8 (3%)	5 (2%)	16 (6%)	75 (30%)	143 (58%)	97
Speed of final resolution to	247	8 (3%)	1 (>1%)	19 (8%)	80 (32%)	139 (56%)	97
Quality of technical advice	225	9 (4%)	1 (>1%)	16 (7%)	56 (25%)	143 (64%)	114
Response to special requests (e.g., scheduling exceptions,	339	7 (4%)	2 (1%)	13 (8%)	46 (27%)	105 (61%)	166

Note. Percentages are based on n , which does not include the not applicable responses displayed in the last column.

When asked to provide comments on ways in which OLCF can improve user support services, 43% of respondents were satisfied with the assistance center's services, while 22% shared general complaints, and 14% wanted quicker responses from user support (Table 20).

Table 20. Suggestions for Improving User Assistance ($n = 37$)

Theme	Number of	%
Satisfied	16	43%

General complaint/requests	8	22%
Quicker responses needed	5	14%
Problems with	4	11%
Miscellaneous	4	11%

Overall, users reported a high level of satisfaction with the two aspects of OLCF account management they were asked to evaluate. Among project classifications, users with ALCC projects were the most satisfied ($M = 4.50$, $SD = 0.76$) with the “speed of response to account management query” and users with Director’s Discretion projects were most satisfied ($M = 4.46$, $SD = 0.80$) with the “effectiveness of response to account management query” (Table 21). When looking at these aspects of User Assistance among all users, a large majority of the users (each item with 67%) were “Satisfied” or “Very satisfied” (Table 22).

Table 21. Account Management Evaluation by Project Classification

Please rate your satisfaction with the following aspects of Account Management (the	INCITE	Director’s	ALCC	All Users
	M (SD)	M (SD)	M (SD)	M (SD)
Speed of response to account management query	4.31 (1.01)	4.44 (0.81)	4.50 (0.76)	4.43 (0.95)
Effectiveness of response to account management	4.32 (1.00)	4.46 (0.80)	4.44 (0.79)	4.36 (0.94)

Note. Means and standard deviations based on a rating scale of 1 = Very Dissatisfied to 5 = Very Satisfied.

Table 22. Account Management Evaluation – All Users

Overall, rate your satisfaction with the following	n	1 = Very Dissatisfi	2 =	3 = Neutral	4 =	5 = Very Satisfie	Not applicab
Speed of response to account management	259	11 (4%)	2 (1%)	16 (6%)	89 (34%)	141 (54%)	84
Effectiveness of response to account	256	11 (5%)	0 (0%)	18 (7%)	84 (33%)	143 (56%)	83

Note. Percentages are based on N, which does not include the not applicable responses displayed in the last column.

Training and Education

Training Preferences

The first and second most favorable methods of training are consistent across programs 1) Online documentation and 2) online training. However, live training via the Web is preferred over live training in-person by INCITE project users (33% and 26%, respectively), whereas Director’s Discretion and ALCC project users indicated a preference for live training in person (35% and 35%, respectively) over live training via the Web (37% and 38%, respectively).

Refer to Table 23 for users’ training preferences by project classification.

Table 23. Users’ Training Preferences by Project Classification

Training Method	INCITE (n =	Director’s Discretio n (n =	ALCC (n =	All Users (n
	# (%)	# (%)	# (%)	# (%)
Online documentation	142 (75%)	124 (78%)	54 (83%)	267 (78%)
Online training	95 (50%)	89 (56%)	32 (49%)	183 (53%)
Live via Web	63 (33%)	56 (35%)	23 (35%)	118 (34%)

Live in-person	49 (26%)	59 (37%)	18 (38%)	105 (30%)
Other, please specify	0 (0%)	2 (1%)	3 (5%)	5 (1%)

Note. Users add up to more than 100% per column because some preferred more than one training method. All Users

totals may be more than totals for Project Classifications because some have more than one project type.

The most favorable time of year among OLCF users to attend training is in the summer (55%). The order of preference by season was the same across users of all project types (summer, spring, winter, fall), except among users with “ALCC” projects who preferred winter more than spring (Table 24).

Table 24. Users’ Training Preferences by Project Classification

What is the most convenient time of year to attend a training event?	INCITE (n =	Director’s Discretio n (n =	ALCC (n =	All Users (n
	# (%)	# (%)	# (%)	# (%)
Spring	33 (19%)	26 (18%)	9 (16%)	60 (19%)
Summer	98 (56%)	86 (57%)	27 (48%)	177 (56%)
Fall	18 (10%)	15 (10%)	7 (13%)	32 (10%)
Winter	26 (15%)	23 (15%)	13 (23%)	48 (15%)

Note. All Users total may be more than total for Project Classifications because some have more than one project type.

When presented with a list of training topics, respondents’ most frequently requested topic was GPU Programming (61%), followed by Tuning and Optimization (49%), and Advanced MPI (46%). The frequencies of requested topics varied across program classifications with GPU Programming (57-76%), followed by Tuning and Optimization (49-57%), and Advanced MPI (43-47%). Respondents from the ALCC program indicated a slightly higher preference for Hybrid Programming (MPI and OpenMP) as this topic came in 3rd most frequently selected (51% for Hybrid Programming versus 44% for Advanced MPI; (Table 25).

Table 25. Training Desired by Project Classification

Training Topics	INCITE (n =	Director’s Discretio n (n =	ALCC (n =	All Users (n
	# (%)	# (%)	# (%)	# (%)
GPU Programming	102 (57%)	100 (65%)	48 (76%)	203 (61%)
Tuning and Optimization	87 (49%)	76 (50%)	36 (57%)	162 (49%)
Advanced MPI	85 (47%)	66 (43%)	28 (44%)	153 (46%)
Hybrid Programming (MPI and	64 (36%)	56 (37%)	32 (51%)	130 (39%)
Visualization and Data Analysis Tools	65 (36%)	56 (37%)	19 (30%)	121 (36%)
Debugging	61 (34%)	52 (34%)	24 (38%)	110 (33%)
Managing I/O	51 (28%)	52 (34%)	18 (29%)	102 (31%)
MPI Basics	49 (27%)	39 (25%)	11 (17%)	92 (28%)
OLCF Specific Topics	29 (16%)	30 (20%)	8 (13%)	52 (16%)
Code Porting Tools	29 (16%)	25 (16%)	6 (10%)	50 (15%)

Note. Users add up to more than 100% per column because some offered more than one suggestion. All Users totals

may be more than totals for Project Classifications because some have more than one project type.

Users were asked to provide any comments that would help the OLCF improve its training and education curriculum. . The most common responses were “training topic suggestions” (29%), “add

more online tutorials and improve documentation” (23%), and “miscellaneous suggestions/comments” (18%). Refer to Table 26 for a complete list of themes represented among users’ comments. The following quotes are selected examples of user responses for these themes:

Table 26. Users’ Suggestions for Improving the OLCF Training and Education Curriculum ($n = 17$)

Theme	Number of	%
Topic suggestions	5	29%
Add more online tutorials and improve	4	23%
Miscellaneous suggestions/comments	3	18%
Scheduling issues	2	12%
Satisfied	2	12%
Budget constraints	1	6%

Live Training In-Person

When asked about in-person training, only 16% (56) of users reported that they participated in one or more in-person OLCF training events since January 1, 2013 (Table 27).

Table 27. Users Who Attended Training In-Person During 2013

Have you participated in any live OLCF training events since January 1, 2013 in	INCITE ($n =$ # (%))	Director’s Discretion ($n =$ # (%))	ALCC ($n =$ # (%))	All Users (n # (%))
Yes	31 (16%)	31 (19%)	10 (15%)	56 (16%)
No	164 (84%)	131 (81%)	57 (85%)	297 (84%)

Note. All Users total may be more than total for Project Classifications because some have more than one project type.

Users who reported that they attended one or more OLCF training events in-person during 2013 were asked to rate their overall satisfaction with the in-person training events they attended. Overall satisfaction was high ($M = 4.32$, $SD = 0.61$) on a scale of 1 = Very Dissatisfied to 5 = Very Satisfied. Users with INCITE projects had the highest average satisfaction ratings ($M = 4.45$, $SD = 0.51$). Refer to Table 28 for average user satisfaction ratings associated with live training events attended in-person by project classification and Table 29 for a detailed breakdown of satisfaction levels by project classification.

Table 28. User Average Level of Overall Satisfaction with In-Person Training Attended During 2013 by Project Classification

Satisfaction with In-Person	n	Mean	Standard
INCITE	31	4.4	0.5
Director’s Discretion	31	4.1	0.6
ALCC	10	4.4	0.9
All Users	56	4.3	0.6

Note. All Users total may be more than total for Project Classifications because some have more than one project type.

Table 29. User Satisfaction with In-Person Training Attended During 2013 by Project Classification

Satisfaction with OLCF User	n	1 = Very	2 =	3 =	4 =	5 = Very Satisfied
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INCITE	31	0 (0%)	0 (0%)	0 (0%)	17 (55%)	14 (45%)
Director's Discretion	31	0 (0%)	1 (3%)	1 (3%)	21 (68%)	8 (26%)
ALCC	10	0 (0%)	1 (10%)	0 (0%)	3 (30%)	6 (60%)
All Users	56	0 (0%)	1 (2%)	1 (2%)	33 (59%)	21 (38%)

Note. All Users total may be more than total for Project Classifications because some have more than one project type.

Users who did attend were asked to reflect on the training event in which they participated in person, and explain what they felt could be improved. The most common responses were “share materials ahead of time and online” (29%), “better organization” (18%), and “technology/coding issues” (18%). Refer to Table 30 for a complete list of themes represented among users’ suggestions for improvement to the live, in-person OLCF training events.

Table 30. Suggestions for Improving Live, In-Person OLCF Training Events ($n = 17$)

Theme	Number of	%
Share materials ahead of time and	5	29%
Better Organization	3	18%
Technology/Coding Issues	3	18%
More Examples	2	12%
Satisfied	1	6%
Miscellaneous	4	24%

Note. Users add up to more than 100% because some provided more than one suggestion for improvement.

Users were asked to reflect on the training event in which they participated in person, and explain what they felt OLCF did well. The most common responses were “quality speakers” (50%), “topics/materials” (40%), and “hands-on experience” (20%). Refer to Table 31 for a complete list of themes represented among users’ opinions about what the OLCF did well regarding the live, in-person OLCF training events that they attended in 2013.

Table 31. User Opinions About What OLCF Did Well Regarding Live, In-Person OLCF Training Events in 2013 ($n = 20$)

Theme	Number of	%
Quality Speakers	10	50%
Topics/Materials	8	40%
Hands-On Experience	4	20%
Organization	4	20%
Available Content	1	5%
Suggestions	1	5%

Note. Users add up to more than 100% because some provided responses that fit more than one theme.

The majority of OLCF users said “Yes” (75%) or “Maybe” (23%) to the prospect of attending future in-person OLCF training, based on their previous experience (Table 32).

Table 32. Plans to Attend Future Training Events by Project Classification

Based on your previous experience, would you attend a future in-person OLCF training	INCITE (n = 21) # (%)	Director's Discretion (n = 10) # (%)	ALCC (n = 10) # (%)	All Users (n = 57) # (%)
Yes	25 (81%)	24 (75%)	6 (60%)	43 (75%)
Maybe	5 (16%)	8 (25%)	4 (40%)	13 (23%)
No	1 (3%)	0 (0%)	0 (0%)	1 (2%)

Note. All Users totals may be more than totals for Project Classifications because some have more than one project type.

Users who reported that they did not attend any OLCF training events in-person during 2013 were asked to indicate which factors on a list provided led to their decision not to attend. The top three most frequently provided reason users did not participate in live training events included: “did not have the time to attend” (46%), “did not require training” (30%), and “did not have the budget to attend” (27%). Refer to Table 33 for the complete list of reasons users could not attend live training event in-person during 2013.

Table 33. Users’ Reasons for Not Participating in a Live OLCF Training Event In-Person During 2013

Reasons for not participating in an OLCF training event in person	INCITE (n = 164)	Director’s Discretio n (n =	ALCC (n =57)	All Users (n =
	# (%)	# (%)	# (%)	# (%)
Do not have the time to attend	85 (52%)	56 (42%)	30 (53%)	138 (46%)
Do not require training	56 (34%)	35 (26%)	14 (25%)	88 (30%)
Do not have the budget to attend	38 (23%)	36 (27%)	19 (33%)	79 (27%)
Location was inconvenient	32 (20%)	26 (20%)	11 (19%)	62 (21%)
Prefer to learn on my own	33 (20%)	22 (17%)	14 (25%)	59 (20%)
Timing was inconvenient	30 (18%)	26 (20%)	12 (21%)	56 (19%)
Other	4 (2%)	8 (6%)	4 (7%)	14 (5%)
Training topics were not of interest	9 (5%)	5 (4%)	1 (2%)	12 (4%)

Note. All Users totals may be more than totals for Project Classifications because some have more than one project type.

Live Training via the Web

Roughly 18% (63) of users reported that they participated in one or more live OLCF training event via online webcast since January 1, 2013 (Table 34).

Table 34. Users Who Attended Training via online Webcast During FY 2013

Have you participated in any OLCF training events via online webcast?	INCITE (n =	Director’s Discretio n (n =	ALCC (n =	All Users (n
	# (%)	# (%)	# (%)	# (%)
Yes	32 (16%)	31 (19%)	10 (15%)	63 (18%)
No	163 (84%)	131 (81%)	57 (85%)	290 (82%)

Note. All Users totals may be more than totals for Project Classifications because some have more than one project type.

Users who reported that they attended one or more OLCF training events live via the Web during 2013 were asked to rate their overall satisfaction with the training events they attended. Overall satisfaction was high ($M = 4.17$, $SD = 0.66$) on a scale of 1 = Very Dissatisfied to 5 = Very Satisfied. Users with ALCC projects had the highest average satisfaction ratings ($M = 4.31$, $SD = 0.63$). Refer to Table 35 for average user satisfaction ratings associated with live training events.

Table 35. User Average Level of Overall Satisfaction with Training Attended Live Via the Web During 2013 by Project Classification

Satisfaction with In-Person	n	Mea	Standard
INCITE	32	4.1	0.6
Director’s Discretion	33	4.2	0.6
ALCC	13	4.3	0.6
All Users	63	4.1	0.6

Note. All Users totals may be more than totals for Project Classifications because some have more than one

project type.

Table 36. User Satisfaction with Training Attended via online Webcast During 2013 by Project Classification

Satisfaction with OLCF User	n	1 = Very Dissatisfi	2 =	3 =	4 =	5 = Very Satisfie
INCITE	32	0 (0%)	0 (0%)	5 (16%)	17 (53%)	10 (31%)
Director's Discretion	33	0 (0%)	0 (0%)	4 (12%)	17 (52%)	12 (36%)
ALCC	13	0 (0%)	0 (0%)	1 (8%)	7 (54%)	5 (38%)
All Users*	63	0 (0%)	0 (0%)	9 (14%)	34 (54%)	20 (32%)

*Note. All Users total may be more than total for Project Classifications because some have more than one project type.

Users who did attend were asked to reflect on the training event(s) in which they participated via the Web, and explain what they felt could be improved. The most common responses were “more online tutorials and documentation posted before the training” (26%), “miscellaneous suggestions” (16%), and “assistance with technical support for viewing training and participating” (16%). Refer to Table 37 for a complete list of themes represented among users’ suggestions for improvement to the live, OLCF training events offered via the Web.

Table 37. Suggestions for Improving Live, OLCF Training Events Offered Via the Web (n = 12)

Theme	Number of respondents	%
More online tutorials and documentation posted before the	5	26%
Miscellaneous suggestions	3	16%
Assistance with technical support for viewing training and	3	16%
Scheduling issues	2	11%
Content needs to be more advanced	2	11%
Satisfied	2	11%
Incorporate some hands-on activity	2	11%

Note. Users add up to more than 100% because some provided more than one suggestion for improvement.

Users were asked to reflect on the training event in which they participated via the Web, and explain what they felt OLCF did well. The most common responses were “quality speakers/training facilitation” (32%), “relevant quality topics/content” (32%), and “satisfied” (27%). Refer to Table 38 for a complete list of themes represented among users’ opinions about what the OLCF did well regarding the live, OLCF training events offered via the Web that they attended in 2013.

Table 38. User Opinions About What OLCF Did Well Regarding Live, OLCF Training Events Offered Via the Web in 2013 (n = 22)

Theme	Number of	%
Quality speakers/training facilitation	7	32%
Relevant quality topics/content	7	32%
Satisfied	6	27%
Clear presentation	5	23%
Hands-on training	1	5%
Access to materials provided	1	5%

Note. Users add up to more than 100% because some provided responses that fit more than one theme.

The majority of OLCF users said “Yes” (86%) or “Maybe” (14%) to the prospect of attending future

OLCF training offered live via the Web, based on their previous experience (Table 39).

Table 39. Plans to Attend Future Training Events by Project Classification

Based on your previous experience, would you attend a future in-person OLCF training	INCITE (n = 22) # (%)	Director's Discretion (n = 26) # (%)	ALCC (n = 14) # (%)	All Users (n = 62) # (%)
Yes	27 (84%)	26 (81%)	13 (93%)	54 (86%)
Maybe	5 (16%)	6 (19%)	1 (7%)	9 (14%)
No	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Note. All Users totals may be more than totals for Project Classifications because some have more than one project type.

Users who reported that they did not attend any OLCF training events live via the Web during 2013 were asked to indicate which factors on a list provided led to their decision not to attend. The top three most frequently provided reason users did not participate in live training events included: “did not have the time to attend” (39%), “did not require training” (35%), and “timing was inconvenient” (19%). Refer to Table 40 for the complete list of reasons users could not attend live training event via the Web during 2013.

Table 40. Users’ Reasons for Not Participating in a Live OLCF Training Event In-Person During 2013

Reasons for not participating in an OLCF training event in person	INCITE (n = 150) # (%)	Director's Discretion (n = 100) # (%)	ALCC (n = 52) # (%)	All Users (n = 252) # (%)
Do not have the time to attend	68 (43%)	44 (34%)	19 (37%)	110 (39%)
Do not require training	63 (40%)	43 (33%)	19 (37%)	100 (35%)
Timing was inconvenient	24 (15%)	29 (22%)	10 (19%)	55 (19%)
Prefer to learn on my own	27 (17%)	22 (17%)	10 (19%)	51 (18%)
Training topics were not of interest	14 (9%)	13 (10%)	2 (4%)	25 (9%)
Other	11 (7%)	10 (8%)	5 (10%)	22 (8%)
Do not have the budget to attend	6 (4%)	3 (2%)	4 (8%)	12 (4%)
The training was too basic	9 (6%)	4 (3%)	2 (4%)	11 (4%)
Location was inconvenient	2 (1%)	2 (2%)	1 (2%)	3 (1%)
The training was too advanced	0 (0%)	2 (2%)	0 (0%)	2 (1%)

Note. All Users totals may be more than totals for Project Classifications because some have more than one project type.

OLCF Communications

Eighty-six percent of respondents (303) rated their overall satisfaction (on a rating scale of 1 = Very Dissatisfied to 5 = Very Satisfied) with communications from the OLCF as “satisfied” or “very satisfied”, while only 1% indicated they were “dissatisfied” or “very dissatisfied” ($M = 4.17$, $SD = 0.69$). Satisfaction with OLCF communications was highest among users with INCITE projects ($M = 4.19$, $SD = 0.70$). Refer to Table 41 for users’ satisfaction with OLCF communication by project classification.

Table 41. Users’ Overall Satisfaction with Communications from the OLCF by Project Classification

Satisfaction with OLCF	n	Mean	Standard
INCITE	195	4.1	0.70
Director's Discretion	161	4.1	0.6

ALCC	65	4.1	0.5
All Users	351	4.1	0.6

Users were asked to rate communications methods on a scale where 1 = Not at all useful, 2 = Somewhat useful, 3 = Very useful. Respondents indicated the weekly email message was most useful ($M = 2.46$, $SD = 0.54$). Users found most types of communication methods useful, however Twitter was only found “somewhat useful” or “very useful” by 20% and 7% of users, respectively (Table 42). These findings are consistent across project classifications. See Table 43 for a more detailed breakdown of averages.

Table 42. Users’ Communication Methods by Project Classification

Please rate the following	INCITE	Director’s Discretion	ALCC	All Users
	M (SD)	M (SD)	M (SD)	M (SD)
Weekly Email Message	2.47 (0.56)	2.47 (0.53)	2.58 (0.53)	2.46 (0.54)
General Email	2.39 (0.56)	2.36 (0.54)	2.40 (0.53)	2.38 (0.54)
Opt-In Email Notification	2.33 (0.60)	2.36 (0.55)	2.39 (0.50)	2.35 (0.55)
Message of the Day (MOTD)	2.26 (0.64)	2.22 (0.61)	2.26 (0.44)	2.24 (0.60)
Twitter	1.56 (0.72)	1.61 (0.73)	1.60 (0.52)	1.63 (0.70)

Note. Means and standard deviations based on a rating scale where 1 = Not at all useful, 2 = Somewhat useful, 3 = Very useful.

Table 43. Communication Methods – All Users

Please rate the following communications methods:	n	Not aware	Not at all useful	Somewhat useful	Very useful	Not applicable
Weekly Email Message	311	15 (5%)	6 (2%)	147 (47%)	143 (46%)	31
General Email	310	11 (4%)	9 (3%)	168 (54%)	122 (39%)	32
Opt-In Email Notification	227	38 (17%)	7 (3%)	109 (48%)	73 (32%)	108
Message of the Day (MOTD)	236	52 (22%)	16 (7%)	107 (45%)	61 (26%)	100
Twitter	135	63 (46%)	36 (27%)	27 (20%)	9 (7%)	192

Note. Percentages are based on n , which does not include the not applicable responses displayed in the last column.

Users were asked to list other communication methods they prefer (Table 44). The most common responses were via email (26%), via Web site (26%), and Google+ (11%).

Table 44. Other Communication Methods – All Users ($n = 27$)

Please list other communication methods	Number of respondents	%
Webpage or website	7	26%
Email	6	22%
Google+	3	11%
Facebook	2	7%
Twitter	2	7%
Suggestions for tools not to use	2	7%
Miscellaneous	7	26%

Note. Users add up to more than 100% because some mentioned more than method of communication.

OLCF Web Site Evaluation

Ninety-nine percent of respondents indicated that they had visited the <http://olcf.ornl.gov> Web site. Thirty-two percent indicated that they visit the site once a week or more, 5% of whom indicated that they visit the site every day. Only four respondents indicated they had never visited the site. Nineteen percent of ALCC users indicated they visited the OLCF Web site at least twice a week. See Table 45 for a more complete breakdown by project classification.

Table 45. Frequency of Visits to OLCF Web Site by Project Classification

How often do you visit the OLCF Web site, http://olcf.ornl.gov ?	INCITE (n = 100)	Director's Discretion (n = 63)	ALCC (n = 63)	All Users (n = 226)
	# (%)	# (%)	# (%)	# (%)
Every day	8 (4%)	5 (3%)	3 (5%)	15 (5%)
Twice a week	22 (12%)	16 (10%)	9 (14%)	35 (10%)
Once a week	31 (16%)	27 (17%)	10 (16%)	58 (17%)
Twice a month	36 (19%)	27 (17%)	20 (32%)	60 (17%)
Once a month	36 (19%)	38 (24%)	8 (13%)	71 (21%)
Less than once a month	54 (28%)	44 (28%)	13 (20%)	100 (29%)
I have never visited an OLCF Web site	3 (2%)	1 (1%)	0 (0%)	4 (1%)

Note. All Users totals may be more than totals for Project Classifications because some have more than one project type.

Overall, respondents indicated they were moderately satisfied with the main OLCF Web site ($M = 4.12$, $SD = 0.63$) based on a rating scale of 1 = Very Dissatisfied to 5 = Very Satisfied. "Accuracy of information" was the highest rated across programs (means ranged from 4.10 to 4.16) indicating users were more than satisfied. See Table 46 for a detailed breakdown of satisfaction with various Web site aspects by project type.

Table 46. Evaluation of OLCF Web site by Project Classification

Aspects of the OLCF Web site	INCITE	Director's Discretion	ALCC	All Users
	M (SD)	M (SD)	M (SD)	M (SD)
Accuracy of information	4.16 (0.60)	4.10 (0.70)	4.10 (0.68)	4.14 (0.63)
Timeliness of information	4.11 (0.63)	4.06 (0.66)	4.02 (0.52)	4.08 (0.62)
Ease of finding information	3.94 (0.78)	3.93 (0.79)	3.80 (0.81)	3.93 (0.78)
Overall satisfaction with the OLCF	4.10 (0.64)	4.15 (0.64)	4.05 (0.64)	4.12 (0.63)

Note. Means and standard deviations based on a rating scale of 1 = Very Dissatisfied to 5 = Very Satisfied.

The greatest number of respondents indicated being satisfied with the accuracy of information provided, with 88% reporting they were either "Satisfied" or "Very Satisfied" with this aspect of the site (Table 47). The aspect which had the highest percentage of respondents indicating they were

either “Dissatisfied” or “Very Dissatisfied” was ease of finding information (4%). For each of the other aspects of the Web site addressed, approximately 1-2% of users reported being either “Dissatisfied” or “Very Dissatisfied.”

Table 47. Evaluation of OLCF Web Site - All Users

Aspects of the OLCF Web	n	1 = Very	2 =	3 =	4 = Satisfie	5 = Very	Not Applica
Accuracy of information	314	1 (<1%)	1 (<1%)	34 (11%)	196 (62%)	82 (26%)	17
Timeliness of information	304	0 (0%)	4 (1%)	36 (12%)	196 (65%)	68 (22%)	21
Ease of finding information	318	3 (1%)	9 (3%)	62 (19%)	177 (56%)	67 (21%)	16
Overall satisfaction with the OLCF	320	2 (1%)	2 (1%)	29 (9%)	210 (66%)	77 (24%)	13

Note. Percentages are based on *n*, which does not include the not applicable responses displayed in the last column.

The three main themes in explanations for their dissatisfaction with the Web site included: the Web site was not easy to navigate (75%), information is outdated (17%), and system status was hard to find (8%; Table 48).

Table 48. Users' Explanations for Being Dissatisfied with One or More Aspects of the OLCF Web Site (*n* = 12)

Theme	Number of	%
Web site not easy to navigate	9	75%
Outdated information	2	17%
System status hard to find	1	8%

The OLCF has worked to improve the quality, organization, and functionality of the user support section of the OLCF Web site. To assess users' perceptions of this effort, users were asked to select the statement that best describes their opinion regarding these efforts from a list of nine options. The majority of users (59%) acknowledged that they had noticed significant improvements to the user support section of the website. Of these who saw significant improvement, only 7% felt that substantial improvements are still needed (Table 49).

Table 49. Evaluation of OLCF's Improvements to the User Support Section of the OLCF Web site by Project Classification

The OLCF has worked to improve the quality, organization, and functionality of the user support section of the OLCF Web site. Which of the following statements best describes	INCITE (n = 160) # (%)	Director's Discretion (n = 57) # (%)	ALC (n = 57) # (%)	All Users (n = 274) # (%)
The OLCF has significantly improved the User Support section of the OLCF Web site, and no additional improvements are needed at this time	53 (31%)	43 (31%)	8 (14%)	89 (30%)
The OLCF has significantly improved the User Support section	45 (27%)	34 (24%)	16 (28%)	76 (25%)
The OLCF has significantly improved the User Support section of the OLCF Web site, but substantial improvements are	6 (4%)	4 (3%)	5 (9%)	12 (4%)
I have noticed minor improvements to the User Support section of the OLCF Web site, and no additional improvements	17 (10%)	12 (9%)	10 (17%)	29 (9%)
I have noticed minor improvements to the User Support section	6 (4%)	6 (4%)	2 (4%)	12 (4%)
I have noticed minor improvements to the User Support section of the OLCF Web site, but substantial improvements are	6 (4%)	3 (2%)	1 (2%)	8 (3%)
I have not noticed any improvements to the User Support section of the OLCF Web site, and no additional improvements	30 (18%)	28 (20%)	11 (19%)	61 (20%)
I have not noticed any improvements to the User Support section	4 (2%)	8 (6%)	4 (7%)	11 (4%)
I have not noticed any improvements to the User Support section of the OLCF Web site, but substantial	2 (1%)	1 (1%)	0 (0%)	2 (1%)

Note. All Users totals may be more than totals for Project Classifications because some have more than one project type

Overall, respondents indicated they were moderately satisfied with the various aspects of the online training and support on the user support section of the OLCF Web site, <https://www.olcf.ornl.gov/support/>, as the means ranged from 3.83 to 4.21 on a rating scale of 1 = Very Dissatisfied to 5 = Very Satisfied. “Titan user guide” was the highest rated among users with Director’s Discretion and ALCC projects (means ranged from 4.11 to 4.23) indicating users were more than satisfied. “Titan user guide” was the second highest rated among users with INCITE projects after the “Getting started guide.” See Table 50 for a detailed breakdown of satisfaction with various user support Web site aspects by project type.

Table 50. Evaluation of the User Support Section of the OLCF Web site by Project Classification

Please rate your satisfaction with the following online training and support on the user support	INCITE	Director’s	ALCC	All
	M (SD)	M (SD)	M (SD)	M (SD)
Titan user guide	4.19 (0.74)	4.23 (0.69)	4.11 (0.71)	4.21 (0.71)
Getting started guide	4.21 (0.65)	4.20 (0.68)	4.10 (0.68)	4.20 (0.65)
OLCF system status information	4.10 (0.75)	4.09 (0.72)	4.00 (0.66)	4.10 (0.72)
Online OLCF tutorials	4.01 (0.71)	4.06 (0.82)	3.84 (0.81)	4.04 (0.75)
Lens user guide	4.05 (0.67)	3.94 (0.71)	4.03 (0.57)	4.03 (0.66)
Available software	3.99 (0.68)	4.01 (0.77)	3.87 (0.69)	4.01 (0.69)
Searchable knowledge base	3.89 (0.75)	3.99 (0.79)	3.79 (0.77)	3.96 (0.75)
My OLCF	3.87 (0.80)	3.89 (0.87)	3.68 (0.79)	3.91 (0.81)
Known issues	3.82 (0.77)	3.78 (0.85)	3.59 (0.63)	3.83 (0.77)

The greatest number of respondents indicated being satisfied with the “Getting started guide,” with 89% reporting they were either “Satisfied” or “Very Satisfied” with this aspect of the site (Table 51). The aspect which had the highest percentage of respondents indicating they were either “Dissatisfied” or “Very Dissatisfied” was “My OLCF” (3%). For each of the other aspects of the user support Web site addressed, approximately 1-2% of users reported being either “Dissatisfied” or “Very Dissatisfied.”

Table 51. Evaluation of the User Support Section of the OLCF Web site - All Users

Please rate your satisfaction with the following online training and support on the user support	n	1 = Very Dissatisfied	2 = Dissatisfied	3 = Neutr	4 = Satisfi	5 = Very Satisfie	Not Applicable
Titan user guide	299	2 (1%)	3 (1%)	30 (10%)	160 (53%)	104 (35%)	38
Getting started guide	289	1 (<1%)	0 (0%)	31 (11%)	164 (57%)	93 (32%)	48
OLCF system status information	283	1 (<1%)	4 (1%)	42 (15%)	156 (55%)	80 (28%)	47
Online OLCF tutorials	229	1 (<1%)	1 (<1%)	51 (22%)	111 (48%)	65 (28%)	103
Lens user guide	149	0 (0%)	0 (0%)	30 (20%)	84 (57%)	35 (23%)	173
Available software	257	0 (0%)	2 (1%)	54 (21%)	140 (54%)	61 (24%)	74
Searchable knowledge base	271	3 (1%)	1 (<1%)	62 (23%)	144 (53%)	61 (23%)	63
My OLCF	196	2 (1%)	3 (2%)	53 (27%)	91 (46%)	47 (24%)	128
Known issues	214	1 (<1%)	3 (1%)	69 (32%)	99 (46%)	42 (20%)	114

Note. Percentages are based on *n*, which does not include the not applicable responses displayed in the last column.

The three main themes in explanations for their dissatisfaction with the user support portion of the Web site included: “insufficient system status information” (40%), “poor Web site organization” (30%), and “more/better tutorials” (30%; Table 52).

Table 52. Users’ Explanations for Being Dissatisfied with the OLCF Web Site’s User Support Section (*n* = 10)

Theme	Number of	%
Insufficient system status information	4	40%
Poor Web site organization	3	30%
More/better tutorials	3	30%

The three main themes identified among all users’ responses to a call for suggestions for improvement to the User Support section of the OLCF Web site were: “improve organization/make materials easier to find” (28%), “add training materials” (19%), and “satisfied” (17%; see Table 53):

Table 53. Suggestions for Improvement to the User Support Section of the OLCF Web site (*n* = 36)

Theme	Number of	%
Improve organization/make materials easier to	10	28%
Add training materials	7	19%
Satisfied	6	17%
More updates/Use statistics	5	14%
General suggestion	5	14%
Not familiar enough/can’t comment	4	11%
More support needed	2	6%
Miscellaneous	3	8%

Note. Users add up to more than 100% because some mentioned more than suggestion for improvement.

The three main themes identified among all users’ responses to a call for suggestions for the Web site, including information and/or documentation that they would like to have access to were: “better organization/function” (27%), “documentation requests” (23%), and “satisfied/no comment” (15%; see Table 54):

Table 54. Suggestions for the OLCF Web Site, Including Information and/or Documentation that Users Would Like Access To (*n* = 26)

Theme	Number of	%
Better organization/function	7	27%
Documentation requests	6	23%
Satisfied/no comment	4	15%
Improved, updated documentation	3	12%
Improve system status web	3	12%
Add more online training and tutorials	2	8%
Miscellaneous suggestion	1	4%

OLCF Systems Evaluation

Overall, respondents indicated they were satisfied with various aspects of the OLCF systems. Refer to Table 55 for users’ satisfaction with OLCF systems by project classification.

Table 55. Users’ Satisfaction with OLCF Systems by Project Classification

	INCITE	Director’s Discretion	ALCC	All Users
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Aspects of the OLCF Web sites	M (SD)	M (SD)	M (SD)	M (SD)
Sufficient notice given prior to scheduled	4.27 (0.66)	4.22 (0.72)	4.18 (0.53)	4.25 (0.67)
Sufficient project disk space	4.02 (0.84)	4.05 (0.85)	4.03 (0.66)	4.06 (0.81)
Bandwidth offered by OLCF	4.07 (0.71)	4.03 (0.70)	3.97 (0.72)	4.03 (0.70)
Ease of transferring data to/from the	3.93 (0.82)	3.97 (0.79)	3.82 (0.92)	3.94 (0.82)

Note. Means and standard deviations based on a rating scale of 1 = Very Dissatisfied to 5 = Very Satisfied.

Overall, the majority of respondents indicated they were “Satisfied” or “Very Satisfied” with each of the aspects of the OLCF systems evaluated (Table 56). Respondents indicated being most satisfied with the notice given prior to scheduled maintenance, with 90% reporting they were either “Satisfied” or “Very Satisfied” with this aspect of the systems. Ease of transferring data to/from the OLCF (5%) had the highest percentage of respondents indicating they were either “Dissatisfied” or “Very Dissatisfied.” For the disk space offered by OLCF, approximately 5% of users reported being either “Dissatisfied” or “Very Dissatisfied.”

Table 56. Users’ Satisfaction with OLCF Systems – All Users

Aspects of the OLCF	n	1 = Very	2 =	3 =	4 =	5 = Very	Mean
Sufficient notice given prior to scheduled maintenance	330	1 (<1%)	3 (1%)	28 (8%)	179 (54%)	119 (36%)	4.25
Sufficient project disk space	325	2 (<1%)	12 (4%)	48 (15%)	165 (51%)	98 (30%)	4.06
Bandwidth offered by OLCF	319	2 (1%)	2 (1%)	54 (17%)	186 (58%)	75 (23%)	4.03
Ease of transferring data to/from	323	3 (1%)	13 (4%)	62 (19%)	167 (52%)	78 (24%)	3.94

If a user rated any of the aspects of the OLCF systems with “Very Dissatisfied” or “Dissatisfied,” they were asked to explain their rating (Table 57). Twenty (74%) of the users who were “Very Dissatisfied” or “Dissatisfied” with one or more aspects of the OLCF systems provided explanations for their dissatisfaction. The most common explanations included “data transfer rate is very slow” (35%), “home space is too small” (35%), and “data is purged too frequently” (15%).

Table 57. Users’ Explanations for Dissatisfaction with OLCF Systems (n = 20)

If you rated any of the aspects of the OLCF systems in the previous question	Number of	%
Data transfer rate is very slow	7	35%
Home space is too small	7	35%
Data is purged too frequently	3	15%
Better notice needed before maintenance	2	10%
SSH Secure Shell issues	2	10%
Don't like Globus Online	2	10%
Miscellaneous	1	5%

Note. Users add up to more than 100% because some provided more than one explanation.

Of the 201 respondents who provided answers when asked “Compared to the previous year, have noted overall improvement in systems performance?” 65% (131 respondents) said they noticed an overall improvement in systems performance. Users with INCITE projects noted the most agreement that there was an improvement in systems performance (68% selected yes). Users with Director’s Discretion projects indicated the highest disagreement with this question, with 37% who responded “no.” Details are provided in Table 58.

Table 58. Changes in Systems Performance Overall at the OLCF Compared to the Previous Year

Compared to the previous year, have you noted overall improvement in systems	INCITE (n = 125)	Director's Discretion (n = 44)	ALCC (n = 44)	All Users (n = 103)
	# (%)	# (%)	# (%)	# (%)
Yes	85 (68%)	52 (63%)	28 (64%)	131 (65%)
No	40 (32%)	30 (37%)	16 (36%)	70 (35%)

Note. All Users totals may be less than totals for Project Classifications because some have more than one project type.

The 103 users who chose the response option “Not applicable” are not reported in this table.

Titan

Users’ overall satisfaction with Titan was moderately high ($M = 4.16$, $SD = 0.66$). Overall satisfaction with Titan was highest among users with INCITE projects ($M = 4.16$, $SD = 0.67$). When asked about satisfaction with various features of specific platforms, users were moderately satisfied in their satisfaction ratings of various aspects of the Titan (Tables 59 and 60). User satisfaction was highest with the overall system performance ($M = 4.13$, $SD = 0.75$) followed by the usability of the batch queue system ($M = 4.09$, $SD = 0.73$) and accessibility of the batch queue system ($M = 4.07$, $SD = 0.67$). The lowest rated aspect of the Titan platform was frequency of scheduled outages ($M = 3.71$, $SD = 0.81$).

Table 59. Evaluation of Titan by Project Classification

Overall satisfaction with Titan and aspects of Titan	INCITE	Director's Discretion	ALCC	All Users
	M (SD)	M (SD)	M (SD)	M (SD)
Overall satisfaction with Titan	4.16 (0.67)	4.13 (0.69)	4.14 (0.53)	4.16 (0.66)
Overall system performance	4.10 (0.81)	4.07 (0.79)	4.11 (0.60)	4.13 (0.75)
Usability of batch queue system	4.09 (0.79)	4.09 (0.72)	4.06 (0.63)	4.09 (0.73)
Programming libraries	4.10 (0.68)	4.03 (0.71)	4.06 (0.59)	4.07 (0.67)
Accessibility of batch queue system	4.06 (0.75)	4.01 (0.79)	4.00 (0.67)	4.06 (0.71)
Software environment	4.03 (0.73)	3.99 (0.71)	4.08 (0.65)	4.04 (0.70)
Job success rate	3.99 (0.75)	3.94 (0.80)	4.11 (0.60)	4.04 (0.73)
Performance tools	3.95 (0.69)	3.90 (0.74)	3.95 (0.65)	3.94 (0.71)
Debugging tools	3.89 (0.76)	3.81 (0.77)	3.92 (0.72)	3.88 (0.75)
Data analysis software	3.83 (0.80)	3.73 (0.73)	3.73 (0.63)	3.79 (0.75)
Frequency of unscheduled (unanticipated)	3.81 (0.81)	3.68 (0.79)	3.91 (0.63)	3.78 (0.77)
Job turnaround time	3.69 (0.95)	3.67 (0.94)	3.56 (1.00)	3.73 (0.90)
Frequency of scheduled outages	3.72 (0.83)	3.65 (0.86)	3.67 (0.87)	3.71 (0.81)

Note. Means and standard deviations based on a rating scale of 1 = Very Dissatisfied to 5 = Very Satisfied.

Table 60. Evaluation of Titan – All Users

Aspects of Titan	n	1 = Very	2 =	3 =	4 =	5 = Very	Not Applicable
Overall satisfaction with Titan	28	0 (0%)	3 (1%)	34 (12%)	161 (57%)	84 (30%)	35
Overall system performance	28	1 (<1%)	6 (2%)	40 (14%)	145 (51%)	92 (32%)	33
Usability of batch queue system	28	2 (1%)	5 (2%)	39 (13%)	162 (56%)	80 (28%)	34
Programming libraries	24	0 (0%)	2 (1%)	41 (16%)	139 (57%)	63 (26%)	71
Accessibility of batch queue	28	2 (1%)	4 (1%)	40 (14%)	167 (59%)	71 (25%)	35
Software environment	26	1 (<1%)	4 (2%)	41 (16%)	153 (58%)	62 (24%)	53
Job success rate	28	0 (0%)	7 (2%)	49 (18%)	151 (54%)	74 (26%)	39
Performance tools	20	0 (0%)	1 (<1%)	55 (27%)	103 (51%)	44 (22%)	111
Debugging tools	19	0 (0%)	2 (1%)	60 (31%)	87 (46%)	41 (22%)	125
Data analysis software	16	1 (1%)	0 (0%)	63 (37%)	74 (44%)	31 (18%)	145
Frequency of unscheduled (unanticipated) outages	269	3 (1%)	5 (2%)	82 (30%)	137 (51%)	42 (16%)	47

Job turnaround time	27	5 (2%)	19 (7%)	73 (26%)	131 (47%)	51 (18%)	39
Frequency of scheduled	27	3 (1%)	11 (4%)	94 (34%)	128 (46%)	43 (15%)	38

Note. Percentages are based on *n*, which does not include the not applicable responses displayed in the last column.

If a user rated any of the aspects of the Titan platform with “Very Dissatisfied” or “Dissatisfied,” they were asked to explain their rating (Table 61). Thirty-nine (78%) of the users who were “Very Dissatisfied” or “Dissatisfied” with one or more aspects of the Titan platform provided explanations for their dissatisfaction. The most common explanations included “queue complaints” (44%), “improve performance” (15%), and too many outages (13%).

Table 61. Users’ Explanations for Dissatisfaction with Titan (*n* = 39)

If you rated any of the aspects of the Titan platform in the previous question	Number of	%
Queuing complaints/issues	17	44%
Improve performance	6	15%
Too many outages	5	13%
Make more time available on Titan	5	13%
Module system issues	2	5%
Miscellaneous	6	15%

Note. Users add up to more than 100% because some provided more than one explanation.

HPSS

Users’ overall satisfaction with the HPSS archival storage platform was moderately high ($M = 4.07$, $SD = 0.70$). Overall satisfaction with the HPSS archival storage platform was highest among users with INCITE projects ($M = 4.14$, $SD = 0.72$). When asked about satisfaction with various features of the HPSS Archival Storage Platform, users were moderately satisfied in their satisfaction ratings (Tables 62 and 63). The HPSS aspect rated highest among users was reliability (data integrity) ($M = 4.09$, $SD = 0.76$). The ability to store files and reliability (data integrity) were highest for users with INCITE projects ($M = 4.14$, $SD = 0.71$ and $M = 4.14$, $SD = 0.78$, respectively). The ability to store files was highest for users with Director’s Discretion projects ($M = 4.05$, $SD = 0.76$). Users with “ALCC” projects also had two aspects of HPSS rated highest. In addition to the ability to store files, they also rated ability to retrieve files highest ($M = 3.95$, $SD = 0.62$).

Table 62. Evaluation of HPSS Archival Storage Platform by Project Classification

Aspects of the HPSS Archival Storage Platform	INCITE	Director’s Discretio	ALCC	All Users
	M (SD)	M (SD)	M (SD)	M (SD)
Reliability (data integrity)	4.14 (0.78)	4.01 (0.84)	3.94 (0.73)	4.09 (0.76)
Ability to store files	4.14 (0.71)	4.05 (0.76)	3.95 (0.62)	4.08 (0.70)
Overall satisfaction with HPSS	4.14 (0.72)	4.05 (0.74)	3.95 (0.57)	4.07 (0.70)
Ability to retrieve files	4.11 (0.70)	4.01 (0.77)	3.95 (0.62)	4.05 (0.70)
Frequency of unscheduled (unanticipated)	4.11 (0.77)	3.86 (0.79)	3.91 (0.70)	3.98 (0.76)
Time to store files	4.09 (0.79)	3.87 (0.80)	3.86 (0.71)	3.98 (0.78)
Frequency of scheduled outages	4.06 (0.77)	3.87 (0.76)	3.81 (0.75)	3.95 (0.75)
htar interface	4.02 (0.85)	3.87 (0.86)	3.74 (0.75)	3.94 (0.82)
Time to retrieve files	4.00 (0.80)	3.83 (0.80)	3.76 (0.75)	3.92 (0.77)
hsi interface	3.97 (0.88)	3.89 (0.84)	3.82 (0.77)	3.92 (0.84)

Note. Means and standard deviations based on a rating scale of 1 = Very Dissatisfied to 5 = Very Satisfied.

Table 63. Evaluation of HPSS Archival Storage Platform – All Users

Aspects of the HPSS Archival	n	1 = Very	2 =	3 =	4 =	5 = Very	Not Applicable
Reliability (data integrity)	188	1 (1%)	2 (1%)	34 (18%)	94 (50%)	57 (30%)	117
Ability to store files	194	1 (1%)	1 (1%)	32 (16%)	108 (5%)	52 (27%)	115
Overall satisfaction with	194	1 (1%)	1 (1%)	32 (16%)	109 (56%)	51 (26%)	115
Ability to retrieve files	191	1 (1%)	1 (1%)	33 (17%)	109 (57%)	47 (24%)	117
Frequency of unscheduled (unanticipated) outages	186	1 (1%)	0 (0%)	49 (26%)	87 (47%)	49 (26%)	121
Time to store files	196	1 (1%)	2 (1%)	49 (25%)	91 (46%)	53 (27%)	111
Frequency of scheduled	187	1 (1%)	0 (0%)	52 (28%)	89 (47%)	45 (24%)	117
htar interface	156	2 (1%)	2 (1%)	40 (26%)	72 (46%)	40 (26%)	149
Time to retrieve files	192	1 (1%)	2 (1%)	54 (28%)	90 (47%)	45 (23%)	113
hsi interface	172	2 (1%)	5 (3%)	41 (24%)	80 (47%)	44 (25%)	137

Note. Percentages are based on *n*, which does not include the not applicable responses displayed in the last column.

The three main themes identified among all users' responses to a call for suggestions for improvements to make HPSS more useful to their projects include: improvements to his and htar (38%), satisfied/no comments (19%), and I haven't learned to use HPSS/inexperienced (14%; see Table 64):

Table 64. Users' Suggestions for HPSS Archival Storage Platform Improvements by Project Classification (*n* = 21)

Are there any improvements needed to make HPSS more useful	Number of	%
Improvements to his and htar	8	38%
Satisfied/no comment	4	19%
I haven't learned to use HPSS/inexperienced	3	14%
Better performance	2	10%
Keep users from losing data	2	10%
Miscellaneous	2	10%

Lustre/Widow Scratch Filesystem

Users' overall satisfaction with the Lustre/Widow scratch filesystem was moderately high ($M = 4.07$, $SD = 0.68$). Overall satisfaction with the Lustre/Widow scratch filesystem was highest among users with INCITE projects ($M = 4.12$, $SD = 0.70$). When asked about satisfaction with various features of the Lustre/Widow Scratch Filesystem, users were moderately satisfied in their ratings (Tables 65 and 66). The Lustre/Widow scratch filesystem aspect rated highest among users was the reliability (data integrity) ($M = 4.11$, $SD = 0.65$). Reliability (data integrity) was highest among users with INCITE projects ($M = 4.15$, $SD = 0.61$). The size of the platform was highest among users with Director's Discretion and ALCC projects ($M = 4.08$, $SD = 0.71$ and $M = 4.07$, $SD = 0.54$, respectively).

Table 65. Evaluation of the Lustre/Widow Scratch Filesystem by Project Classification

Aspects of the Lustre/Spider Storage Platform	INCITE	Director's Discretion	ALCC	All Users
	M (SD)	M (SD)	M (SD)	M (SD)
Reliability (data integrity)	4.15 (0.61)	4.06 (0.67)	4.00 (0.75)	4.11 (0.65)
Size	4.12 (0.68)	4.08 (0.71)	4.07 (0.54)	4.11 (0.67)
Overall satisfaction with Lustre/Widow scratch	4.12 (0.70)	4.05 (0.65)	3.95 (0.62)	4.07 (0.68)
Frequency of scheduled outages	4.11 (0.63)	3.98 (0.66)	3.98 (0.63)	4.03 (0.65)
File and directory operations	3.98 (0.82)	3.98 (0.69)	3.91 (0.71)	4.00 (0.75)
I/O bandwidth	4.03 (0.74)	3.93 (0.73)	3.93 (0.64)	3.99 (0.72)
Frequency of unscheduled (unanticipated)	4.06 (0.68)	3.94 (0.67)	3.89 (0.70)	3.99 (0.67)

Note. Means and standard deviations based on a rating scale of 1 = Very Dissatisfied to 5 = Very Satisfied.

Table 66. Evaluation of the Lustre/Widow Scratch Filesystem – All Users

Aspects of the Lustre/Spider	n	1 = Very	2 =	3 = Neutral	4 = Satisfied	5 = Very	Not Applica
Reliability (data integrity)	266	1 (<1%)	1 (<1%)	35 (13%)	161 (61%)	68 (26%)	42
Size	264	0 (0%)	4 (2%)	34 (13%)	156 (59%)	70 (26%)	42
Overall satisfaction with Lustre/Widow scratch	268	1 (1%)	4 (2%)	36 (13%)	162 (60%)	65 (24%)	42
Frequency of scheduled	263	0 (0%)	1 (<1%)	48 (18%)	156 (59%)	58 (22%)	47
File and directory operations	271	2 (1%)	7 (3%)	44 (16%)	155 (57%)	63 (23%)	41
I/O bandwidth	268	1 (<1%)	5 (2%)	50 (19%)	151 (56%)	61 (23%)	45
Frequency of unscheduled	258	0 (0%)	4 (2%)	48 (18%)	153 (59%)	53 (21%)	52

Note. Percentages are based on N, which does not include the not applicable responses displayed in the last column.

The three main themes identified among all users' responses to a call for suggestions for improvements to make Lustre/Widow Scratch Filesystem more useful to their projects include: data is purged too frequently/need more space (25%), satisfied/no comments (19%), and improve I/O performance (13%; see Table 67):

Table 67. Users' Suggestions for Improvements to the Lustre Widow/Spider Storage Platform by Project Classification ($n = 32$)

Are there any improvements needed to make Lustre widow/spider storage more	Number of	%
Data is purged too frequently/need more space	8	25%
Satisfied/no comments	6	19%
Improve I/O performance	4	13%
Requests for user assistance/better communication	3	9%
Improve stability	2	6%
Need more tools	2	6%
Don't know/don't have enough experience	1	3%
Miscellaneous	6	19%

Data Analysis, Visualization, & Workflow

When asked how large their datasets in data analysis and visualization are, 317 users responded. The largest percentage of users who responded to this question (32%) reported that their datasets were less than 10 GBs. The rest of the users were relatively equally distributed in terms of varying larger dataset sizes (Table 68).

Table 68. Size of Users' Datasets in Data and Visualization ($n = 317$)

How large are your datasets in data analysis and visualization?	N	%
Less than 10 GBs	101	32%
11 to 50 GBs	60	19%
51 to 100 GBs	39	12%
101 GBs to 1 TB	65	21%
Larger than 1 TB	52	16%

With regards to data analysis and visualization tools currently used, the highest percentage of respondents (26%) reported using VisIt. This was followed by "My own tools/ offsite custom apps" (23%) and ParaView (15%). Fifteen more tools were reported by two or more users (Table 69). An additional 15 37 more tools were used by one user each.

Table 69. Data Analysis and Visualization Tools Currently Used ($n = 170$)

Data analysis and visualization	Number of	%
VisIt	45	26%
My own tools/ offsite custom apps	39	23%
ParaView	26	15%
Matlab	23	14%
VMD	16	9%
NCL/ gvncl	15	9%
None	15	9%
IDL	13	8%
Tecplot	8	5%
R	8	5%
Ensignt	6	4%

Python	5	3%
Fortran	5	3%
NCO	4	2%
Gnuplot	4	2%
Ferret	3	2%
CFView	2	1%
Mathematica	2	1%
Miscellaneous tools	37	22%

When asked about contact with the visualization staff, the average rating across all aspects evaluated among all users was 4.02 ($SD = 0.83$). The average rating for “the sufficiency of the data analysis and visualization tools provided by OLCF” was the aspect of visualization rated highest by all users ($M = 4.07$, $SD = 0.75$). Details are provided in Table 70.

Table 70. Evaluation of Visualization by Project Classification

Aspects of visualization:	INCITE	Director's	ALCC	All
	M (SD)	M (SD)	M (SD)	M (SD)
Speed of initial response to queries by the	4.12 (0.75)	4.12 (0.78)	4.00 (0.93)	4.07 (0.77)
Speed of final resolution to queries by the	4.04 (0.82)	4.06 (0.80)	3.80 (0.94)	3.99 (0.83)
Effectiveness of problem resolution by the	4.00 (0.96)	4.03 (0.85)	3.94 (1.00)	3.96 (0.92)
Helpfulness of the visualization staff	4.10 (0.85)	4.12 (0.78)	4.13 (0.89)	4.07 (0.83)
The sufficiency of the visualization cluster (hardware) for	4.02 (0.90)	3.86 (0.93)	3.72 (1.07)	3.95 (0.90)
The sufficiency of the data analysis and visualization tools	4.15 (0.67)	4.05 (0.77)	4.10 (0.97)	4.07 (0.75)
Overall Mean	4.07	4.04	3.95	4.02

When asked about contact with the visualization staff, most respondents reported being “Satisfied” or “Very Satisfied,” with all aspects evaluated. Respondents were most satisfied with the sufficiency of the data analysis and visualization tools provided by OLCF (78%) and the speed of initial response to queries by the visualization staff (77%). In addition, most aspects of visualization only received ratings of “Dissatisfied” or “Very Dissatisfied” from 1-3% of users; however, “the sufficiency of the visualization cluster (hardware) for users’ data processing needs” had the highest percentage of “Dissatisfied” or “Very Dissatisfied” users at 5% (Table 71).

Table 71. Evaluation of Visualization – All Users

Aspects of visualization:	n	1 = Very Dissatisfi	2 =	3 = Neutral	4 =	5 = Very	Not Applica
Speed of initial response to queries	81	0 (0%)	1 (1%)	18 (22%)	36 (45%)	26 (32%)	219
Speed of final resolution to queries by the visualization	80	1 (1%)	1 (1%)	19 (24%)	36 (45%)	23 (29%)	220
Effectiveness of problem resolution	82	2 (2%)	1 (1%)	21 (26%)	32 (39%)	26 (32%)	217
Helpfulness of the visualization	82	1 (1%)	0 (0%)	19 (23%)	34 (42%)	28 (34%)	218
The sufficiency of the visualization cluster (hardware) for your	96	1 (1%)	4 (4%)	23 (24%)	39 (41%)	29 (30%)	204

The sufficiency of the data analysis and visualization tools	99	0 (0%)	1 (1%)	21 (21%)	47 (48%)	30 (30%)	198
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Note. Percentages are based on N, which does not include the not applicable responses displayed in the last column.

If a user rated any of the aspects of their contact with visualization staff with “Very Dissatisfied” or “Dissatisfied,” they were asked to explain their rating (Table 72). All of the users (n= 6) who were “Very Dissatisfied” or “Dissatisfied” with one or more aspects of their contact with visualization staff provided explanations for their dissatisfaction. The most common explanations included “Lens issues” (67%), and “more/better support needed” (33%).

Table 72. Users’ Explanations for Dissatisfaction with Visualization Services (*n* = 6)

If you rated any of the aspects of the OLCF systems in the previous question	Number of	%
Lens issues	4	67%
More/better support	2	33%
Not enough memory	1	17%
Increased collaboration	1	17%

Note. Users add up to more than 100% because some provided more than one explanation.

Users were asked if they needed assistance with analysis and visualization of their data. Of the 143 users who responded to this question, 24% said yes, and an additional 7% said maybe or not right now, but maybe later. Refer to Table 73 for themes among users’ responses.

Table 73. Users’ Need for Assistance with Analysis and Visualization of Their Data (*n* = 143)

Do you need assistance with analysis and visualization of your	N	%
No	88	62%
Yes	34	24%
Maybe/Not now, but maybe later	10	7%
Other	6	4%
Already receiving assistance	4	3%
Not usually	2	1%

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

In response to three questions regarding users’ visualization needs, the majority of respondents did not show interest or indicate their needs. Only 18% of respondents reported that they needed assistance using workflow tools for their analysis or large-scale simulations, while 24% wanted help in optimizing the I/O in their codes. However, 41% (124) of users indicated that they would be interested in applying the OLCF end-to-end dashboard to their simulations in real- time (Table 74).

Table 74. OLCF User Visualization Needs

Needs/Interests	n	Yes # (%)	No # (%)
Do you need assistance applying workflow tools for your analysis or large-	300	54 (18%)	246 (82%)
Do you need help in optimizing your I/O in your codes?	297	72 (24%)	225 (76%)
Would you be interested in applying our end-to-end dashboard, which is a web-based application, for displaying results (images/textual	300	124 (41%)	176 (59%)

In response to a question regarding how OLCF could better support users' data analysis, visualization, and/or workflow experience, 20% of respondents mentioned "Lens issues" (Table 75). Another 20% of respondents said that they were satisfied. Three additional themes came in second most frequently suggested at 13% each "haven't used visualization facilities yet/don't have questions yet," "suggestions," and "training requests."

Table 75. Evaluation of OLCF Support of User Visualization Needs ($n = 6$)

Theme	N	%
Lens issues	6	20%
Satisfied	6	20%
Haven't used visualization facilities yet/don't have questions yet	4	13%
Suggestions	4	13%
Training requests	4	13%
Need more staff/support	3	10%
Improve workflow/efficiency	2	7%
Miscellaneous	5	17%

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

Looking to the Future

When asked if they run their own code, 80% (270) of users who responded to the question said "Yes." Those users were then asked to give the name and a brief description of the code they run. 86% (231) of users responded with the name and description of one or more codes. Of the 171 codes listed, 36 were listed by one or more users (Table 76). Fifty-nine percent (166) of respondents, who run their own code, reported that their code uses GPU acceleration (Table 77). The majority of those who chose to specify which technologies they used reported using CUDA (82%; Table 78).

Table 76. Codes OLCF Users Run ($n = 230$)

Theme	Number of	%
CESM	13	6%
S3D	10	4%
LAMMPS and modifications of	5	2%
Denovo	4	2%
FINE/Turbo	4	2%
LSMS	4	2%
NAMD	4	2%
PHASTA	4	2%
Quantum espresso	4	2%
BCL	3	1%
CASTRO	3	1%
Exnihilo	3	1%
openFOAM	3	1%
Osiris	3	1%
WRF	3	1%
XGC	3	1%
ARCHES	2	1%
CASINO	2	1%
CASL	2	1%
Chimera	2	1%
CL-SHASTA	2	1%
CP2K	2	1%
CWRF	2	1%

Geant4	2	1%
GenASiS	2	1%
LS3DF	2	1%
MPACT	2	1%

Table 76 - continued

Theme	Number of	%
NekTar	2	1%
NIMROD	2	1%
nwchem	2	1%
OpenMM	2	1%
qmcpack	2	1%
RAPTOR	2	1%
RMG	2	1%
TDSLDA	2	1%
VPIC	2	1%
Miscellaneous codes	135	59%

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

Table 77. Users Whose Code Uses GPU Acceleration ($n=279$)

Does your code utilize GPU	Number of	%
No	166	59%
Yes	113	41%

Table 78. GPU Programming Technologies Being Used ($n=111$)

If you answered yes, which GPU programming	Number of respondents	%
CUDA	91	82%
OpenACC	23	21%
OpenCL	14	13%
Other	5	5%

Note. Users add up to more than 100% because some preferred more than one effort to use GPGPUs.

When asked if they are currently thinking about implementing GPU technology, 62% (99) of respondents said “Yes” (Table 79). Eighty-nine users shared which GPU acceleration they were thinking about using, the majority of whom were thinking about using CUDA (58%) or OpenACC (55%; Table 80).

Table 79. Users Thinking About Using GPU Programming Technologies ($n=159$)

Are you currently thinking about implementing GPU	Number of respondent	%
Yes	99	62%
No	60	38%

Table 80. GPU Programming Technologies Users Have Started Thinking about Using? ($n=89$)

If you answered yes, which GPU programming technologies have	Number of respondent	%
CUDA	52	58%
OpenACC	49	55%
Other	23	26%
OpenCL	9	10%

Note. Users add up to more than 100% because some have been thinking of more than one technology to use.

Users who run their own code and have no plans to use GPU programming technologies were asked to explain why they do not plan on using GPU acceleration. The top three most common themes among

respondents' comments were "don't think it can help/not necessary" (31%), "not familiar enough" (28%), and "don't have time/support" (25%). Refer to Table 81 for themes.

Table 81. Reasons Why Users Do Not Plan to Utilize GPU Accelerator Technologies? ($n=32$)

If you run your own code and have no plans to utilize GPU programming technologies, could you tell us the reasons as to why you do	Number of	%
Don't think it can help/not necessary	10	31%
No familiar enough	9	28%
Don't have time/support	8	25%
Waiting for interface to mature/code to standardize	4	13%
Miscellaneous	5	16%

Note. Users add up to more than 100% because some comments contained more than one theme.

Users were asked to provide comments regarding Titan's use of GPU accelerators. The top three most common themes among respondents' comments were that OLCF were satisfied (27%), users were new or early users/or haven't used yet (23%), and suggestions/requests (20%). Refer to Table 82 for themes.

Table 82. Users Comments Regarding Titan ($n=66$)

Please list any comments you may have regarding Titan's use of GPU	Number of	%
Satisfied	18	27%
Still new or early user/or haven't used yet	15	23%
Requests/suggestions	13	20%
Complaints/issues	8	12%
Need assistance	6	9%
No comment	5	8%
Queue issues	2	3%
Miscellaneous	6	9%

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

