

Report from the Project Manager

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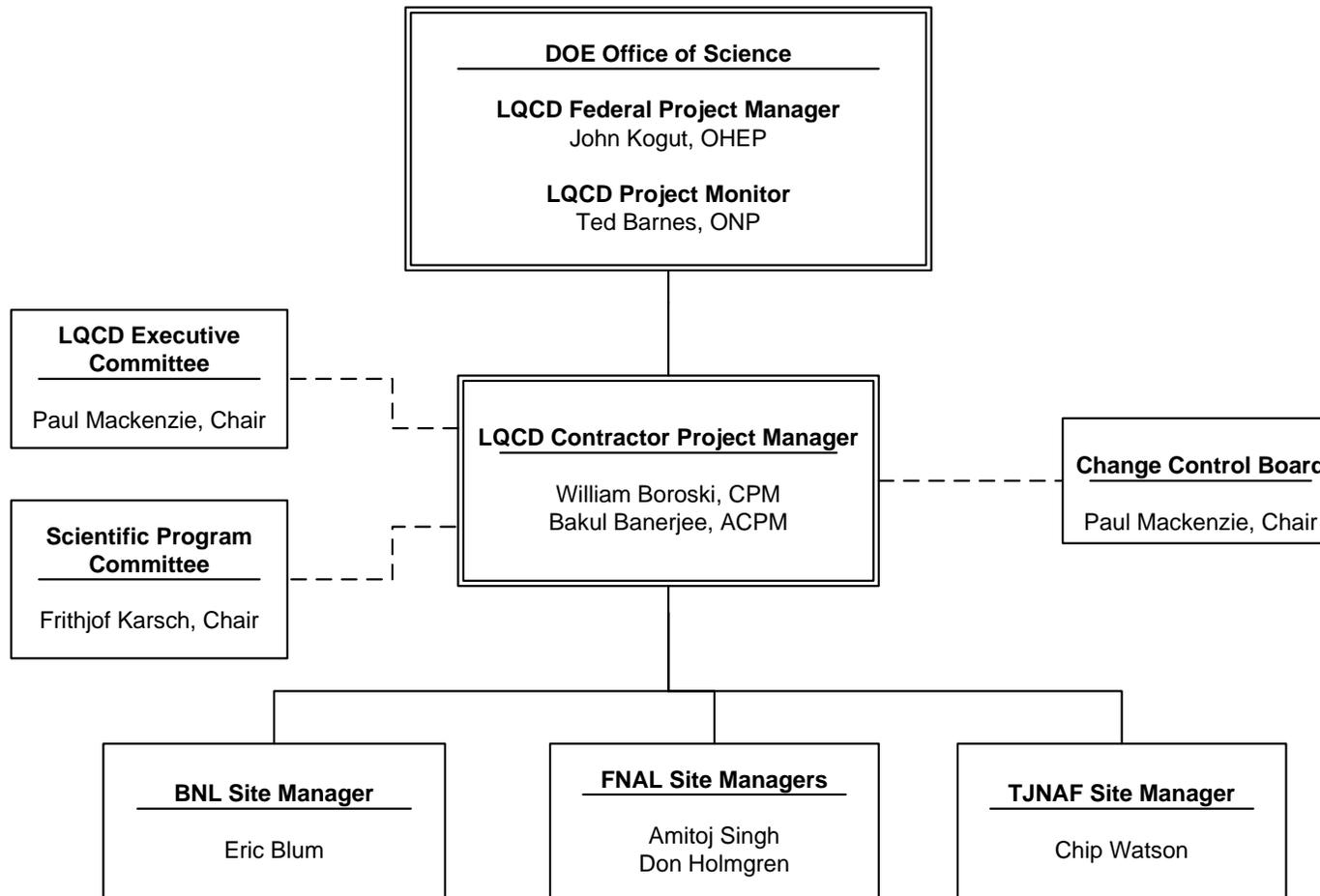
USQCD All-Hands Meeting
Fermi National Accelerator Laboratory
May 14-15, 2009



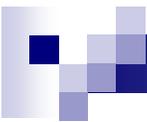
Outline

- Organization update
- OMB300 project scope
- Progress towards performance goals and milestones
- Budgets and cost performance
- Extension project update

Organization Overview



Org chart has been updated to reflect changes in the leadership of the Executive Committee, Scientific Program Committee, and Change Control Board.



OMB300 Project Scope

- Four-year project funded from Oct 1, 2005 through Sep 30, 2009 to deploy and operate computing facilities dedicated to LQCD calculations
 - Funding provided by DOE OHEP and ONP
 - Project Budget: \$9.2M (*\$5.87M for equipment, \$3.33M for personnel*)

- Operations support (admin, hardware maintenance, site management)
 - US QCDOC, SciDAC clusters, new LQCD clusters

- Purchase and deploy new clusters
 - FY06: Kaon cluster at FNAL; 6n cluster at JLab
 - FY07: 7n cluster at JLab
 - FY08/09: J-pi cluster at FNAL

- Project management
 - Modest budget to support project management activities

- Not in project scope
 - Software development / Scientific software support

FY08 Performance Goals and Milestones

- Annual performance goals & milestones defined in OMB Exhibit 300 document include:

<i>Item</i>	<i>FY08 Goal</i>	<i>Actual</i>
Deployed Tflops	4.1	5.8*
Delivered Tflops-yrs	12.0	12.1
% machine uptime (weighted average by capacity)	93%	96%
% helpdesk tickets closed within 2 business days	92%	96%
Frequency of cyber security vulnerability scans	Monthly	Daily / wkly
Number of distinct users	30	66
Customer satisfaction rating	87%	91%

** FY08 deployment actually occurred in early FY09, due to planned deployment across FY08/09 boundary*

- Our performance is monitored through monthly stakeholder calls, quarterly DOE OCIO progress reports, and annual progress reviews
 - LQCD Project continues to receive “green” scores on quarterly reports
 - FY09 annual external progress review will be held at FNAL on June 4-5
 - This year’s focus will be on scientific impact and technical progress

Milestone Performance *(Tflops deployed to date)*

<u>Year</u>	<u>Tflops Deployed</u>	
	<u>Baseline</u>	<u>Actual</u>
FY2006	2.0 <i>1.8 Tflops at FNAL 0.2 Tflops at Jlab</i>	2.6 <i>FNAL Kaon: 2.3 JLab 6N: 0.3</i>
FY2007	2.9	2.98 <i>JLab 7N</i>
FY2008	4.1	5.75 <i>FNAL J-Psi</i>
FY2009	2.5	2.65 <i>FNAL J-Psi</i>
Total	9.0	14.0

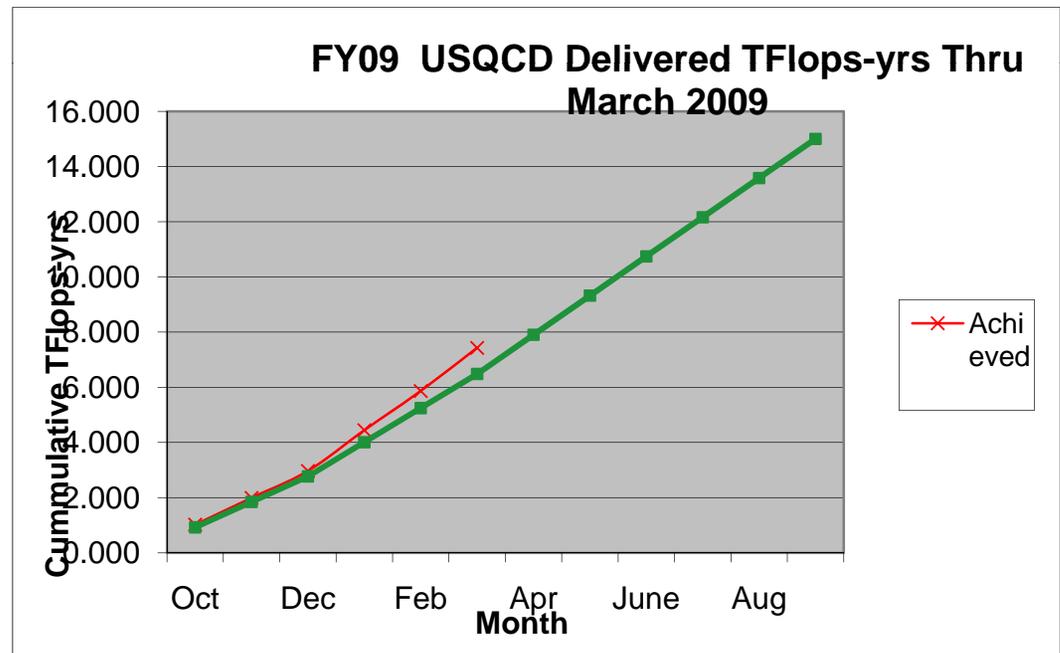
Milestone Performance (*Tflops-yrs delivered*)

■ FY08

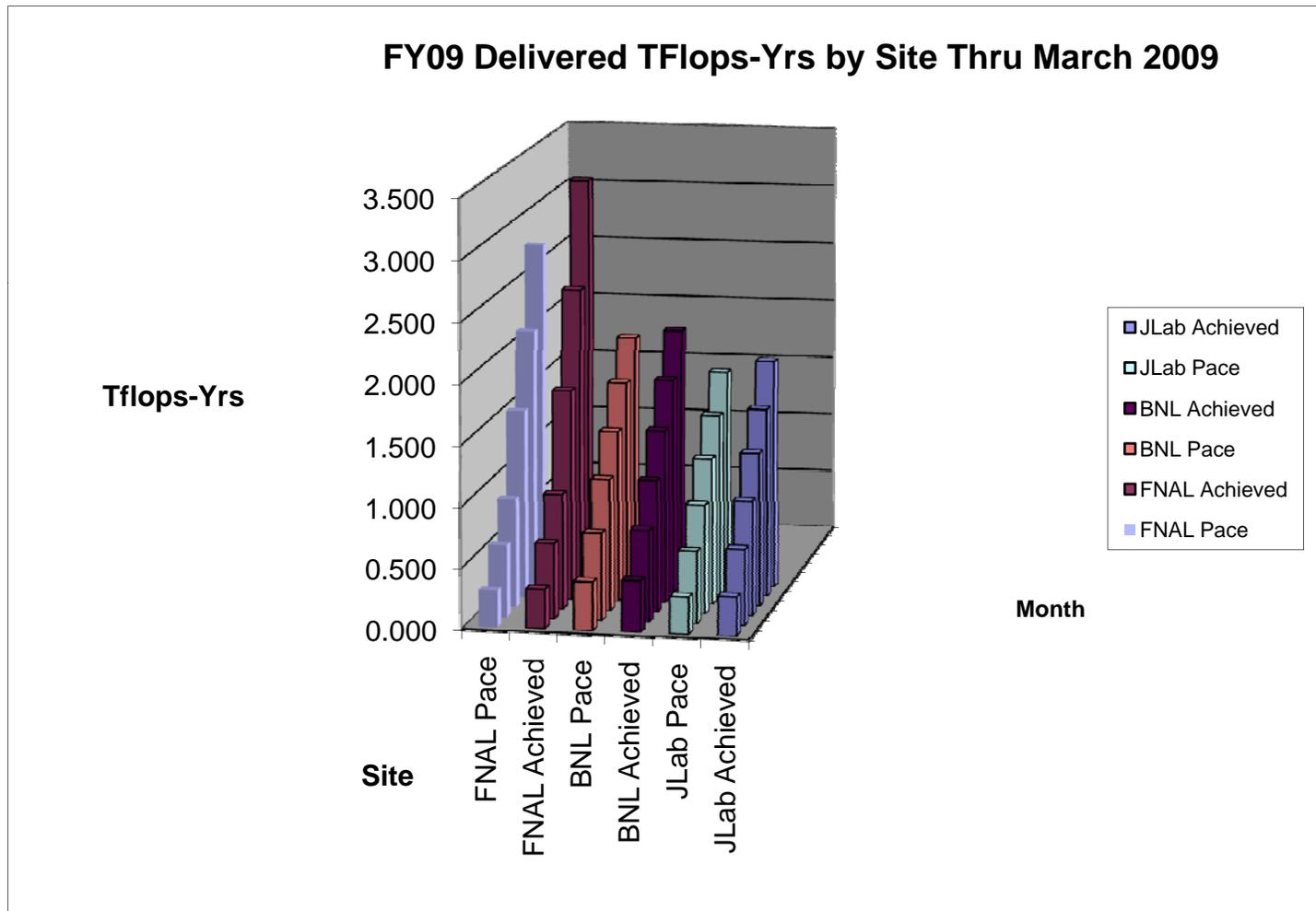
- FY08 performance goal = 12.0 Tflops-yrs delivered
- Total delivered = 12.07 Tflops-yrs (*100.6% of goal*)

■ FY09

- FY09 performance goal is 15 Tflops-yrs
- Goal through March is 6.48 Tflops-yrs
- Through March, SC LQCD has delivered 7.43 Tflops-yrs (115% of goal)
- Actual performance data through March 2009 are shown to the right



Delivered Tflops-Yrs by Site – FY09 Performance



FY2008 Cost Performance *(Final)*

■ Period of Performance *(Oct-07 through Sep-08)*

	<u>Personnel</u>	<u>Equipment</u>	<u>Total</u>
Budget			
FY07 Carry-Forward	\$ 34K	\$ 243K	\$ 277K
FY08 Budget	<u>\$ 930K</u>	<u>\$ 1,570K</u>	<u>\$ 2,500K</u>
Total Avail. Funds	\$ 964K	\$ 1,813K	\$ 2,777K
Actual Final Costs			
	\$ 827K	\$ 244K	\$ 1,071K
% of budget	86%	14%	39%
% of yr complete	100%	100%	100%

- Personnel costs below budget because effort required to support and maintain QCDOC was much less than anticipated.

-Equipment costs below budget because FY08 cluster procurement was obligated in late FY08 but not costed until early FY09. Actual cluster cost was within planned budget.

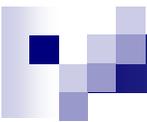
-All unspent funds have been carried forward into FY09.

FY2009 YTD Cost Performance *(through Mar 2009)*

■ Period of Performance *(Oct-08 through Mar-09)*

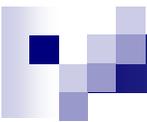
	<u>Personnel</u>	<u>Equipment</u>	<u>Total</u>
Budget			
FY08 Carry-Forward	\$ 136K	\$ 1,569K	\$ 1,706K
FY09 Budget	<u>\$ 1,022K</u>	<u>\$ 678K</u>	<u>\$ 1,700K</u>
Total Avail. Funds	\$ 1,158K	\$ 2,247K	\$ 3,406K
Actual Costs			
	\$ 550K	\$1,533K	\$ 2,083K
% of budget	48%	68%	61%
% of yr complete	50%	50%	50%

- Personnel costs largely on track for the year.
- Equipment costs to date associated with FY08 J-Psi procurement.
- Spend rates are consistent with plans. No concerns or problems foreseen. Anticipate completing the current project within the approved budget.



LQCD ARRA Project

- There is a strong possibility that \$4.96M in American Recovery and Reinvestment Act (ARRA) funds may be available to augment the LQCD Computing Project.
- The LQCD ARRA project is planned by DOE and is expected to be realized, but is not yet 100% certain.
- Tentative plan (*assuming project approval and availability of funds*):
 - Deploy and operate a new 16 Tflops/s sustained cluster at JLab, likely incorporating Intel Nehalem processors and quad data rate Infiniband.
 - Split procurement across FY09/10 fiscal year boundary, with first phase of the cluster coming online in early FY10 and second phase coming online by end of January 2010.
 - Analogous to FY08/09 J-Psi procurement and deployment
 - Proposed budget provides funds for compute and storage hardware, and personnel costs to support four years of operations.



LQCD-Ext Project Scope

- Acquire and operate dedicated hardware at BNL, JLab, and FNAL for the study of quantum chromodynamics during the period FY2010 through FY2014.
 - Scope and budget included in BY10 submission of e300 business case
- Computing hardware will be sited at each host laboratory and operated as a single distributed computing facility.
 - Each facility is locally managed following host laboratory policies and procedures (security, ES&H, etc.)
- Acquisition and Operations Strategy
 - The QCDOC at BNL will be operated through the end of FY10.
 - Existing clusters at FNAL and JLab will be operated through end of life
 - *Typically 4 years –determined by cost-effectiveness.*
 - New systems will be acquired in each year of the project and will be operated from purchase through end of life, or through the end of the project, whichever comes first.
 - New computing systems will be sited at FNAL, JLab, and BNL. Based on price/performance, the systems may include highly integrated hardware such as the anticipated BlueGene/Q.

Preliminary System Description

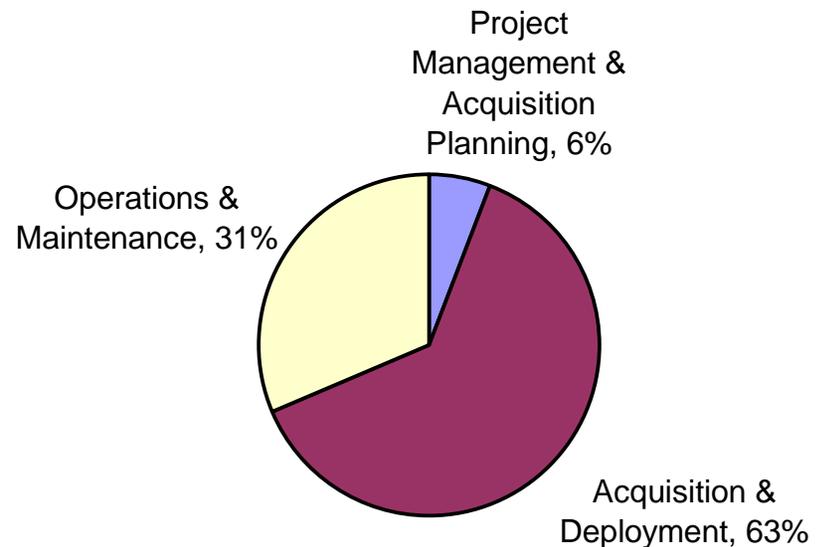
- The following systems will be in existence at the start of the LQCD-ext project:

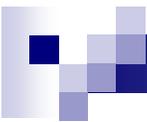
Machine Name	Site	# Nodes	Processor	Performance (Sustained)	Operated through
QCDOC	BNL	12,288-chip purpose-built supercomputer		4.2 Tflops	FY2010
Kaon	FNAL	600	Dual-core 2.0 GHz AMD Opteron	2.56 Tflops	FY2010
7n	JLab	396	Quad-core 1.9 GHz AMD "Barcelona"	2.9 Tflops	Q3-FY2011
J/Psi	FNAL	856	Quad-core 2.1 GHz AMD Opteron	8.4 Tflops	FY2012

- During the extension, a maximum of five additional independent systems will be deployed.
 - One per year in FY2010 through FY2014
 - Maximum budgeted cost per system is \$1.85M.
- Typical system will consist of a commodity cluster with a high performance interconnect.
 - Other suitable hardware will be considered and evaluated on price/performance criteria.
- The FY2010 and FY2011 systems will be acquired across the FY10/11 fiscal year boundary.
 - Purchasing scheme will be analogous to the FY08/09 cluster purchase
 - Current plan is to deploy the FY2010 and 2011 machines at Fermilab, in existing computer room facilities.
 - Acquisition plan will be discussed in a later talk.
- Each system will be operated for a minimum of 4 years.
- Each system will support the software libraries and physics applications developed by the SciDAC and SciDAC-II Lattice QCD projects.

Project Budget

- Preliminary Estimated Total Project Cost (TPC) = \$17.175M
 - *Based on preliminary guidance from OHEP and ONP*
 - *Budget has not been set to match a funding profile*
- Period of performance: FY10 through FY14
- Project funds will be used to support the operation of existing hardware and the procurement of new computing hardware to meet performance requirements and metrics.
- Project funding covers:
 - Project management and acquisition planning
 - Operations and maintenance of production systems
 - Acquisition and deployment of new hardware
- Not in scope
 - Software development
 - Scientific software support





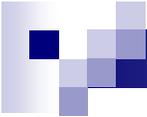
LQCD-ext Project Status

- Working our way through the DOE Critical Decision (CD) process
 - CD-0: *Approve mission need*
 - CD-1: *Approve alternative selection and cost range*
 - CD-2: *Approve performance baseline*
 - CD-3: *Approve start of construction*
 - CD-4: *Approve start of operations or project completion*

- CD-0 approval was obtained on April 13, 2009

- CD-1 review was held on April 21.
 - Still awaiting written report
 - CD-1 approval anticipated after we respond to review recommendations

- CD-2/3 tentatively scheduled for late summer (August?)
 - Will adjust our budget profile to match funding profile guidance
 - Will bring all necessary project documents into final shape for baselining.



Summary

- LQCD computing project continues to run smoothly
 - Site managers continue to do a very good job of operating their respective systems to minimize downtime and maximize output.
 - We have been successful in meeting our key performance goals and milestones.

- We have been successful in deploying new systems and operating our facilities within budget.
 - Acknowledging that the host laboratories also provide significant resources, the value of which is significant.

- ARRA funds may soon be available that will significantly augment computing capacity

- We are working hard to ensure that the LQCD-ext achieves CD-2/3 approval and is funded for the start of FY10.
 - We are encouraged by the support offered to date by the Offices of HEP and NP.