

LQCD-ext Project Management & Performance

Bill Boroski
LQCD-ext Contractor Project Manager

DOE FY2012 Annual Progress Review
Brookhaven National Laboratory
May 16-17, 2012

Outline

- ▶ Updates to project scope, budget, and organization
- ▶ FY11 & FY12 performance results
- ▶ FY11 & FY12 financial results
- ▶ User survey results
- ▶ FY13 hardware acquisition strategy
- ▶ Summary

LQCD-Ext Project Scope

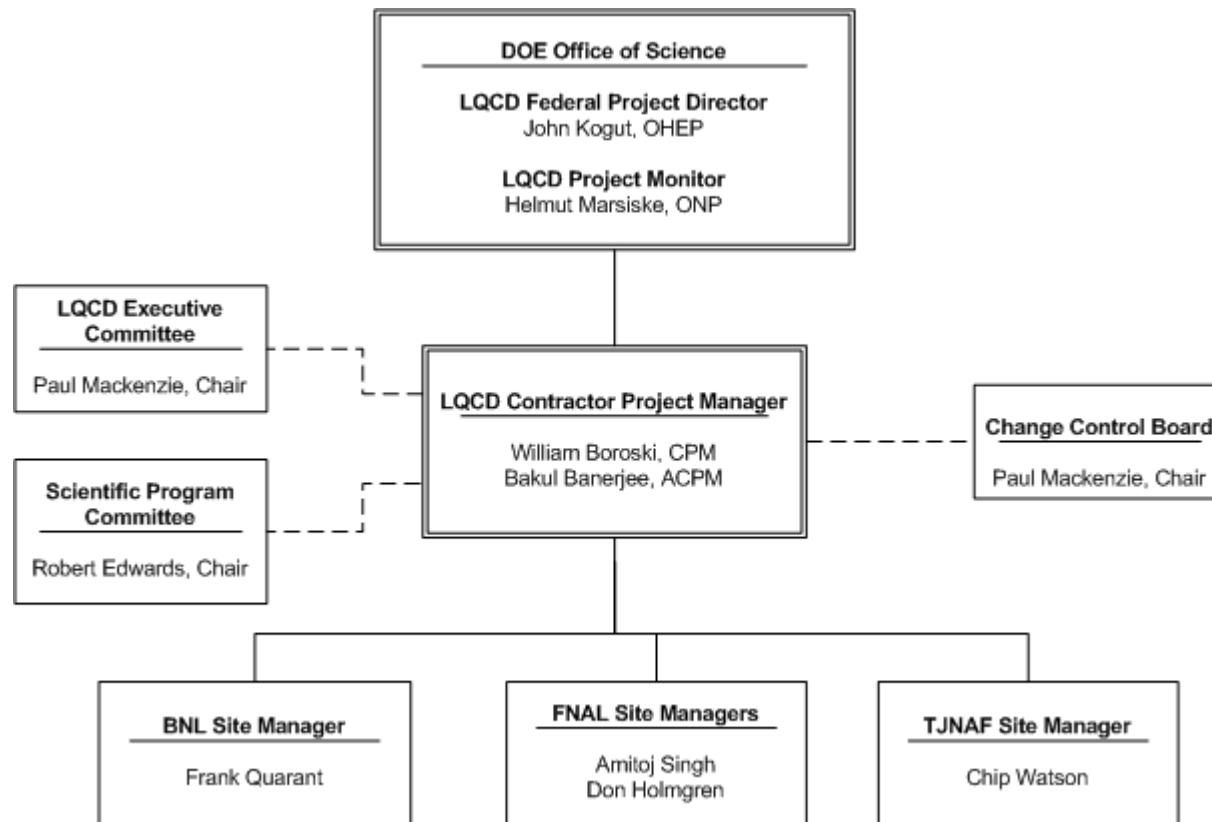
- ▶ Acquire and operate dedicated hardware at BNL, JLab, and FNAL for the study of QCD during the period FY2010–2014.
- ▶ Scope includes acquisition, deployment, and operation of computing facilities; software development is out of scope.
- ▶ Currently executing against baseline plan, with a few exceptions
 - Several machines have been operated beyond planned lifetimes
 - QCDOC at BNL was operated through August 2011
 - 7n at JLab was operated through mid-May 2012
 - Kaon at FNAL is still in use
 - FY11 procurement included a mix of conventional Infiniband cluster nodes and GPU-accelerated nodes. FY12 procurement will also contain a mix.
 - Planning to provide a modest level of salary and M&S support for the operation of prototype BG/Q at BNL, in exchange for 20 TF (peak) compute capacity (10% of one rack).
 - Will assume responsibility for operating and supporting the compute hardware at JLab acquired under the LQCD-ARRA project (FY13–14).

Project Execution & Work Planning

- ▶ Project Execution Plan (PEP)
 - Controlled document defining project need, requirements, scope, management, cost and schedule, change control, etc.
- ▶ Work organized via WBS
 - MS Project used to identify tasks, develop schedules, and track progress against milestones
 - Work broken down into two primary areas:
 - Steady-state operations and maintenance
 - Procurement and deployment of equipment and new systems
- ▶ Other important project documents
 - Risk Management Plan, Acquisition Strategy Documents, Annual Acquisition Plans, C&A Documentation
 - All under formal version control

| ID | WBS | Task Name | Start | Finish | 2010 | | | | 2011 | |
|----|--------------|---|--------------|--------------|------|----|----|----|------|------|
| | | | | | H2 | H1 | H2 | H1 | | |
| 1 | 1 | LQCDEXT | Mon 10/4/10 | Fri 9/30/11 | | | | | | 57 |
| 1 | 1.1 | BNL | Mon 10/4/10 | Fri 9/30/11 | | | | | | 57 |
| 2 | 1.1.2 | LQCDEXT BNL FY11 | Mon 10/4/10 | Fri 9/30/11 | | | | | | 57 |
| 3 | 1.1.2.7 | FY11 BNL site operation | Mon 10/4/10 | Fri 9/30/11 | | | | | | 57 |
| 4 | 1.1.2.7.7 | Site operation & management of LQCDEXT | Mon 10/4/10 | Fri 9/30/11 | | | | | | 58% |
| 5 | 1.1.2.7.8 | Decommissioning QCDOC | Fri 7/29/11 | Fri 7/29/11 | | | | | | 0% |
| 2 | 2 | LQCDEXT_FINALFY10_14.mpp | Tue 1/19/10 | Thu 10/20/11 | | | | | | 47 |
| 1 | 2.1 | FNAL | Tue 1/19/10 | Thu 10/20/11 | | | | | | 47 |
| 2 | 2.1.2 | LQCDEXT FNAL FY11 | Tue 1/19/10 | Thu 10/20/11 | | | | | | 47 |
| 3 | 2.1.2.1 | FY11 FNAL - plan and deploy system | Tue 1/19/10 | Thu 10/20/11 | | | | | | 37 |
| 4 | 2.1.2.1.1 | Deploy FY10 Hardware in "Friendly user" | Tue 9/21/10 | Tue 11/30/10 | | | | | | 100% |
| 5 | 2.1.2.1.2 | Plan FNAL FY11 deployment work | Tue 1/19/10 | Fri 7/15/11 | | | | | | 76% |
| 6 | 2.1.2.1.2.1 | Test processors and chipsets for FY | Mon 10/4/10 | Fri 10/15/10 | | | | | | 100% |
| 7 | 2.1.2.1.2.2 | System Design Document for GPU | Mon 10/18/10 | Mon 5/23/11 | | | | | | 90% |
| 8 | 2.1.2.1.2.8 | Decision to split Ds expansion purch | Tue 1/19/10 | Tue 1/19/10 | | | | | | 100% |
| 9 | 2.1.2.1.2.3 | Release RFP (new HW) | Tue 5/31/11 | Tue 5/31/11 | | | | | | 0% |
| 10 | 2.1.2.1.2.4 | Receive RFP (new HW) responses | Wed 6/1/11 | Thu 6/30/11 | | | | | | 0% |
| 11 | 2.1.2.1.2.5 | Award FY2011 purchase contract (r | Fri 7/1/11 | Fri 7/15/11 | | | | | | 0% |
| 12 | 2.1.2.1.2.6 | Exercise FY2011 purchase option 1 | Mon 3/7/11 | Tue 3/8/11 | | | | | | 100% |
| 13 | 2.1.2.1.2.7 | Exercise FY2011 purchase option 2 | Tue 5/31/11 | Wed 6/1/11 | | | | | | 100% |
| 14 | 2.1.2.1.3 | Deploy FY11 hardware | Fri 10/22/10 | Thu 10/20/11 | | | | | | 0% |
| 15 | 2.1.2.1.3.1 | Delivery of Opt. 1 4 Tflops Ds hardw | Wed 5/4/11 | Tue 5/10/11 | | | | | | 0% |
| 16 | 2.1.2.1.3.2 | Release to production of Option 1 4 r | Wed 6/1/11 | Wed 6/1/11 | | | | | | 0% |
| 17 | 2.1.2.1.3.7 | Delivery of 4 Tflops Ds hardware co | Tue 8/9/11 | Mon 8/15/11 | | | | | | 0% |
| 18 | 2.1.2.1.3.6 | Release to production of Option 2 4 r | Thu 9/1/11 | Thu 9/1/11 | | | | | | 0% |
| 19 | 2.1.2.1.3.9 | Sample unit received | Mon 8/1/11 | Mon 8/1/11 | | | | | | 0% |
| 20 | 2.1.2.1.3.8 | Delivery of new HW complete | Tue 9/6/11 | Thu 9/15/11 | | | | | | 0% |
| 21 | 2.1.2.1.3.10 | Acceptance test complete | Fri 9/16/11 | Thu 10/20/11 | | | | | | 0% |
| 22 | 2.1.2.1.3.5 | Release to production - new HW | Thu 10/20/11 | Thu 10/20/11 | | | | | | 10% |
| 23 | 2.1.2.1.3.3 | Support deployment of new HW syst | Thu 10/22/10 | Thu 10/20/11 | | | | | | 9% |
| 24 | 2.1.2.1.3.4 | Procurement and deployment of 128 | Thu 10/20/11 | Thu 10/20/11 | | | | | | 10% |
| 25 | 2.1.2.2 | FY11 FNAL site operation | Fri 10/1/10 | Thu 9/29/11 | | | | | | 58% |
| 26 | 2.1.2.2.1 | Site operation & management of LQCDEXT | Fri 10/1/10 | Thu 9/29/11 | | | | | | 58% |
| 27 | 2.1.2.3 | FY11 project management | Fri 10/1/10 | Thu 9/29/11 | | | | | | 57% |
| 28 | 2.1.2.3.1 | Manage LQCDEXT project | Fri 10/1/10 | Thu 9/29/11 | | | | | | 58% |
| 29 | 2.1.2.3.2 | Management Reserve | Fri 10/1/10 | Fri 10/1/10 | | | | | | 0% |
| 30 | 2.1.2.3.3 | DOE progress review complete | Tue 5/10/11 | Wed 5/11/11 | | | | | | 0% |
| 31 | 2.1.2.3.4 | 22 Teraflops-years aggregate computing | Thu 9/29/11 | Thu 9/29/11 | | | | | | 9/2 |
| 3 | 3 | LQCDEXT_JLABFY10_14.mpp | Fri 10/1/10 | Thu 9/29/11 | | | | | | 58% |
| 1 | 3.1 | JLAB | Fri 10/1/10 | Thu 9/29/11 | | | | | | 58% |
| 2 | 3.1.2 | LQCDEXT JLAB FY11 | Fri 10/1/10 | Thu 9/29/11 | | | | | | 58% |
| 3 | 3.1.2.1 | FY11 JLAB site operation | Fri 10/1/10 | Thu 9/29/11 | | | | | | 58% |
| 4 | 3.1.2.1.1 | Site operation & management of LQCDEXT | Fri 10/1/10 | Thu 9/29/11 | | | | | | 58% |

Management & Oversight



- ▶ Changes since last year
 - Robert Edwards replaced Frithjof Karsch as SPC Chair
 - Frank Quarant replaced Eric Blum as BNL Site Manager

LQCD-Ext Project Budget

- ▶ Approved Baseline Budget = \$18.15 million
 - Jointly funded by DOE Offices of High Energy and Nuclear Physics

Approved Funding Profile (in \$K)

| Expenditure Type | FY10 | FY11 | FY12 | FY13 | FY14 | Total |
|--------------------|--------------|--------------|--------------|--------------|--------------|---------------|
| Personnel | 1,139 | 1,306 | 1,456 | 1,340 | 1,644 | 6,885 |
| Travel | 13 | 11 | 12 | 12 | 12 | 60 |
| M&S | 104 | 84 | 84 | 84 | 84 | 440 |
| Equipment | 1,684 | 1,779 | 1,974 | 2,589 | 2,379 | 10,405 |
| Management Reserve | 60 | 69 | 75 | 75 | 81 | 360 |
| Total | 3,000 | 3,250 | 3,600 | 4,100 | 4,200 | 18,150 |

Hardware Budget Breakdown (in \$K)

| Fiscal Year | Compute Hardware | Storage Hardware | Total |
|--------------|------------------|------------------|---------------|
| FY10 | 1,600 | 84 | 1,684 |
| FY11 | 1,690 | 89 | 1,779 |
| FY12 | 1,875 | 99 | 1,974 |
| FY13 | 2,460 | 129 | 2,589 |
| FY14 | 2,260 | 119 | 2,379 |
| Total | 9,885 | 520 | 10,405 |

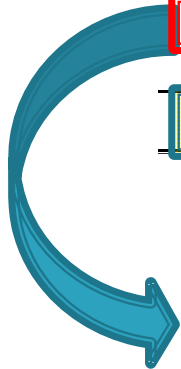
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LQCD-Ext Project Budget

- ▶ We are currently half-way through the LQCD-Ext project.

- ▶ Changes in the budget forecast, relative to the baseline.
 - TPC reduced by \$100K due to tight budget constraints in FY12.
 - Was \$18.15 million; Now \$18.05 million.
 - Personnel Budget Changes
 - Updated salary cost basis for FY13-14
 - Modified staffing model based on operating experience
 - Increased staffing support to operate BG/Q and ARRA facilities in FY13-14
 - Storage Hardware Budget Changes
 - Increased to accommodate growing storage needs
 - Compute Hardware Budget Changes
 - Reduced to accommodate staffing support for BG/Q and ARRA in FY13-14
 - Reduced to accommodate increased storage needs
 - \$94K of unspent management reserve from FY10-11 has been applied to FY12 hardware procurement and deployment budget

LQCD-Ext Project Budget

- ▶ Comparison of current forecast to baseline budget (\$K)

| Expenditure Type | Baseline Budget | Current Forecast | Change Relative to Baseline | % Change |
|--------------------------|-----------------|------------------|-----------------------------|----------------|
| Personnel | 6,885 | 7,038 | 153 | 2% |
| Travel | 60 | 60 | 0 | 1% |
| M&S (spares, tape, etc.) | 440 | 465 | 25 | 5% |
| Compute Hardware | 9,885 | 9,526 | (359) | (4%) |
| Storage Hardware | 520 | 691 | 171 | 25% |
| Management Reserve | 360 | 269 | (91) | (25%) |
| Total | 18,150 | 18,050 | (100) | (0.6 %) |

“Change Relative to Baseline” shows the net effect of the changes previously described.

We are managing the budget to maximize scientific output, and in accordance with the procedures and processes defined in the approved Project Execution Plan.

Performance Measures & Metrics

LQCD Hardware Performance Data

- ▶ Performance and utilization data are available online for LQCD-ext resources at all three sites (BNL, JLab, and FNAL)
 - QCDOC at BNL: <http://lqcd.bnl.gov/comp/usage/> (active thru end-of-life: Sep 2011)
 - 7n at JLab: <http://lqcd.jlab.org/> (active thru end-of-life: May 2012)
 - Kaon, J-Psi, D_s , and D_{sg} at FNAL: <http://www.usqcd.org/fnal>
- ▶ Available data include:
 - Machine usage on an hourly, daily, weekly, monthly, annual basis
 - Interactive views that allow users to select performance periods
 - System and node health monitoring
 - Node uptime, system temperature, processor temperature and fan speeds, CPU load average.
 - Job data
 - Project allocation usage, jobs running and in queue, nodes allocated to projects.
- ▶ Performance and utilization data for BG/Q will become available once that machine is in production operations
- ▶ Performance and utilization for ARRA resources are already available online.

Performance Measures & Metrics

- ▶ Performance goals and milestones for LQCD-ext are documented in the Project Execution Plan (Appendices C & D).
 - ▶ Ensures that the performance goals and milestones remain under formal change control and are readily available to the project team and stakeholders.
 - ▶ These are the same goals and milestones that had previously been explicitly defined in the baseline OMB Exhibit 300 document.

- ▶ 19 project milestones (*for LQCD-ext*)
 - ▶ External reviews of future procurement plans
 - ▶ Incremental procurements/TFlops-deployed
 - ▶ Aggregate TFlops-yrs delivered

- ▶ 29 performance indicators (*for LQCD-ext*)
 - ▶ Additional computing resources brought on-line
 - ▶ System performance (i.e., % of time system available for work)
 - ▶ Process improvements (i.e., % of tickets closed within 2 business days)
 - ▶ Customer satisfaction (measured through user surveys)

- ▶ Progress against these goals is tracked and reported periodically to the Federal Project Manager.

FY11 Performance Summary (1)

Comparison of Actuals to Approved Baseline

| Milestone # | Description | Actual Results | Planned Cost (\$K) | Actual Cost (\$K) | % of Plan | Planned Completion | Actual Completion |
|-------------|---|---|--------------------|-------------------|-----------|--------------------|--|
| 22 | Architecture planning for FY12 procurement reviewed by external DOE committee | Plan reviewed & accepted | 54 | 5 | 9% | 09/30/11 | 07/29/11 |
| 23 | Procurement & deployment of 12 TF (sustained) system | 17.5 TF* <i>IB Cluster</i> <i>9.0 TF</i> <i>(75% of goal)</i> <i>and</i> <i>GPU Cluster</i> <i>8.5 TF*</i> <i>(equivalent)</i> | 1,997 | 1,931** | 97% | 06/30/11 | 08/01/11 <i>(IB cluster)</i> and 03/01/12 <i>(GPU cluster)</i> |
| 24 | 22.0 TF-yrs aggregate computing delivered | 31.48 TF-yrs*** (143% of goal) | 1,199 | 1,280 | 107% | 09/30/11 | 09/30/11 |
| 25 | Security controls testing and contingency plan review complete at BNL, FNAL, and JLab | Completed as planned | 0 | 0 | 100% | 08/31/11 | 08/31/11 |

* Total includes contributions from conventional Infiniband cluster and GPU-accelerated cluster.

** Includes costs that were obligated in FY11 for the FY11 cluster procurement, but actually costed in FY12.

*** Includes operation of Kaon, 7n, and QCDOC machines in FY11, which was not planned for when the baseline was prepared. Since project funds supported the continued operation of these machines, the delivered performance has been included in the total computing delivered.

FY11 Performance Summary (2)

Performance against other Key Performance Indicators (KPIs)

| Measurement Indicators | Target | Actual Results |
|---|--|---|
| Customer Satisfaction Rating | ≥92% | 87% |
| % of tickets closed within two business days | ≥95% | 95% BNL: 100% (83/83 tickets) FNAL: 98% (311/317 tickets) TJNAF: 81% (62/77 tickets) |
| % of average machine uptime at the metafacility | ≥95% | 96.6% (weighted ave) BNL: 97.9% FNAL: 96.7% TJNAF: 93.5% |
| Weekly vulnerability scans | Scans performed at least weekly at each host institution | Daily scans performed at all sites. Performance goal exceeded. |

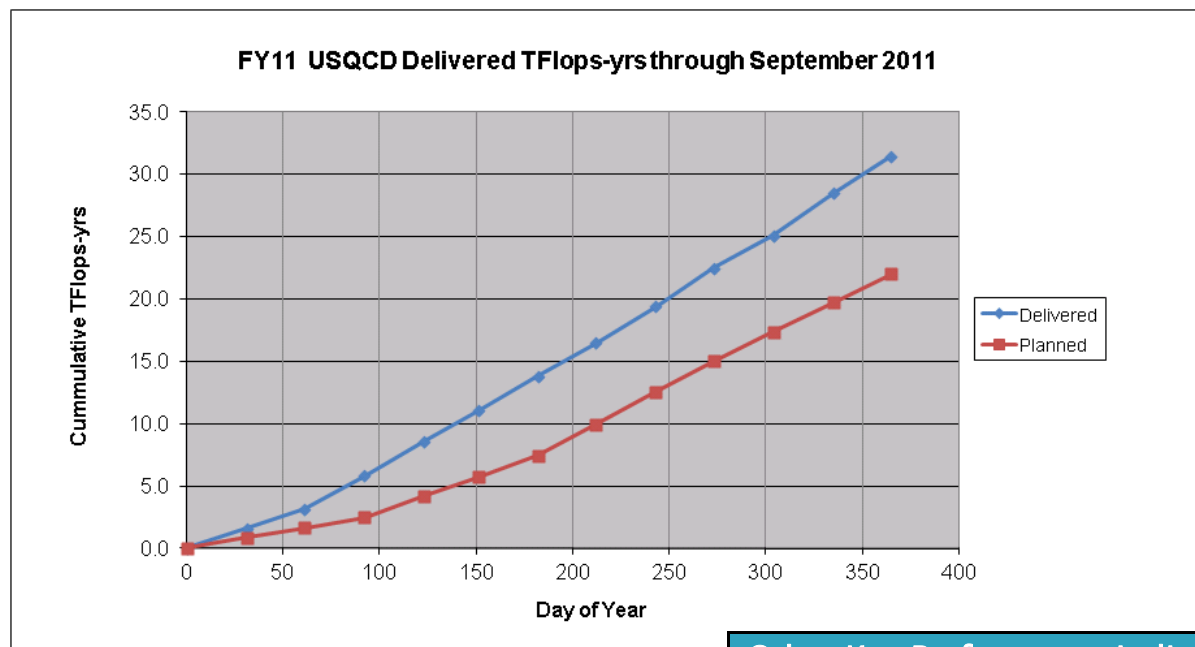
- ▶ All KPI metrics were met with the exception of our overall Customer Satisfaction Rating
 - Although our satisfaction rating increased from 81% in FY10 to 87% in FY11, it is still below our performance target.

FY11 Performance Summary (3)

- ▶ All milestones were completed within acceptable budget variances ($\pm 10\%$).
- ▶ We did not meet target deployment dates due to the impact of the FY11 Continuing Resolution
 - We released the first part of the FY11 machine on June 6, ahead of the target deployment date of June 30.
 - However, because the release rate of funds was throttled due to the CR, we were not able to procure the full Infiniband cluster in a single procurement action. As a result, the compute capacity deployed in June was below the target.
 - Per plan, once funds became available, we exercised the procurement option and released the second part of the cluster on August 8.
 - Deployment of the GPU cluster was delayed due to the impact of the CRs, negotiations with the vendor, flooding in Thailand, and holiday schedules.
- ▶ All KPI metrics were met with the exception of our overall Customer Satisfaction Rating

FY11 Performance Summary

- ▶ FY11 Goal = 22.0 TFlops-yrs
- ▶ Actual = 31.48 TFlops-yrs (143% of goal)



FY11 Acquisition Plan called for both Infiniband and GPU cluster deployments.

Milestone target dates for both IB and GPU cluster deployments were missed due to impact of Continuing Resolution and Thailand flooding.

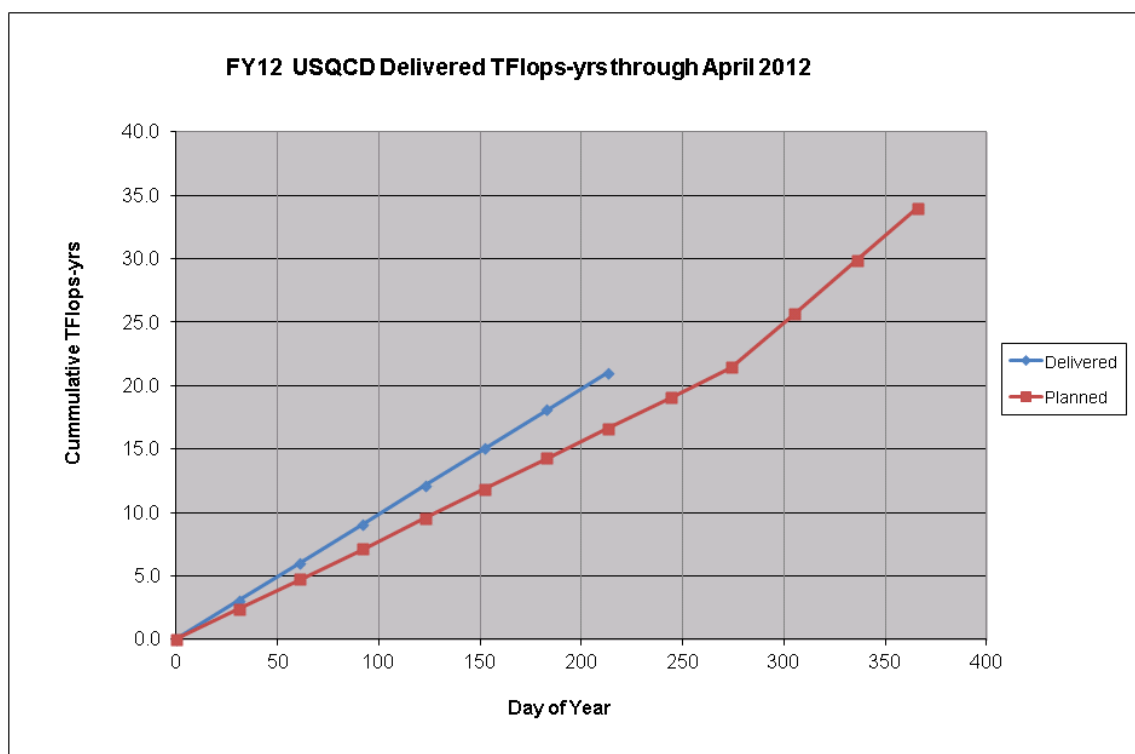
Project operated QCDOC (BNL), Kaon (FNAL), and 7n (JLab) beyond planned lifetimes.

| Other Key Performance Indicators (KPIs) | Target | Actual |
|---|--------|----------|
| TFlops deployed | 12 TF | 17.5 TF* |
| Customer satisfaction rating | ≥92% | 87% |
| % tickets closed within 2 business days | ≥95% | 95% |
| % average machine uptime | ≥95% | 97% |

*Infiniband cluster = 9 TF; GPU cluster = 8.5 TF (effective)

FY12 Milestone Performance *(TFlops-yrs delivered)*

- ▶ Data for FY12 conventional Infiniband clusters thru April 2012 are shown.
- ▶ The unmodified goal for FY12 is 34.0 TFlops-yrs.
- ▶ Goal through April = 16.6 TFlops-yrs
- ▶ Actual = 21.0 TFlops-yrs (126% of goal)



“Unmodified” project goal assumes only conventional Infiniband clusters

- Project is operating both Kaon (FNAL) and 7n (JLab) clusters beyond planned lifetimes
- At the current pace, even without contributions from the planned JLab IB cluster starting in FY12Q4, we will still meet the unmodified goal, because of strong uptimes and contributions from Kaon and 7n

We are beginning to formulate new project goals that take into account both conventional and GPU-accelerated clusters.

Financial Performance

FY11 Project Cost Summary – Final

| Fund Type | FY10 Carry-forward | FY11 Budget | Total FY11 Funds Available | FY11 Actual Costs | FY11 Obligations | % Spent & Obligated |
|--------------|--------------------|------------------|----------------------------|-------------------|------------------|---------------------|
| Equipment | \$ 1,162K | \$ 1,690K | \$ 2,852K | \$ 2,138K | \$ 525K | 93% |
| Operating | \$ 136K | \$ 1,491K | \$ 1,627K | \$ 1,599K | --- | 98% |
| Sub-total | \$ 1,298K | \$ 3,181K | \$ 4,479K | \$ 3,737K | \$ 525K | 95% |
| Mgmt Reserve | \$ 132K | \$ 69K | \$ 201K | \$ 0K | \$ 0K | 0% |
| TOTAL | \$ 1,430K | \$ 3,250K | \$ 4,680K | \$3,737K | \$ 525K | 91% |

- Operating costs were in line with the baseline plan.
- \$525K in equipment funds were obligated late in FY11 for the GPU-accelerated cluster that was received in early FY12 and placed into production in Dec 2011.
- No management reserve funds were expended in FY11.
- \$94K in unspent management reserve from FY10/11 was added to the FY12 hardware budget, in accordance with the approved baseline plan.
- All remaining unspent funds have been carried forward into the FY12 budget.

FY12 Project Cost Summary

Status through March 2012; fiscal year complete: 50%

| Fund Type | FY11 Carry-forward | FY12 Budget | Total FY12 Funds Available | FY12 Actual Costs | FY12 Obligations | % Spent & Obligated |
|---------------------------|--------------------|------------------|----------------------------|-------------------|------------------|---------------------|
| Equipment | \$ 526K | \$ 1,973K | \$ 2,499K | \$ 525K | \$ 842K | 55% |
| Operating | \$ 285K | \$ 1,452K | \$ 1,737K | \$ 603K | \$ 39K | 37% |
| Sub-total | \$ 811K | \$ 3,425K | \$ 4,236K | \$ 1,128K | \$ 881K | 47% |
| Mgmt Reserve | \$ 35K | \$ 75K | \$ 110K | --- | --- | 0% |
| Anticipated Carry-forward | \$ 95K | --- | \$ 95K | --- | --- | 0% |
| TOTAL | \$ 941K | \$ 3,500K | \$ 4,441K | \$1,128K | \$ 881K | 45% |

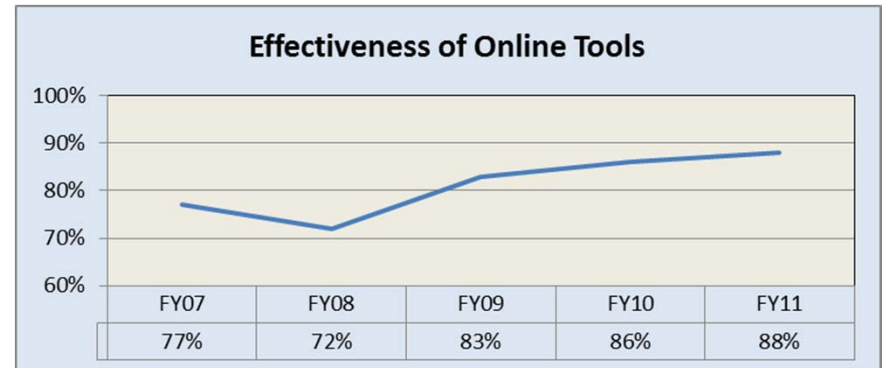
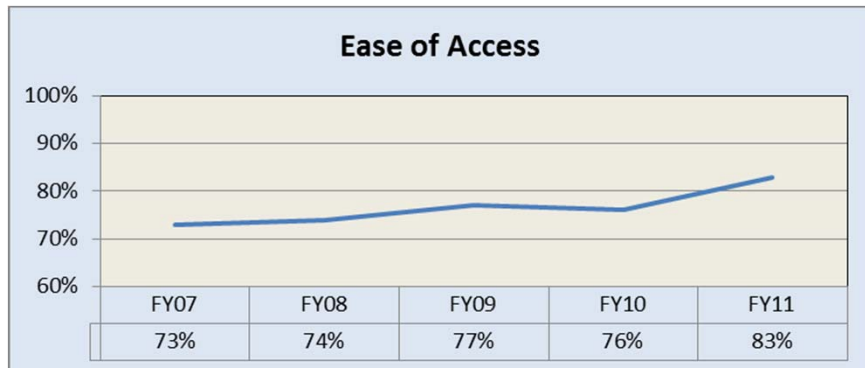
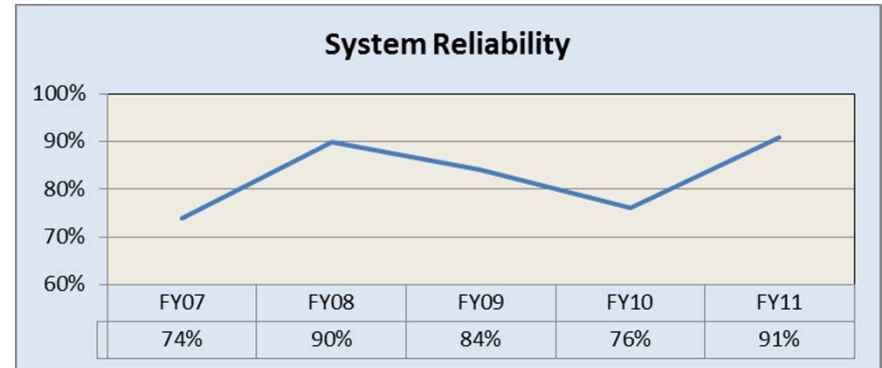
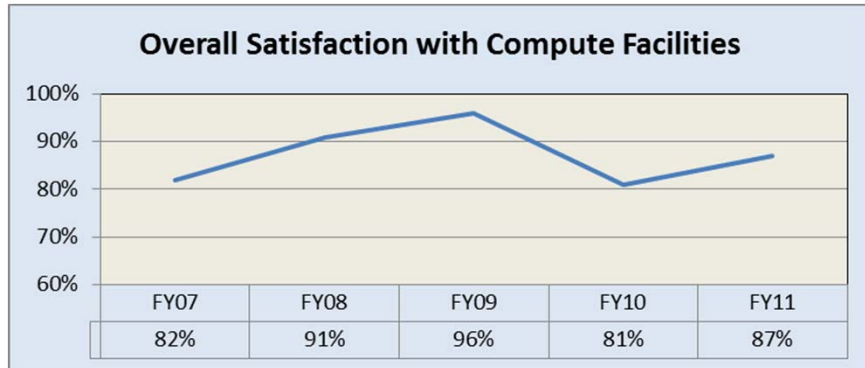
- FY11 carry-over equipment funds have been costed for the GPU cluster deployed at FNAL.
- FY11 carry-over operating funds will be used to cover FY11 carry-over expenses, provide salary support, and augment the FY12 hardware procurement.
- The FY12 budget incorporates the \$100K funding rescission and other previously discussed changes.
- A portion of the FY12 equipment funds have been obligated for the initial cluster purchase at JLab.
- Management reserve is set aside to cover unexpected deployment labor costs.
- “Anticipated Carry-forward” is set aside to cover operations costs during funding delays.

User Survey Results

FY11 Survey Results

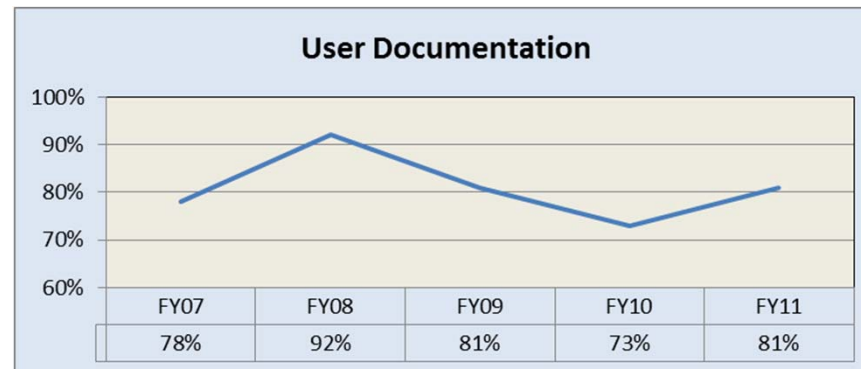
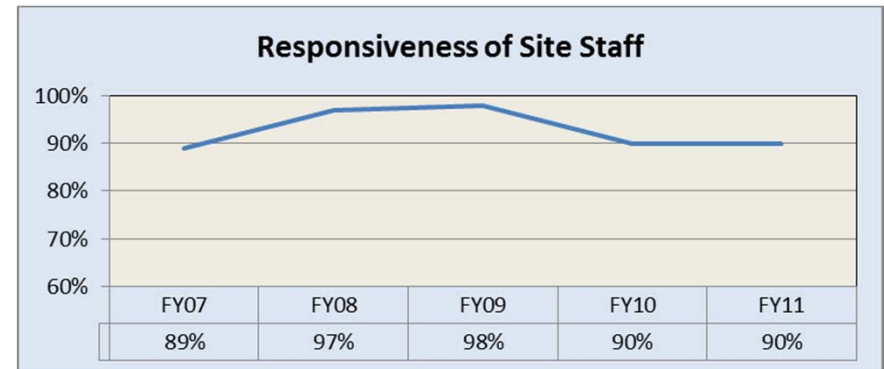
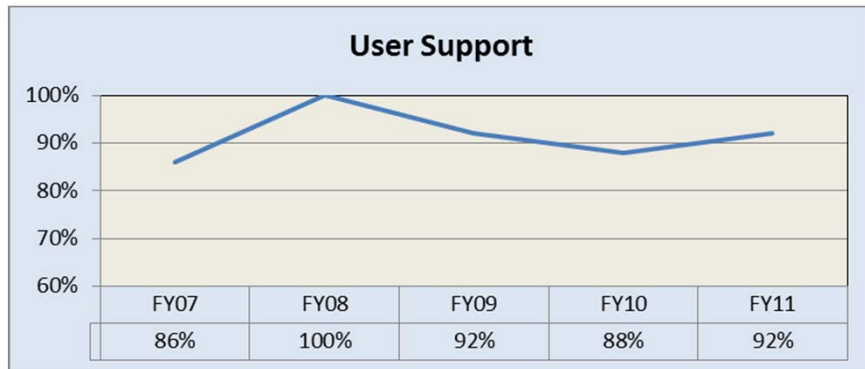
- ▶ Following the suggestions made by the 2011 DOE Progress Review Committee, we modified the user survey in an attempt to encourage a higher response rate.
 - Reduced the total number of questions from 44 to 22.
 - Revised the wording of some questions.
 - Retained the ability for users to provide free-form comments.
- ▶ FY11 response rate = ~60%
 - Approximately 102 users submitted jobs to one of the three facilities during the past year
 - Received input from 61 users (small statistical sample).
 - FY11 response rate = ~60% (61 individuals)
 - Improvement from FY10, when only 39 users responded to the survey call.

Compute Facility Satisfaction Trends



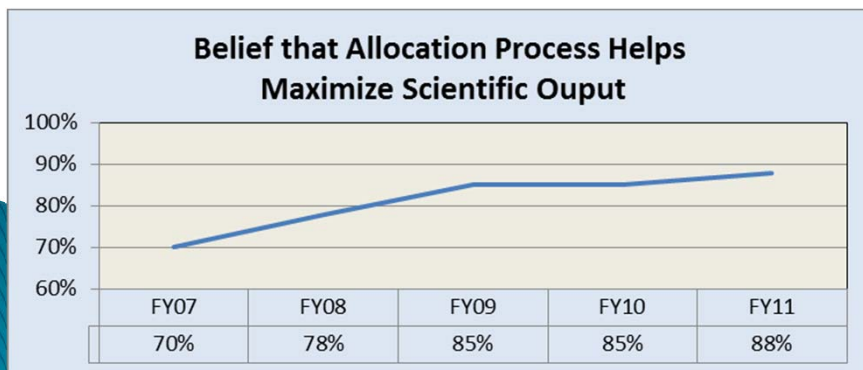
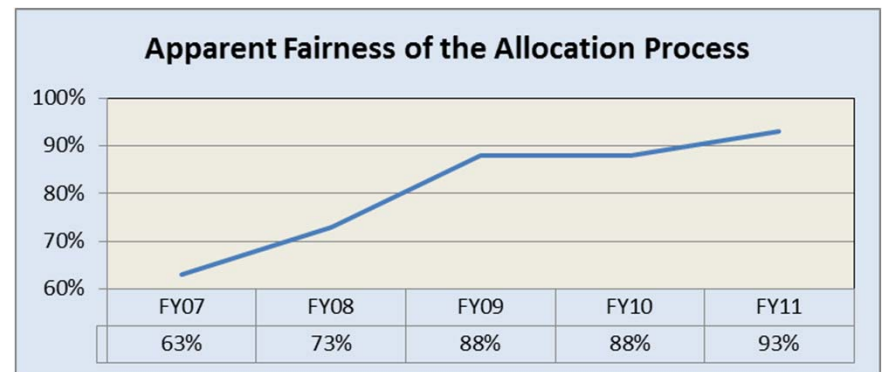
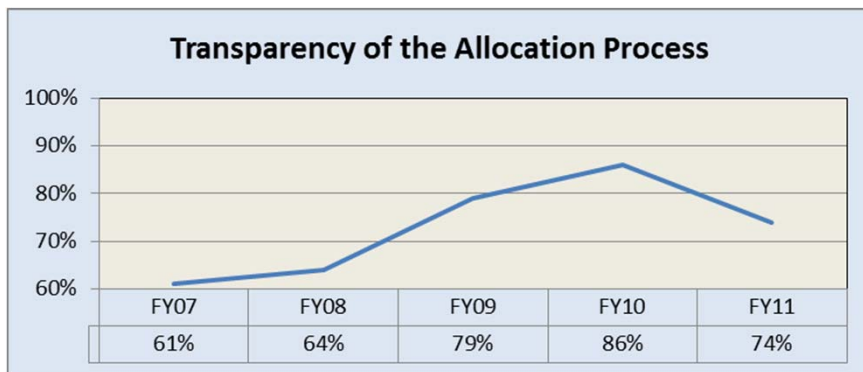
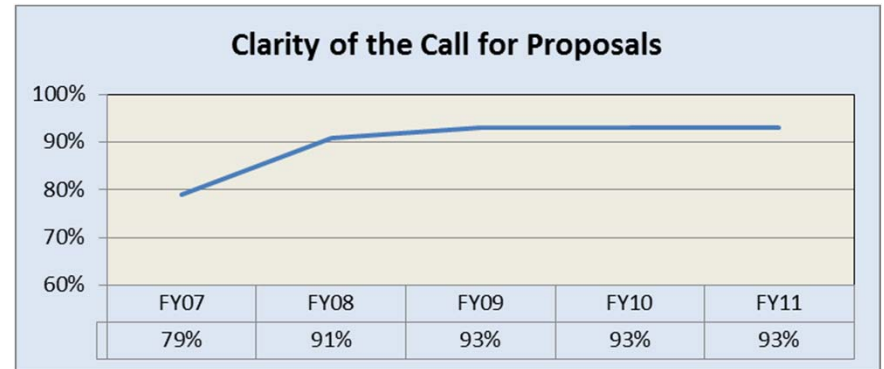
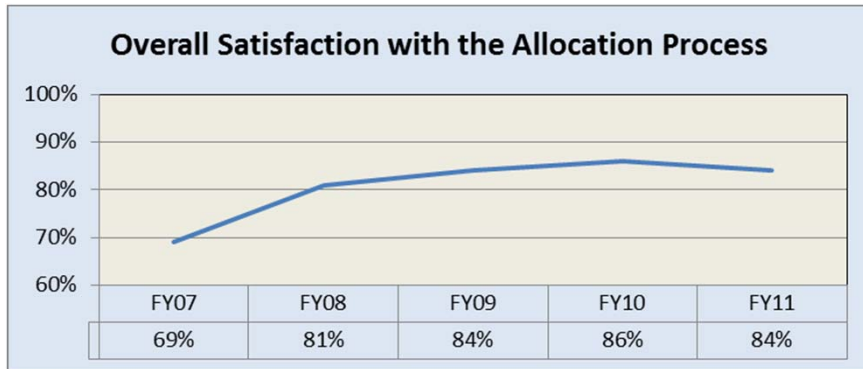
- ▶ Although significantly improved over FY10, the overall satisfaction rating of 87% is below our target goal of 92%. We believe that the timing of several external factors may have contributed to this rating.
- ▶ Although improving, ease of access rating continues to suffer due to access issues associated with the use of Kerberos authentication.

Compute Facility Satisfaction Trends



- ▶ User support and responsiveness ratings appear to have suffered due to loss of key knowledgeable individuals at one of our sites, and to understaffing at another.
- ▶ User documentation remains an area for improvement.

Allocation Process Satisfaction Trends



Several concerns were voiced by survey respondents regarding the allocation process.

Not clear why certain proposals appear to be preferred over others

Would be useful to have a clear statement of the scientific criteria under which proposals are to be evaluated, and of the scientific goals of USQCD

The CFP is getting too long, so subtle changes in a given year may go unnoticed. Perhaps changes should be noted early in the CFP message.

FY11 User Survey Summary

▶ Satisfaction with Compute Facilities

- Although significantly improved over FY10, the overall satisfaction rating of 87% is below our target goal of 92%. We believe that the timing of several external factors may have contributed to this rating.
- User support and responsiveness ratings appear to have suffered due to loss of key knowledgeable individuals at one of our sites, and to understaffing at another. Staffing increases and operational changes will likely improve this situation.
- Ease of access rating continues to suffer due to access issues associated with the use of Kerberos authentication.
- User documentation remains an area for improvement.

▶ Satisfaction with Allocation Process

- User satisfaction ratings nearly met or exceeded prior year ratings in all categories except one: transparency of the allocation process.
- The Scientific Program Committee is making changes to the allocation process to improve feedback on proposal allocations.

Hardware Acquisition Planning

FY13 Acquisition Planning

- ▶ With the emergence of new platforms such as GPU-accelerated clusters, we outlined a new strategy at the FY11 review that we are continuing to follow:
Procure systems that will best optimize our portfolio of hardware (including anticipated supercomputer time) against our portfolio of applications (including configuration generation).
- ▶ In FY13, we once again have several hardware options to consider:
 - Infiniband clusters, GPU-accelerated clusters, BG/Q
- ▶ In order to maximize the use of hardware funds, we are in the process of gathering critical information
 - We will be gathering information on various hardware options, including the IBM BG/Q
 - Pricing and availability of production BG/Q hardware
 - Cost model for operating a BG/Q at BNL
 - We need your input to help us optimize the use of hardware funds and best meet scientific computing needs.
 - What applications will be able to be run on GPUs at that time?
 - What portion of the analysis computing can be done more cost effectively on GPUs vs. IB clusters?
- ▶ We have established a process for finalizing the FY13 acquisition plan that closely follows the FY12 planning process. We propose to use this process to gather information and make an informed decision regarding the planned hardware choice for FY13. Target decision date is mid-August.

FY13 Acquisition Planning: Key Dates

| Activity | Target Due Date |
|---|-----------------|
| Project provides Executive Committee (EC) with data summarizing distribution of job types and sizes over the past year | Apr 15 |
| Project presents acquisition strategy to external committee at DOE annual review | May 16 |
| EC & Scientific Program Committee provides project with anticipated scientific program requirements for various architectures | Jun 15 |
| Project prepares Alternatives Analysis document, which summarizes consideration of various options and proposes cost-effective solution for FY13 hardware deployment. | Jul 29 |
| EC reviews Alternatives Analysis document and proposed solution, and provides advice to the Project on how to proceed. | Aug 10 |
| Project prepares FY13 hardware acquisition plan and informs stakeholders | Aug 15 |
| Project Manager provides Federal Project Director (OHEP) and Federal Project Monitor (ONP) with the FY13 Financial Plan, which contains information on the allocation of hardware funds to the host laboratories. | Aug 20 |

Summary

- ▶ We are now half-way through the LQCD-ext project. Facilities are running well, we're executing well against our plans, and we're expanding the scope of the LQCD-ext project to include the BG/Q and ARRA machines.
- ▶ We successfully met or exceeded all but one of key performance goals in FY11. We did not meet our target deployment dates.
 - User survey results indicate areas for potential improvement.
 - We missed deployment milestones due to Continuing Resolution and other external factors.
- ▶ We are on target to meet nearly all of our FY12 performance goals.
 - Our site managers continue to do a very good job of operating their respective systems for minimize downtime and maximize output.
 - We've been affected by the budget situation in Washington; Continuing Resolutions impact the timing of our procurement and deployment activities.
- ▶ We have significant opportunities to maximize our hardware portfolio going forward and have developed a plan to optimize our procurement strategy in order to make the most effective use of project resources.

Additional Slides

Satisfaction with Facility Operations

Satisfaction Ratings Over Time:

| | FY07 | FY08 | FY09 | FY10 | FY11 |
|-------------------------------|------|------|------|------|------|
| Overall Satisfaction | 82% | 91% | 96% | 81% | 87% |
| System Reliability | 74% | 90% | 84% | 76% | 91% |
| Ease of Access | 73% | 74% | 77% | 76% | 83% |
| User Support | 86% | 100% | 92% | 88% | 92% |
| User Documentation | 78% | 92% | 81% | 73% | 81% |
| Responsiveness of Site Staff | 89% | 97% | 98% | 90% | 90% |
| Effectiveness of Online Tools | 77% | 72% | 83% | 86% | 88% |

- ▶ Although significantly improved over FY10, the overall satisfaction rating of 87% is below our target goal of 92%. We believe that the timing of several external factors may have contributed to this rating.
- ▶ Ease of access rating continues to suffer due to access issues associated with the use of Kerberos authentication.
- ▶ User documentation remains an area for improvement.
- ▶ User support and responsiveness ratings appear to have suffered due to loss of key knowledgeable individuals at one of our sites, and to understaffing at another.

Satisfaction with Allocation Process

Satisfaction Ratings Over Time:

| | FY07 | FY08 | FY09 | FY10 | FY11 |
|---|------|------|------|------|------|
| Overall satisfaction with the proposal process | 69% | 81% | 84% | 86% | 84% |
| Clarity of the Call for Proposals | 79% | 91% | 93% | 93% | 93% |
| Transparency of the allocation process | 61% | 64% | 79% | 86% | 74% |
| Apparent fairness of the allocation process | 63% | 73% | 88% | 86% | 93% |
| Belief that the allocation process helps maximize scientific output | 70% | 78% | 85% | 79% | 88% |

- ▶ User satisfaction ratings nearly met or exceeded prior year ratings in all categories except one: transparency of the allocation process.
- ▶ Several concerns were voiced by survey respondents regarding the allocation process.
 - Not clear why certain proposals appear to be preferred over others
 - Would be useful to have a clear statement of the scientific criteria under which proposals are to be evaluated, and of the scientific goals of USQCD
 - The CFP is getting too long, so subtle changes in a given year may go unnoticed. Perhaps changes should be noted early in the CFP message.

Additional Comments on Overall Satisfaction Rating

- ▶ Based on comments provided by survey respondents and a number of unusual events that occurred during the past year, we believe that the following factors contributed to our overall satisfaction rating of 87%
 - At BNL, two key personnel left their positions for other jobs, which left the project understaffed for most of the fiscal year. Existing personnel had to be trained to be able to provide the same level of support.
 - FNAL suffered two major unplanned weather-related outages during the year; inflight user jobs were terminated as a result.
 - Users continue to comment on challenges associated with Kerberos authentication at Fermilab.
 - A major cyber-security event at JLab forced the lab to disconnect from the Internet; for nearly two weeks only onsite personnel could access the LQCD clusters. Communication with the collaboration was difficult during this period. Five weeks before offsite file transfers were possible, and then only to white-listed sites.
 - One of three system administrators left JLab in early summer, so JLab was understaffed while trying to debug an OS upgrade and rebuilding infrastructure as a result of the cyber event. User support suffered as a result.
 - As JLab was recovering from the cyber incident, Hurricane Irene threatened landfall so JLab decided to drop power to as much of the lab as possible. This unplanned weather-related event affected inflight jobs.
- ▶ Most of the survey responses were entered in a 3-week period one month after most of these events had occurred; we suspect that user experiences as a result of these events contributed to the lower satisfaction rating. In fact, JLab's overall satisfaction rating was notably lower this year.