CISL Update
Operations and Services

CISL HPC Advisory Panel Meeting
06 October 2011

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Overview

- **Organizational Changes in OSD**
- **Updates:**
  - *NWSC User Outreach and Training*
  - *"Advanced Scientific Discovery" at NWSC*
  - *Climate Research Initiative/EaSM Program*
  - *NWSC Transition to Operations*
  - *Formalized OSD Change Control Processes*
  - *Mesa Lab Datacenter Future*
  - *NWSC-1 Procurement Update*
  - *CAS2K11 Wrapup*

OSD Staff Comings and Goings...

- **Changes**
  - *Departures*
    - Kendall Southwick (Student Assistant on the VAPOR project)
    - Blake Caldwell (Network engineer moved to NICS)
    - Jose Castilleja (Workstation Group Leader)
  - *New Staff*
    - Carlos Rojas-Torres, Network Technician I, started 7/18/11
    - Jason Brake, Network Engineer I, started 9/26/11
    - B.J. Smith, Documentation/Web for User Services
    - Nick Wehrheim, Workstation Group Leader (WSST)
    - Jon Buttjer, Temp CPG Staff (started May)
    - Tom Seving, Temp CPG Staff (started Oct)
    - Rocky Madden, Web Programmer (replacing Ingmar) (started Sept)
  - *Reorg*
    - Aaron Anderson, Deputy Director, OSD
    - Mark Bradford, Acting Section Head, ESS
    - Steve Beaty, Security Team Lead
    - Gary New, Section Head – Cheyenne Operations (COS)
    - Ingmar Thompson, Group Leader – CASG (NWSC System Admins)
    - Jasen Boyington, Group Leader – Infrastructure Support Boulder
- **Openings**
  - 7 NWSC System Administrators (SAI at NWSC – phasing these in)
  - 1 Mechanical and 1 Electrical Technicians (at NWSC)
  - SSG Position at NWSC (SEII)
  - 1 EASM user support positions (SEII) at ML
  - DSS EaSM Position (SEII) at ML

CISL Operations & Services Division

Location of Staff
- ML-Boulder
- NWSC
- ML. As needed NWSC.

Anke Kamrath
Director

Tom Engel
HPC Specialist

Aaron Anderson
Deputy Director

Steve Worley
Data Support
- **Doug Schuster** Deputy

Marla Meehl
Networking
- **Jeff Custard** Deputy
- **Jim VanDyke** Network Technicians
- **Network Engineering**

David Hart
User Services
- **BJ Smith** Web/Doc
- **Sidd Ghosh** Consulting
- **Help Desk**
- **Michele Smart** Accounts

Gene Harano
High-end Services
- **Pam Gilman** Central Filesystems
- **Erich Thanhardt** Data Archival
- **Irfan Elahi** Supercomputing

Mark Bradford (acting)
Enterprise Services
- **Markus Stobbs** Web Engineering And Databases
- **Nick Wehrheim** Workstations
- **Jasen Boyington** Infrastructure Support - Boulder
- **Steve Beaty** Security
- **Mark Bradford** Distributed Services

Gary New
Cheyenne Operations
- **Ingmar Thompson** Computer Administration
- **Gary New** Infrastructure Support - Wyoming
- **Linda LaBrie** Business Continuity, Transition & CPG

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NWSC User Outreach and Training

- **Oct 2011 - New Resource Announcement**
  - *Announcement will be sent to current and former CISL users*
- **Nov 2011 – SC11 Booth, State-of the Practice presentations**
  - *Also: Town Hall meeting for NCAR/local users*
- **Nov 2011 - User survey for user environment feedback**
  - *Software stack, file system policies, queuing policies, archival mechanisms, file transfer mechanisms, and training topics*
- **Dec 2011 – AGU: NCAR booth, Invited presentation by R. Loft**
- **Jan 2012 – AMS: NCAR booth, CISL-hosted BoF meeting**
- **Jan, April, July 2012 – New system training sessions**
  - *On-site and via Adobe Connect*
  - *January - Normal Winter Training Workshop*
  - *April, July - shorter, half-day system introductions.*
- **Early 2012 - Training event for U Wyo at NWSC site**
- **Additional promotion via presentations to potential communities:**
  - *MSIs in DC area; FRCRC; EPSCoR National Meeting (Loft)*
  - *And other presentations by CISL leadership*

Accelerated Scientific Discovery plans

- **Announcement being prepared**
  - *Plan to release after procured systems announced*
  - *Solicit projects from all current university users, NSF invitees*
  - *Explicitly looking for projects linked to NWSC Science Justification objectives*
- **~70 million core-hours to be available**
- **Approximate timeline**
  - *Nov. 1: Announcement*
  - *Jan. 7: Submission deadline*
  - *Jan 7-Feb 4: CHAP review/recommendation (electronic)*
  - *mid-Feb: NSF and CISL approval*
  - *Feb-May 1: CSG support/preparation of ASD awardees*
  - *May 1-Aug: ASD awards*

Climate Research Initiative: EaSM

- **Targeted Support for EaSM Funded Programs**
    - *RDA to prepare, serve, and curate NCAR CMIP5 data to support regional climate modeling*
    - *USS to advise and consult with users on CESM model deployment in CRI community. In process of hiring two entry-level consultants to augment consulting group staffing levels*
    - *One-time funding to augment NWSC procurement to support these programs*

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NWSC Transition to Operations

- **NWSC Transition Proposal**
  - *Written ($2.1M), approved and funded for one-time NWSC transition costs*
  - *Categories:*
    1. Early hiring of Facility Staff, Facility Management SW
    2. Overlap of Operations (utilities and operations staff)
    3. Relocation Costs (people and equipment)
    4. Data Transition Services

- **Updated "Transition to Operations Plan"**
  - *Submitted to NSF in August, Approved in September*
  - *Details deployment and risk plans for all aspects of IT and staffing transition*

NWSC Transition to Ops (cont)

- **Many efforts progressing well**
  - *Networking (next slide)*
  - *Basic IT Infrastructure (e.g., DNS, Nagios Monitors)*
    - Equipment purchased and tested at ML
    - Will move to NWSC shortly
  - *GLADE*
    - Central Home Directory (moving Bluefire home in Nov)
    - Detailed data migration plan for NWSC
  - *Accounting*
    - System development underway. Schema design complete.
    - People DB launched June. CISL, NETS and HR core metadata about people and groups synchronized automatically and makes data available across UCAR
  - *Archival Migration*
    - Detailed migration plan underway
    - Initial equipment delivery to NWSC in Nov[9]

Networking at NWSC

- First half of the BiSON fiber path is up and the second half is on schedule
- WAN connectivity is up at 10Gbps on the first path
- Back up 1Gbps WAN wireless is in place
- LAN is up in completed portions of the building (70% complete pending computer room completion)
- Out-of-band is installed except computer room
- Voice services functioning (85% complete pending computer room completion)
- LAN wireless pending building occupancy for accurate surveys
- NETS Nagios monitor will be moved when computer room complete
- Building Automations System networking active and tested
- Qwest services installed on temporary cabling pending cutover to Qwest final installation
- Data center switch/router RFP pending NSF approval

HPSS and AMSTAR Update

- **AMSTAR extended 2 years through December 2014.**
  - *5 TB per cartridge technology*
  - *30 PB capacity increase over 2 years*
  - *New tape libraries, drives, and media at NWSC in November 2011 for primary and second copies*
  - *New tape drives and media at ML in November 2011 for Disaster Recovery copies of selected data*
- **Will release an archive RFP in January 2013 after we have experience with NWSC-1 data storage needs.**
- **Second copies will be housed at NWSC.**
  - *Minimize ML infrastructure requirements*
  - *Minimize bandwidth usage between NWSC and ML*

Formalized OSD Change Control

- ***Motivation:***
  - *" …80% of outages due to a change and 80% of MTTR (Mean time to recovery) was trying to find out what changed."*
   - *The Visible Ops Handbook*

- **Control software and hardware changes:**
  - *minimize unintended effects of changes*
  - *document anticipated system and service changes*
  - *document unanticipated system and service interruptions*
  - *ensure all potentially affected parties at ML and NWSC are informed of upcoming changes.*
  - *allow OSD to give end users and service customers sufficient advance notice, whenever possible, of changes that may affect them*
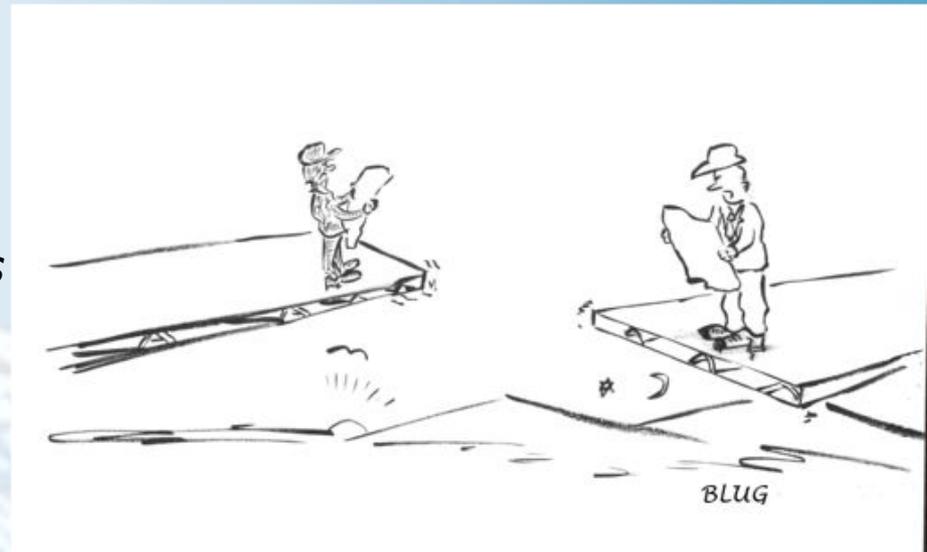
- **Structure**
  - *Established a Change Control Board (CCB) to review/approve "Major" change requests and review Failed changes (Post-Mortem)*
  - *Utilized existing tools with the intent of future enhancements and refinements as we gain more experience.*
  - *Change Control Types*
    - Major – requires formal CCB review
    - Minor, Emergency, and Urgent – reviewed by smaller peer groups
    - Daily/operational changes do not fall under Change Control
    - Failed (unexpected results) changes require a formal Post-Mortem CCB review

OSD Change Control Process

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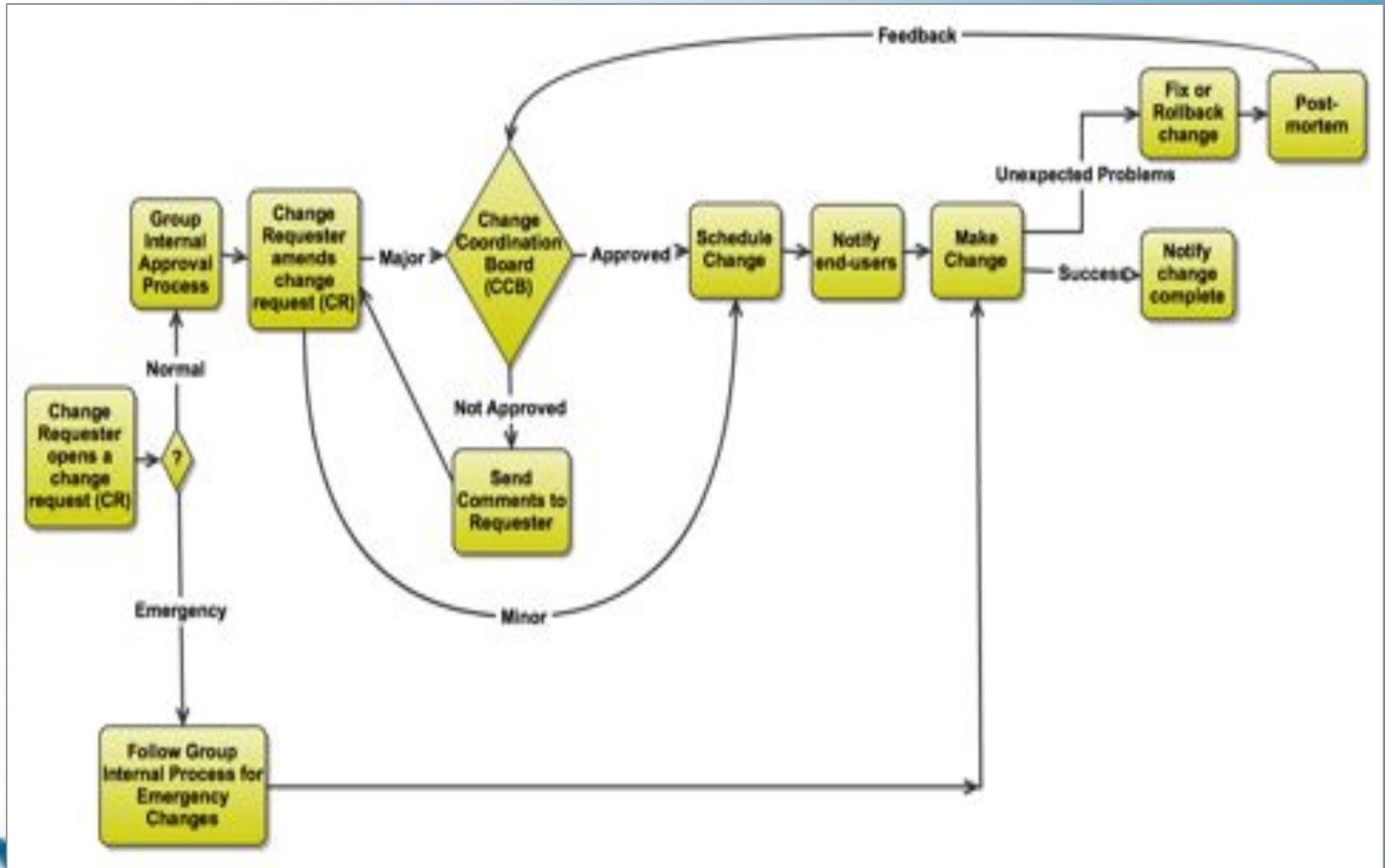
Formalized OSD Change Control

- **Implemented August 1, 2011**
- **The process is continually monitored and refined**
- **Metrics (August 1 – September 30, 2011)**
  - *15 Major changes*
  - *19 Minor changes*
  - *1 Emergency change*
  - *3 Urgent changes*
  - *0 Unsuccessful changes*

BLUG

Planning for Mesa Lab Datacenter Future

- **Staffing**
  - *Jasen Boyington, Leading Infrastructure Support – Boulder and Colo Effort*
  - *Julie Harris joined Infrastructure Support – Boulder group*

- **Colocation**
  - *CISL Production HPC to vacate ML Q3 2012*
  - *Budget plan (FY13) for new era in computing management for Boulder compute facilities operations.*
  - *Preparing to install advanced environmental monitoring systems in Boulder, to be monitored 24x7 at NWSC*
  - *Installing new, low cost hot/cold aisle containment systems for enhanced energy efficiency initiatives.*
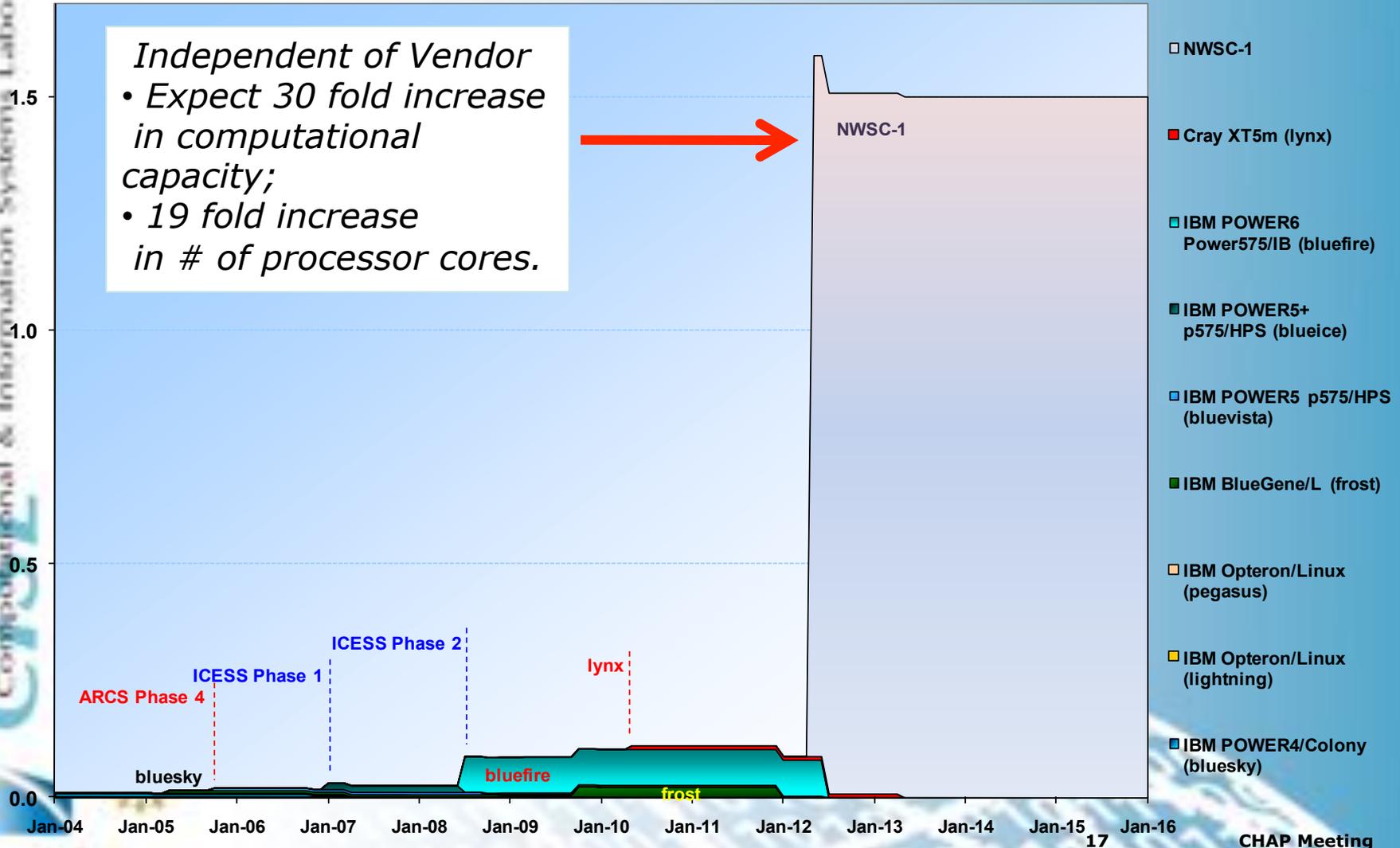
NWSC-1 Resources

- ## When:
  - *September– Procurement Package to NSF*
  - *October– Expect Approval from NSF*
  - *January - Equipment delivery to begin*
  - *June-July 2012 – Production Computing*
    - Allocations for CHAP: ~176M CPU hours/year!!
- ## What to expect: (independent of vendor)
  - *HPC Resource: ~1.5 PFLOPs, >70k cores*
    - ~30x increase in bluefire-equivalents
  - *CFDS Resource: >15 Pbytes, >90 GB/s aggregate bandwidth*
    - ~12x increase in disk capacity
    - ~15x increase in I/O bandwidth
  - *DAV Resource:*
    - ~20x increase over current
    - Large memory system
    - GPU computation/vis cluster

NWSC-1: computing

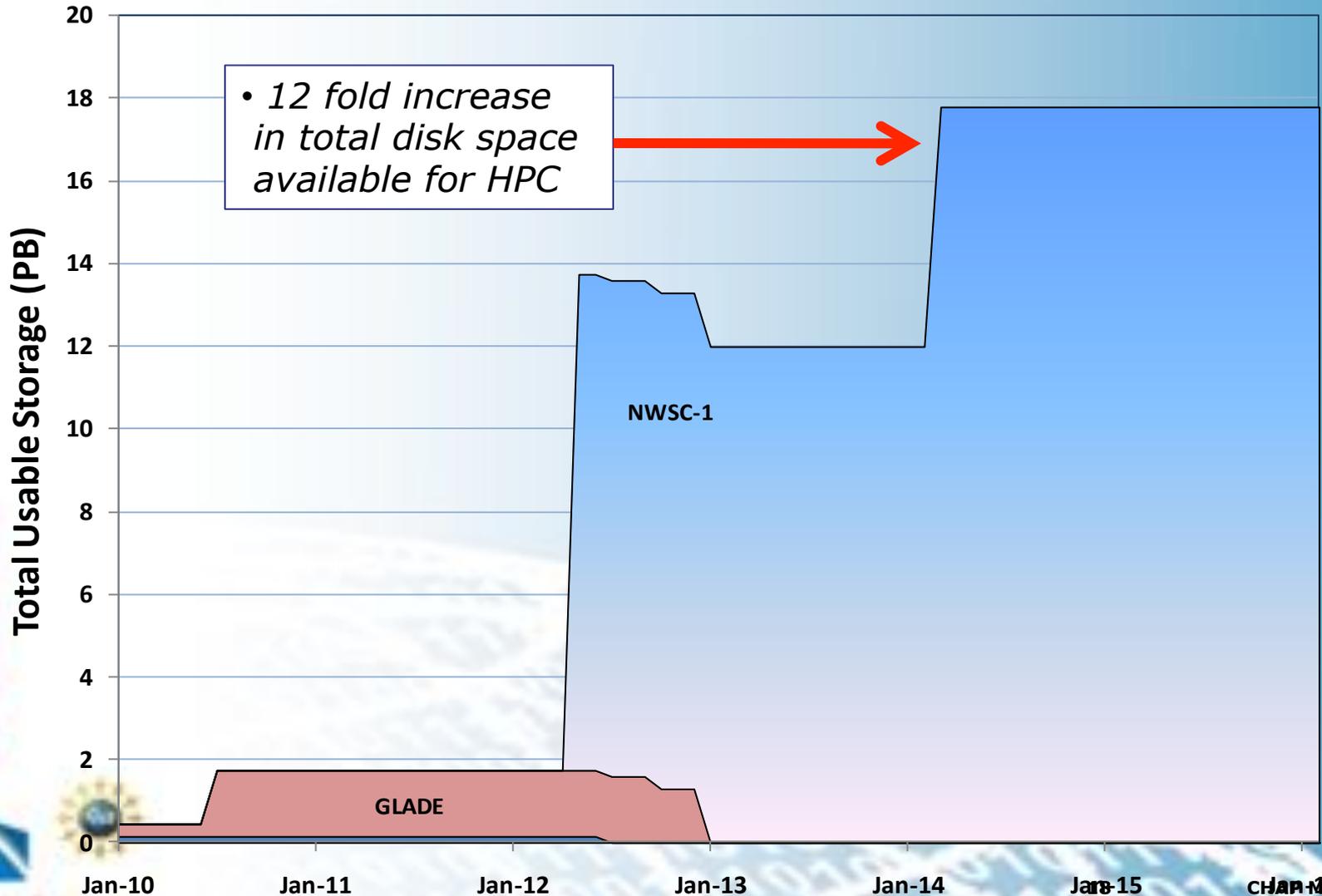## Peak PFLOPs at NCAR

Independent of Vendor
- *Expect 30 fold increase in computational capacity;*
- *19 fold increase in # of processor cores.*

NWSC-1

NWSC-1
Cray XT5m (lynx)
IBM POWER6 Power575/IB (bluefire)
IBM POWER5+ p575/HPS (blueice)
IBM POWER5 p575/HPS (bluevista)
IBM BlueGene/L (frost)
IBM Opteron/Linux (pegasus)
IBM Opteron/Linux (lightning)
IBM POWER4/Colony (bluesky)

ARCS Phase 4
ICESS Phase 1
ICESS Phase 2
lynx
bluesky
bluefire
frost

1.5
1.0
0.5
0.0

Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16

NWSC-1: storage

Total Centralized Filesystem Storage (PB)

☐ NWSC-1   ☐ GLADE   ☐ bluefire

• *12 fold increase in total disk space available for HPC*

NWSC-1

GLADE

Total Usable Storage (PB)

20
18
16
14
12
10
8
6
4
2
0

Jan-10   Jan-11   Jan-12   Jan-13   Jan-14   Jan-15   Jan-16

CAS2K11

- **"Computing in Atmospheric Sciences 2011 (CAS2K11)" in Annecy France (Sept 11-14)**

- **Broad Participation**
  - *Speakers from 10 countries presented*
  - *101 participants from 13 countries*
  - *7 Industrial Sponsors*

- **Presentation Highlights:**
  - *CMIP5/IPCC Computing and Data (Jerry Meehl, Gary Strand, NCAR)*
  - *Climate and Weather Computing in China on Milky-Way*
  - *Project Athena: Very high resolution global climate simulations with the ECMWF model (Martin Miller, ECMWF)*
  - *Exascale Computing: How computer scientists will make your life harder (Mark Snir, U Illinois)*

Questions?