LQCD-ext II Project Report

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USQCD All-Hands Meeting
Brookhaven National Lab
April 26-27, 2019

Outline

- LQCD-ext II progress updates
- Organizational updates
- User survey results and plans
- Web site and documentation updates
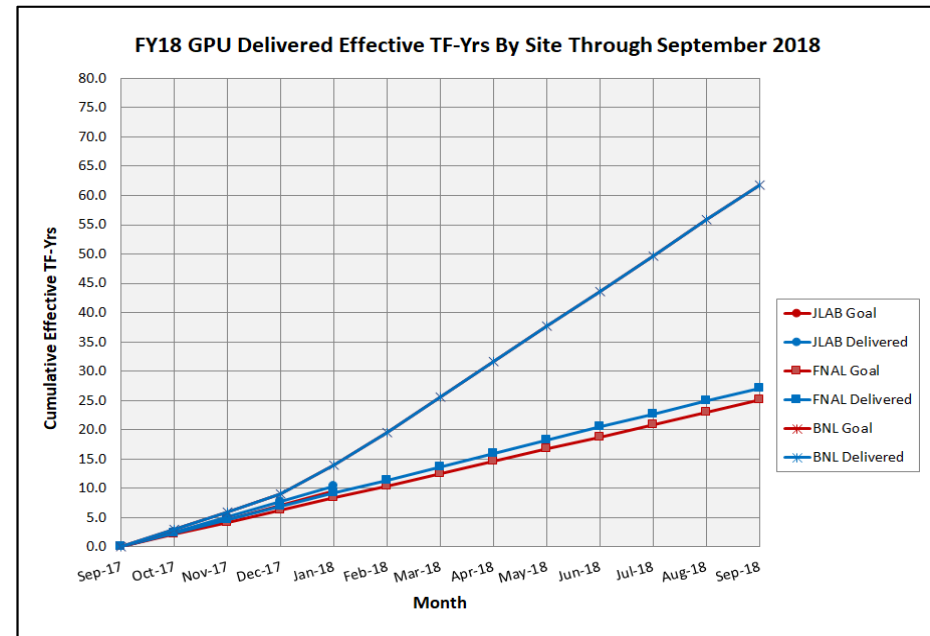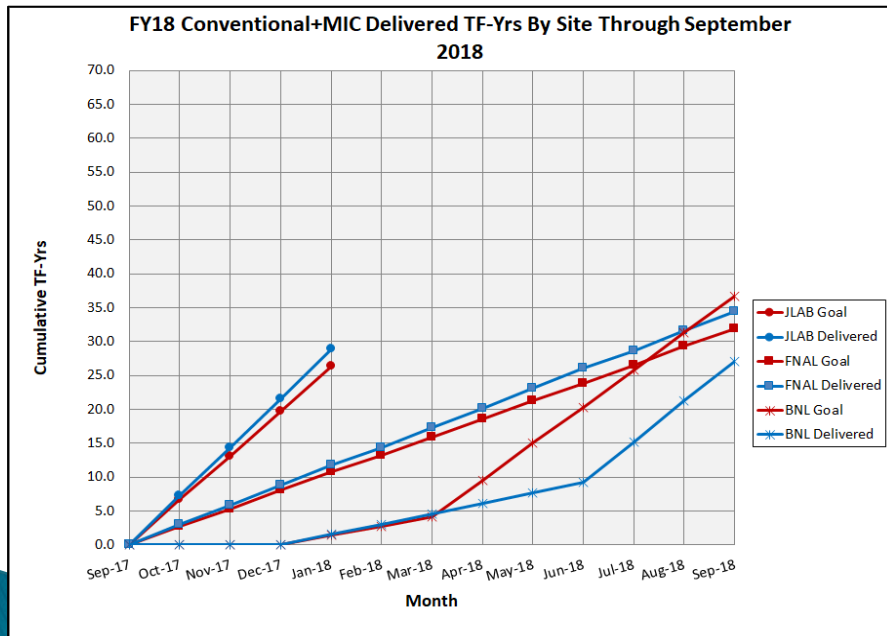- 5-year extension planning (FY20-24)

LQCD-ext II Progress Update

- We're in the fifth year of the current 5-year project   (Oct 2014–Sep 2019)

- Operations continue to run smoothly at all of our host sites

- In January 2018, DOE Office of Nuclear Physics (NP) announced its intent to establish an NP-funded dedicated hardware project at JLab (*Nuclear and Particle Physics LQCD Computing Initiative, or* NPPLCI). Operations under the new structure began in earnest in February 2018. *(NPPLCI details will be discussed in another presentation later today)*

- LQCD-ext II project currently consists of deployments and operations at BNL and FNAL and is funded entirely by DOE Office of High Energy Physics (HEP)

- We continue to maintain information-sharing and knowledge transfer between the three host sites (bi-weekly Site Manager Meetings and quarterly DOE calls). Resources from all sites are available to all of USQCD.

- Between LQCD-ext II and the new NP initiative at JLab, we have received the full $14M of planned funding in accordance with the approved baseline plan, dated Oct 1, 2014

Entity	FY15 (HEP & NP)	FY16 (HEP & NP)	FY17 (HEP & NP)	FY18	FY19	Total
LQCD-ext II	$2M	$3M	$3M	$2M (HEP)	$2M (HEP)	$12M
NPPLCI	---	---	---	$1M (NP)	$1M (NP)	$2M

LQCD-ext II Results – FY18

▸ Delivered Computing:

	TF–yrs Delivered			Node–hrs Delivered
	Goal	Actual	% of Goal	Actual
Conventional Resources	95.0	90.3	95%	4,842,249
Accelerated Resources	96.4	99.3	103%	981,276

FY18 Conventional+MIC Delivered TF-Yrs By Site Through September 2018

FY18 GPU Delivered Effective TF-Yrs By Site Through September 2018

LQCD-ext II Progress: FY19 Year-to-Date

▸ **FY19 (thru March 2019)**

   ◦ BNL has brought online 600 TB of new tape storage and expanded the size of their IC machine by 54 nodes, from 162 to 216 nodes

      • Current configuration: 50% K80s, 50% P100s.

   ◦ FNAL is working on bringing online a new cluster and additional storage; will be online in early July, maybe sooner.

Delivered Computing (TF-yrs)						
FY19 **(Oct '18 thru Mar '19)**				**Cumulative** **(Oct '14 thru Mar '19)**		
	Goal	Actual	% of Goal		Goal	Actual	% of Goal
Conventional Resources[2]	22.1	22.8	103%		443.5	466.7	105%
Accelerated Resources[3]	27.5	28.0	102%		377.6	394.4	104%

1) Conventional resources operational in FY19: Pi0,BNL-KNL, BNL-SKY.   DNR Mode (Bc, Ds)
2) Accelerated resources operational in FY19:   Pi0g, BNL-IC.   DNR Mode (Dsg

Utilization of our FY19 Allocations – BNL

BNL-IC Cumulative Node Usage by Month

BNL-KNL Cumulative Node Usage by Month

BNL-SKY Cumulative Node Usage by Month
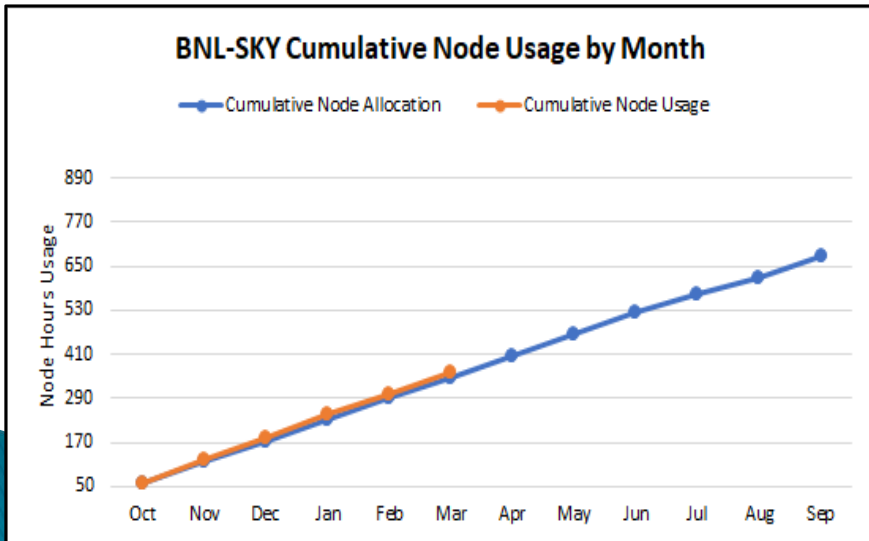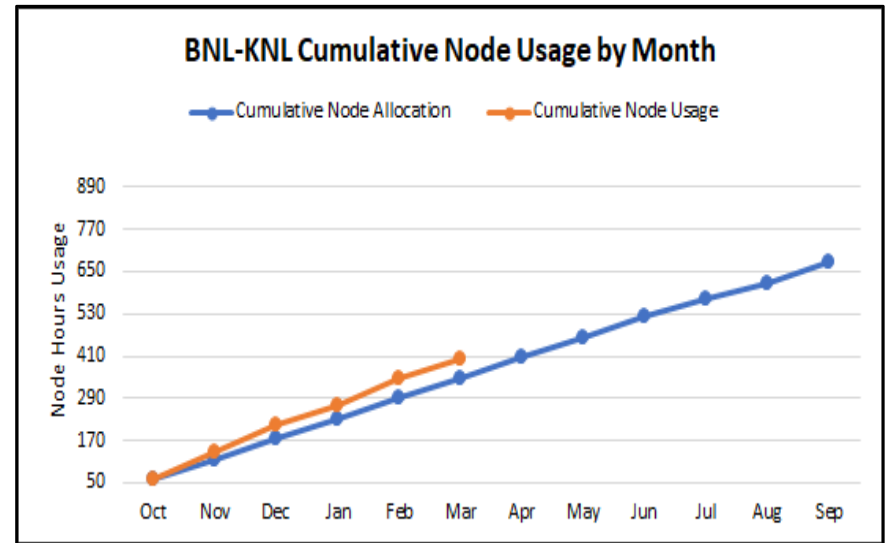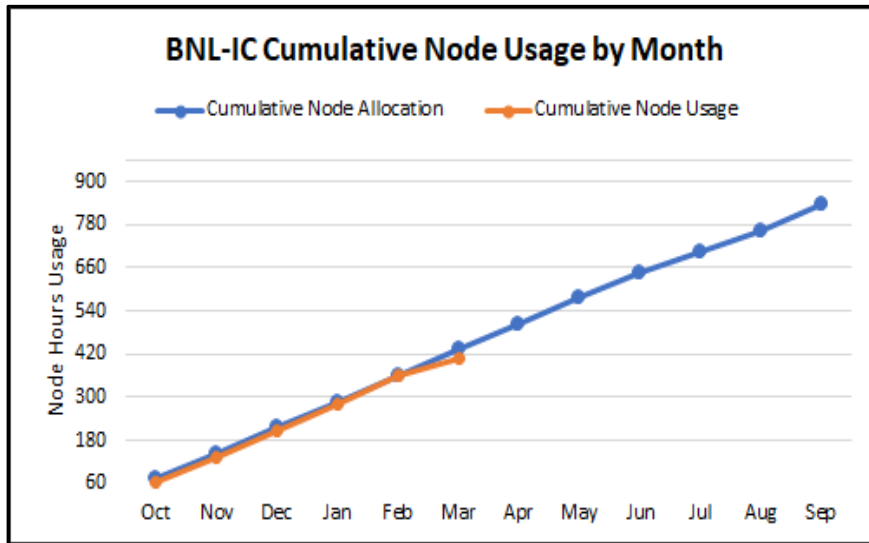
FY19: Oct thru March:

System	Node Allocation	% of Cumulative Allocation Used
BNL–IC	72	94%
BNL–KNL	58	115%
BNL–SKY	58	103%

Utilization of our FY19 Allocations – FNAL

FNAL Pi0 Cumulative Node Usage by Month

FNAL Pi0g Cumulative Node Usage by Month
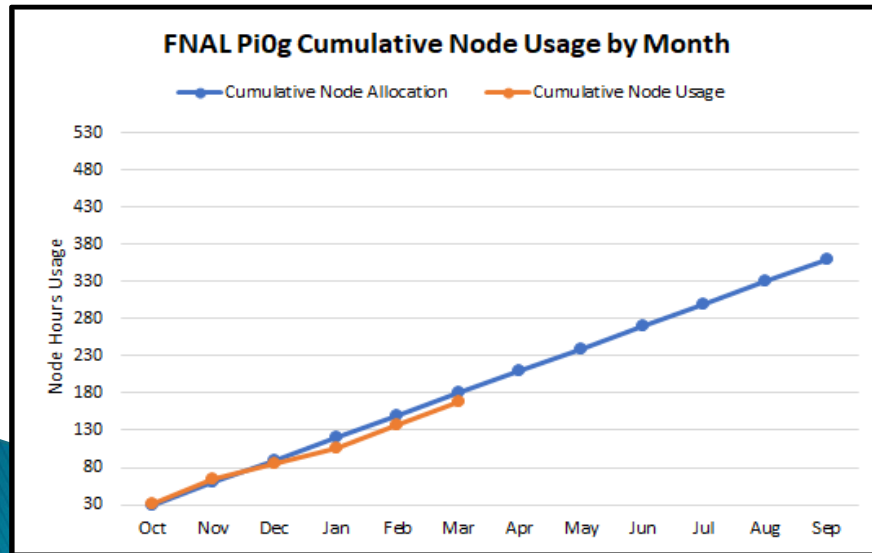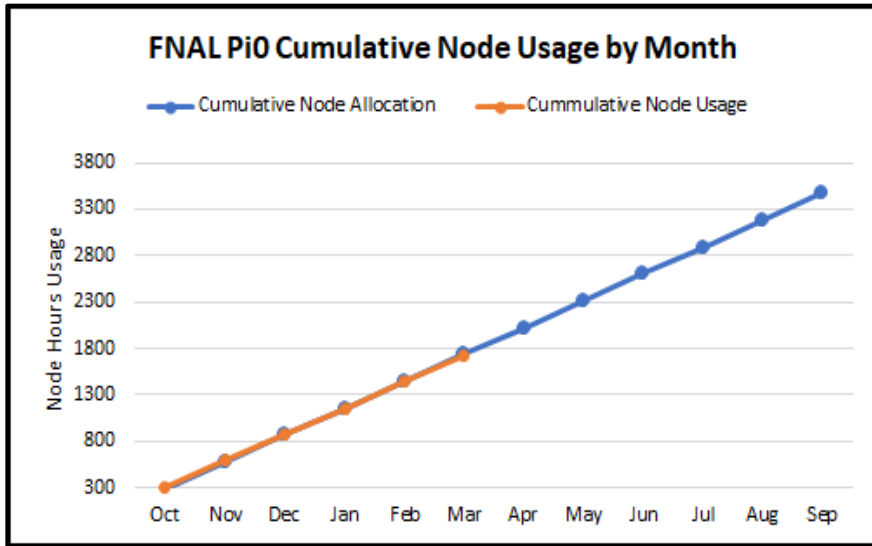
FY19: Oct thru March:

System	Node Allocation	% of Cumulative Allocation Used
FNAL–Pi0	289	100%
FNAL–Pi0g	30	93%

LQCD−ext II Integrated Project Team (IPT)

Organizational changes since last year:

- Jo Fazio
- David Richards
- Ken Schumacher
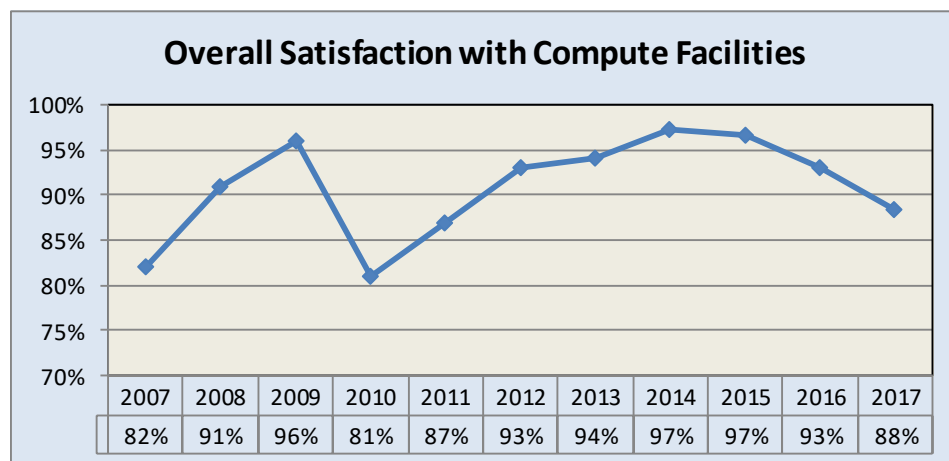- Bryan Hess
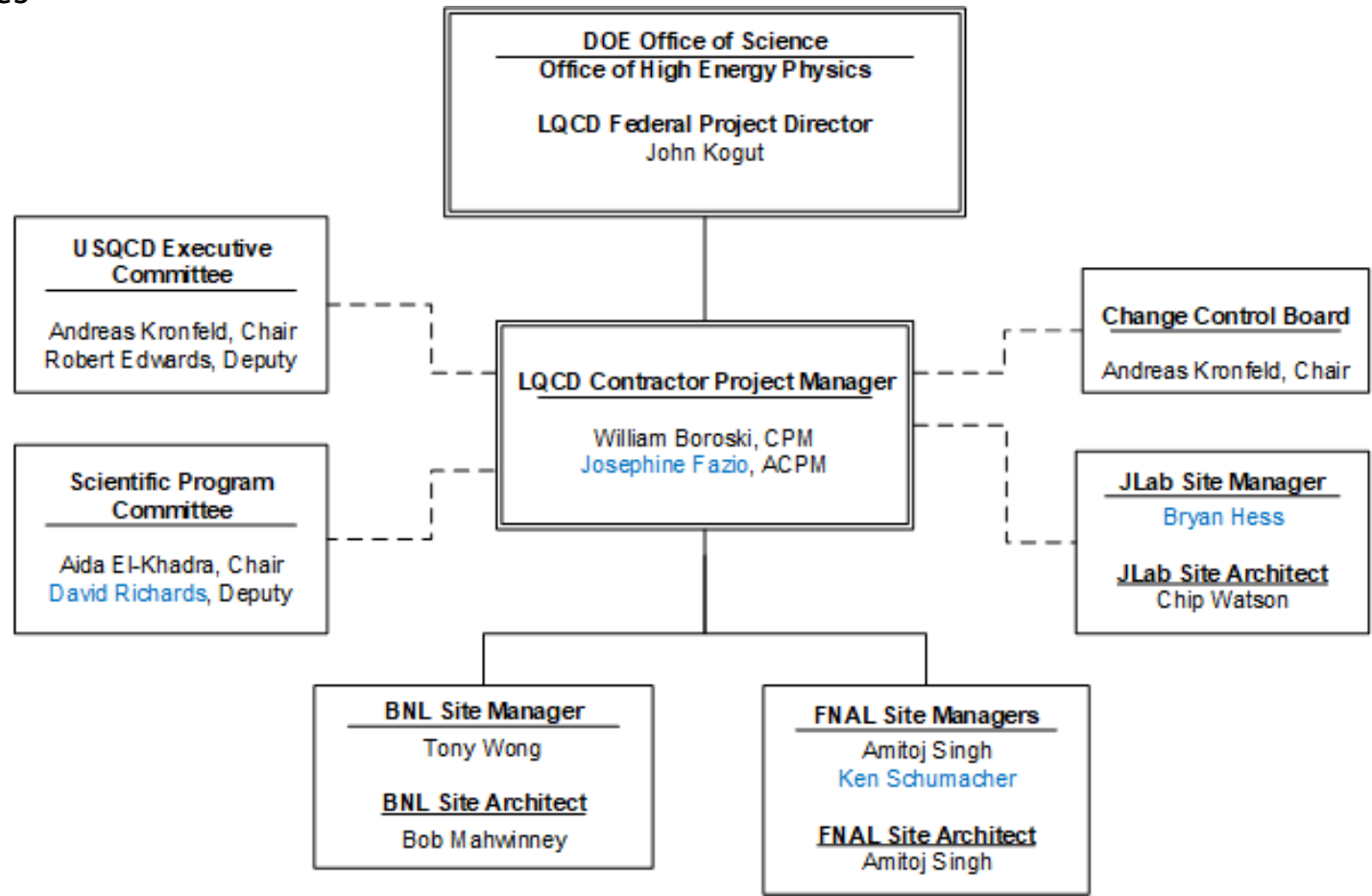
LQCD-ext II Integrated Management Team

Organizational changes since last year:

- Liz Sexton-Kennedy
- Jo Fazio
- Ken Schumacher

DOE Office of Science

Office of High Energy Physics
John Kogut, LQCD Federal Project Director

DOE
---- LQCD

LQCD-ext II Project Office

William Boroski, Contractor Project Manager
Josephine Fazio, Associate Contractor Project Manager

BNL

Director, Computational Science Initiative
Kerstin Kleese van Dam

BNL Site Manager

Tony Wong

FNAL

Chief Information Officer
Elizabeth Sexton-Kennedy

FNAL Site Managers

Amitoj Singh
Ken Schumacher

User Survey Results: Compute Facilities

- ‣ Thank you to everyone who participated in last year's User Survey.
- ‣ Total responses received=57; down from 73 in previous year

- ‣ Overall Satisfaction: 88%
  - ◦ FNAL:97%; other sites lower
- ‣ Problem areas
  - ◦ User documentation
  - ◦ Ease of access
  - ◦ User support
  - ◦ System reliability
- ‣ Significant effort to address documentation and user support shortcomings
  - ◦ Implemented documentation updates at FNAL
  - ◦ Created new documentation and implemented new processes at BNL.

Overall Satisfaction with Compute Facilities

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
82%	91%	96%	81%	87%	93%	94%	97%	97%	93%	88%

User Documentation

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
78%	92%	81%	73%	81%	89%	90%	88%	93%	87%	80%
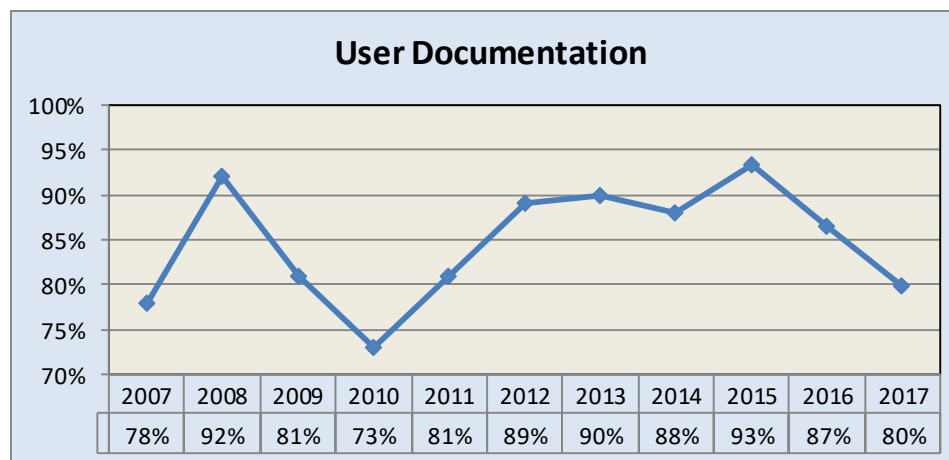
Web Site Updates

- LQCD Project website available through USQCD.org or directly
https://www.usqcd.org/lqcd/WBS/
  - Fixed some incorrectly routed links
  - Updated FNAL landing page

- New BNL web pages
https://www.usqcd.org/bnl/
  - Created USQCD introduction web pages
  - Developed overview to help new users get started
  - Improved online system documentation

User Survey Results: Allocation Process

▸ Positive scores overall. Many thoughtful comments were provided through free-form text submissions. Thank you for your input.

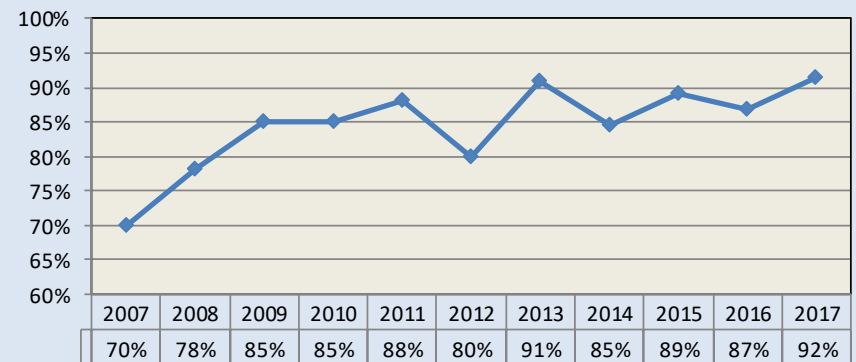### Overall Satisfaction with the Allocation Process

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
69%	81%	84%	86%	84%	83%	97%	84%	91%	85%	92%
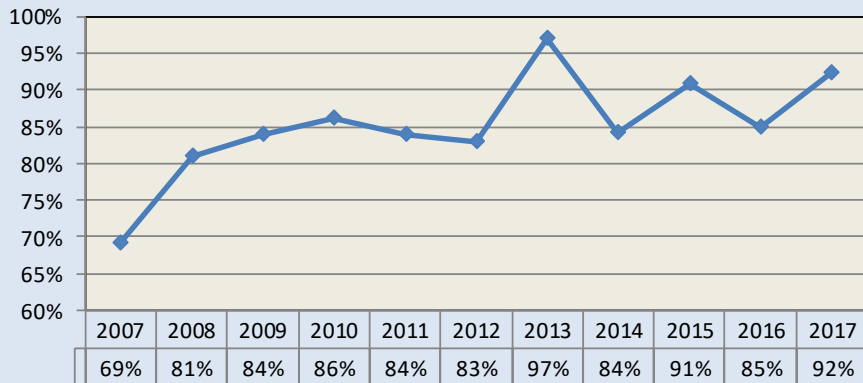
Clarity of the Call for Proposals

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
79%	91%	93%	93%	93%	94%	99%	88%	88%	93%	93%
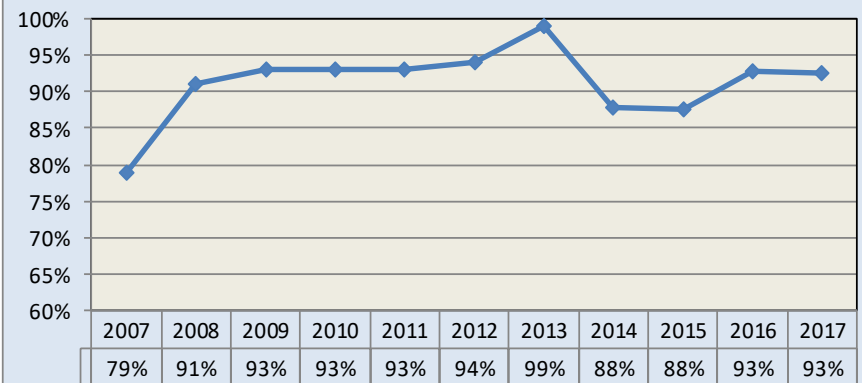
Transparency of the Allocation Process

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
61%	64%	79%	86%	74%	86%	93%	83%	81%	87%	89%
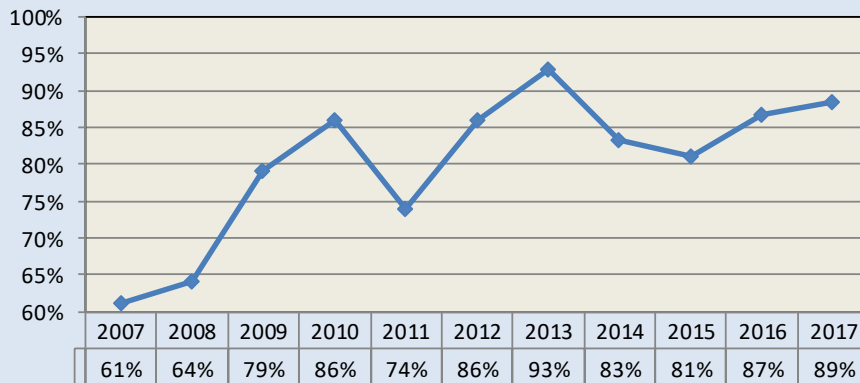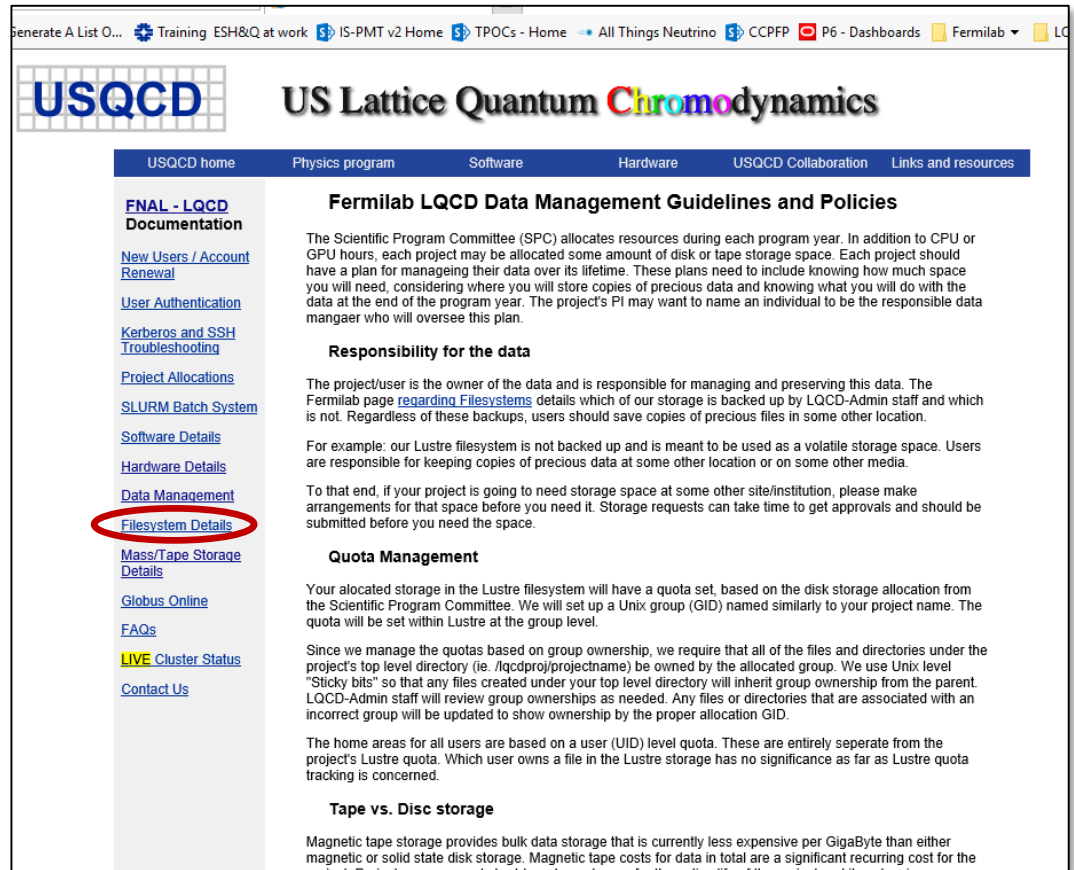
Allocation Process Helps Maximize Scientific Output

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
70%	78%	85%	85%	88%	80%	91%	85%	89%	87%	92%

Data Management Policies and Guidelines

- Active data management is becoming more important as data storage needs (disk and tape) continue to grow and budgets remain fixed.

- Site managers for the three host labs have been creating or reviewing data management policies and guidelines for short-term data storage.
  - ◦ JLab data management policy last updated Jul 1, 2014
  - ◦ FNAL data management policy updated Apr 16, 2019
  - ◦ BNL data management policy under development

Recent success story: Working with numerous PIs, Ken Schumacher was able to facilitate the recovery of 330 TB of disk space that was being used to store legacy data. All of the legacy data was moved or deleted as appropriate. Recovering ~40% of our available storage allocation allows us to operate more efficiently and better satisfy current needs.

Upcoming DOE Science Review

- No annual project review this year.
- In July, DOE/HEP will be reviewing a proposal to extend the LQCD Research Program to the next 5-year period (Oct 2019 through Sep 2024).

  - What is the scientific case for continuing simulations of QCD in high energy physics past 2019? Are the goals of the proposed research program aligned with the experimental and theoretical physics goals of HEP for the period 2020-2024.

  - What is the impact and interplay of lattice QCD simulations on the experimental and theoretical programs of HEP? Will the value of our experimental and theoretical program be measurably enhanced by such simulations?

  - Why is an extended project needed if ASCR* is providing the lattice community access to Leadership Class machines? In particular, is mid-scale hardware, such as CPU and GPU Institutional Clusters, essential and cost effective in such an environment? What is the optimal mix of machines, Leadership Class and mid-scale clusters, given realistic budget scenarios?

  - What are the plans for Fermilab and Brookhaven for LQCD Institutional Cluster computing? How are these plans incorporated into your proposal for LQCD research programs in 2020-2024?

- Review panel comprises computational scientists and high energy theoretical and experimental physicists.

- Review planning and preparations are actively underway.

- Brookhaven and Fermilab are both committed to supporting and expanding mid-scale Institutional Cluster hardware and related storage systems.

*DOE Office of Advanced Scientific Computing Research

Thank you for keeping our systems busy!

Questions?