

# CISL Update Operations and Yellowstone

CISL HPC Advisory Panel Meeting  
18 October 2012

**Anke Kamrath**  
**anke@ucar.edu**  
**Operations and Services Division**  
**Computational and Information Systems Laboratory**

# Much progress since we last met...

- **Staffing**
- **NWSC Facility**
- **Yellowstone/GLADE**
- **Archive**
- **Enterprise Architecture**
- **Networking**
- **RDA**

# OSD Staff Comings and Goings...

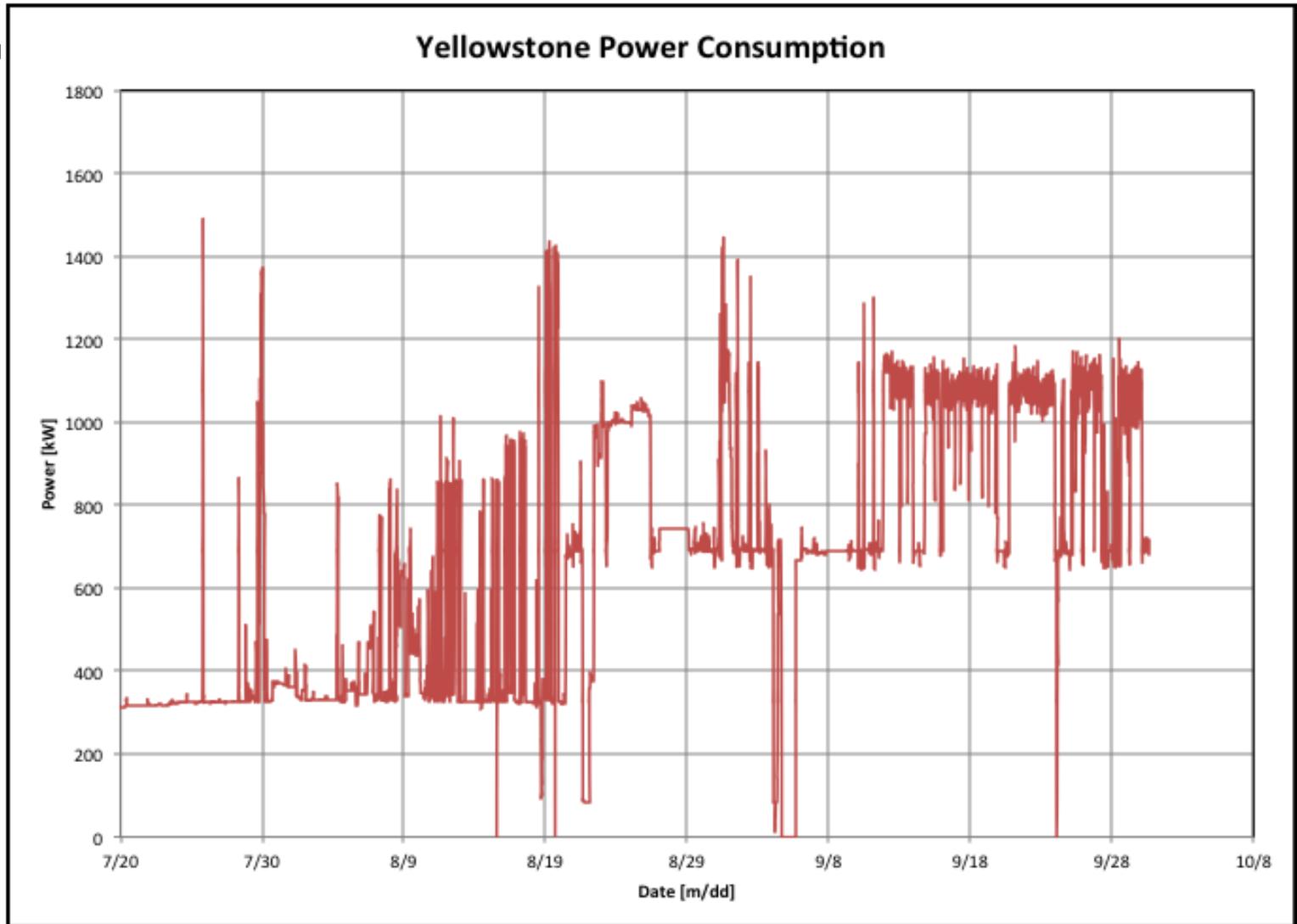
- **New Staff at ML**
  - Matthew Pasiewicz reclassified as WEG Lead
  - Eileen Waukau was reclassified from a Casual Clerk in NETS to a Administrative Assistant II effective 10/1/12
  - Ellen Martinez is now providing budget support for NETS replacing Amy Moore
- **New Staff at NWSC**
  - Jerry Sullivan (TekSystems Temp)
- **Departures**
  - Linda Yellin (Admin)
  - Chris McDill (Admin)
  - Markus Stobbs (WEG lead)
  - Myra Custard (WEG team)
  - Bruce Sun (WEG team)
  - Jeff Alipit (WEG team)
- **Openings**
  - WEG – 4 (Interviews Underway)



# NWSC Facility

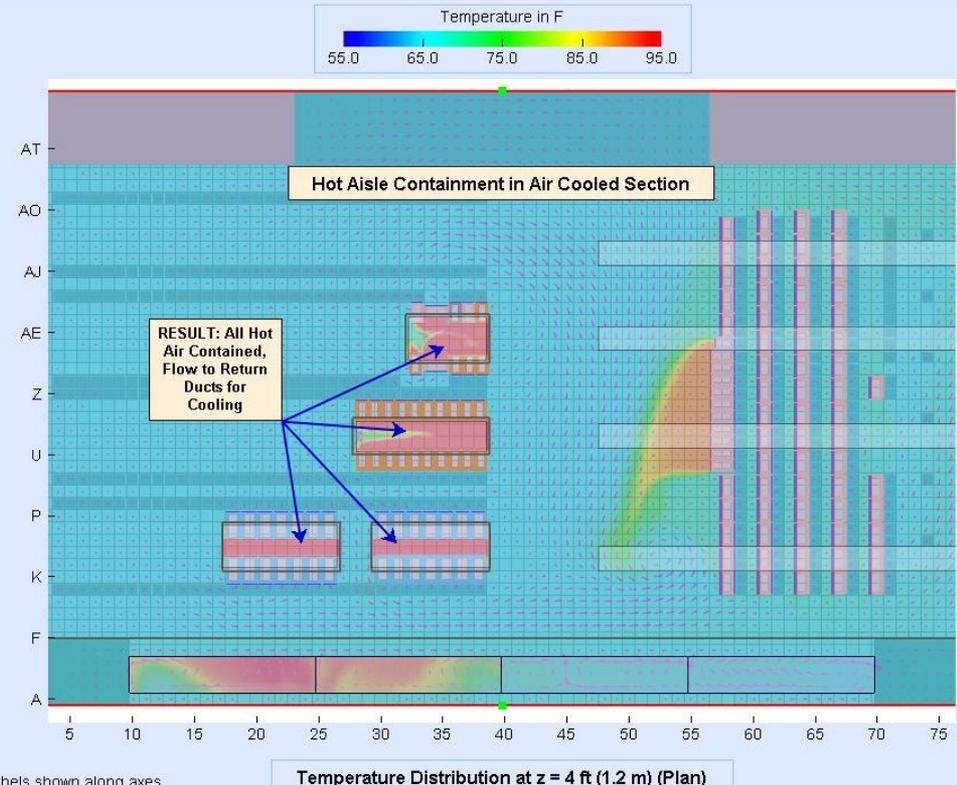
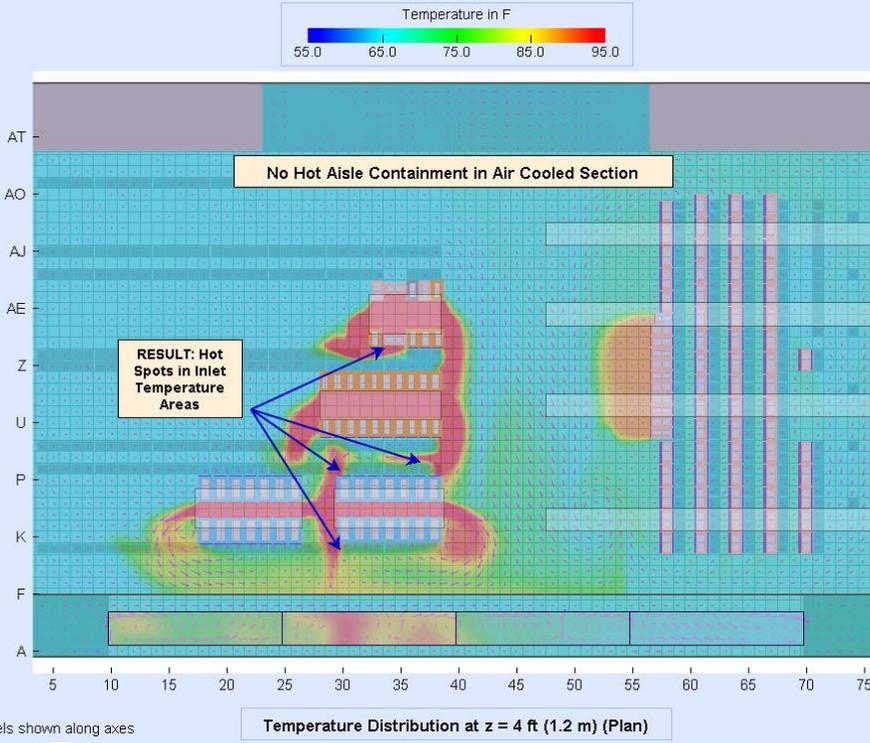
- **CISL Open House in September**
- **Grand Opening this week**
- **Visitor Center Displays Installed**
- **11 Month Warranty Inspection Completed in September**
- **All but one Warranty item Complete**
- **Great deal of facility tuning working on building energy optimization**

# Power Usage is Ramping Up



# CFD Example - Clair Christofersen

## Test Run: With & Without Hot Aisle Containment



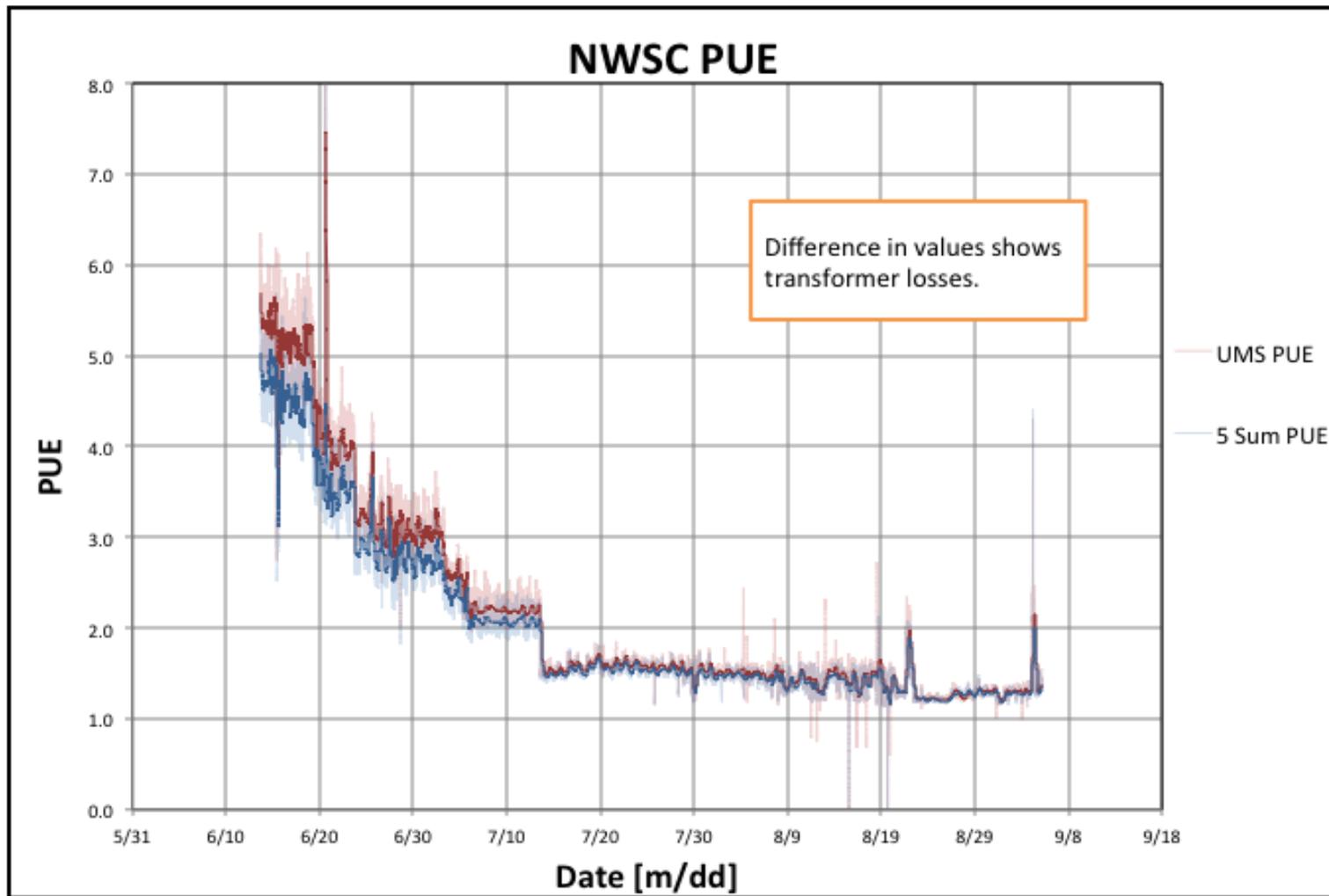
- $\Delta T$ : Temperature Differential**
- $T_{\text{return}} - T_{\text{supply}}$
  - With Hot Aisle Containment, much greater  $\Delta T$  exists
  - Higher  $\Delta T \rightarrow$  Greater Efficiency
    - Reduces the amount of fan or pumping energy required to move the same amount of energy around

Computational  
CSI

Labels shown along axes

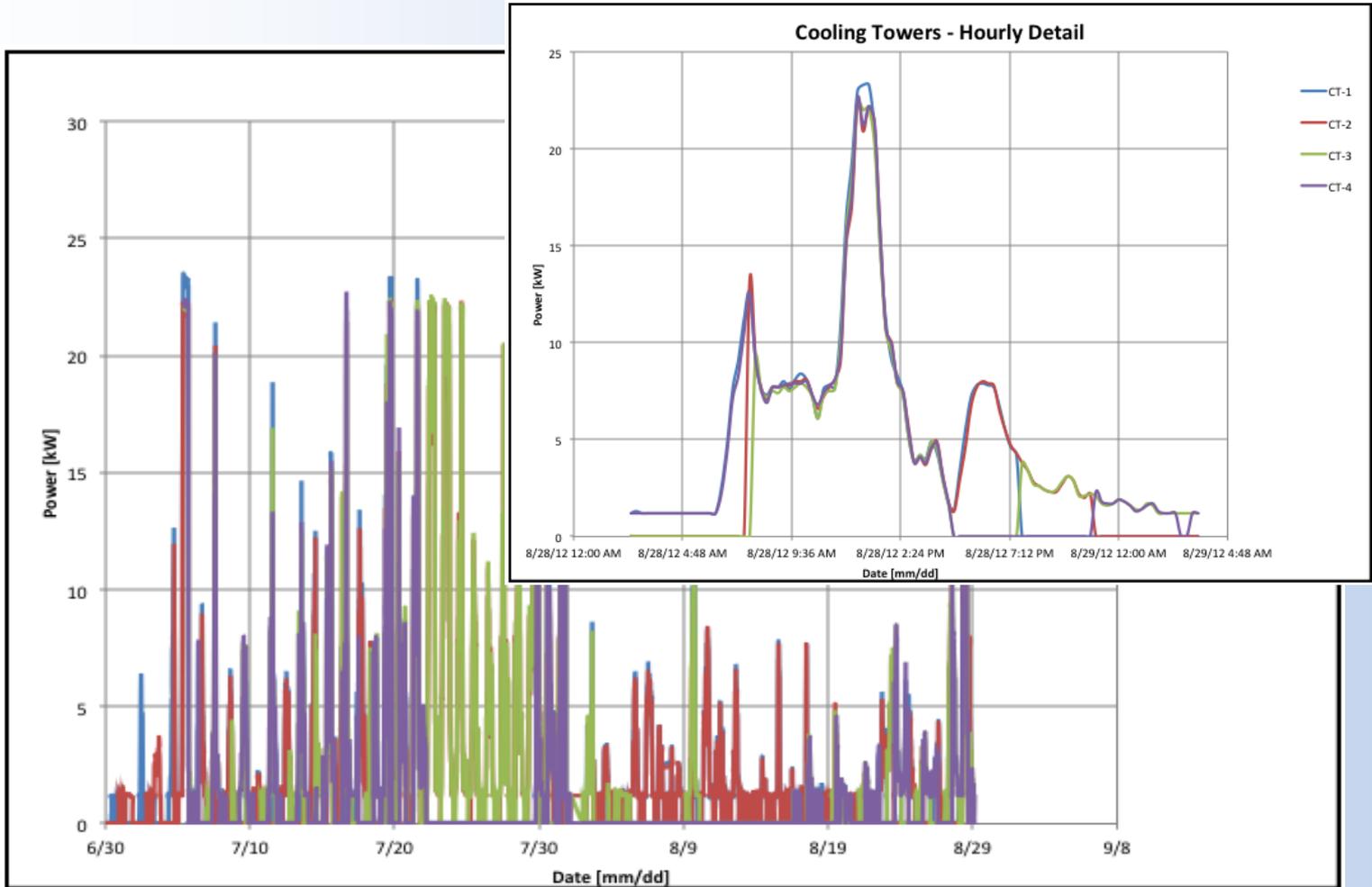
Labels shown along axes

# Optimizing Efficiency – Jason Jones



# Cooling Tower Optimization

## Reworking Control Sequence



# Yellowstone Environment

- **Yellowstone and GLADE Accepted on 9/30!!**
  - Issues Remain:
    - performance at scale
    - firmware
    - GPFS/multicluster
    - IBM & Mellanox working with CISL to address
  - Top500 runs being done on a couple weekends this month
- **~100 “Early, Friendly” ASD Users got on Monday Oct 8!**
  - User Comment
    - *“Yellowstone is performing excellent with everything I've thrown at it. Even a bit faster than I had expected.”*
  - Targeting October 22 for official ASD start, barring system issues
  - Expect new challenges to arise. Scaling of codes, etc.
  - Production Readiness Date - TBD

# Working Yellowstone Issues

- **Big Items**
  - Bisection BW – Routing Summit w/ IBM and Mellanox
  - Data Movers & GPFS MultiClusters
  - Compute node firmware upgrade
- **Frequent Meetings with IBM**
  - Daily 10am Telecon with IBM
  - Weekly IBM Executive-level telecon
  - IBM Applications Specialist on-side this week at Boulder working with CESM, WRF, etc development teams.
- **Subcontract Mod in the works to clarify remaining items**
- **Bluefire to continue in service for at least 6 weeks after Yellowstone enters “production ready” for all users.**

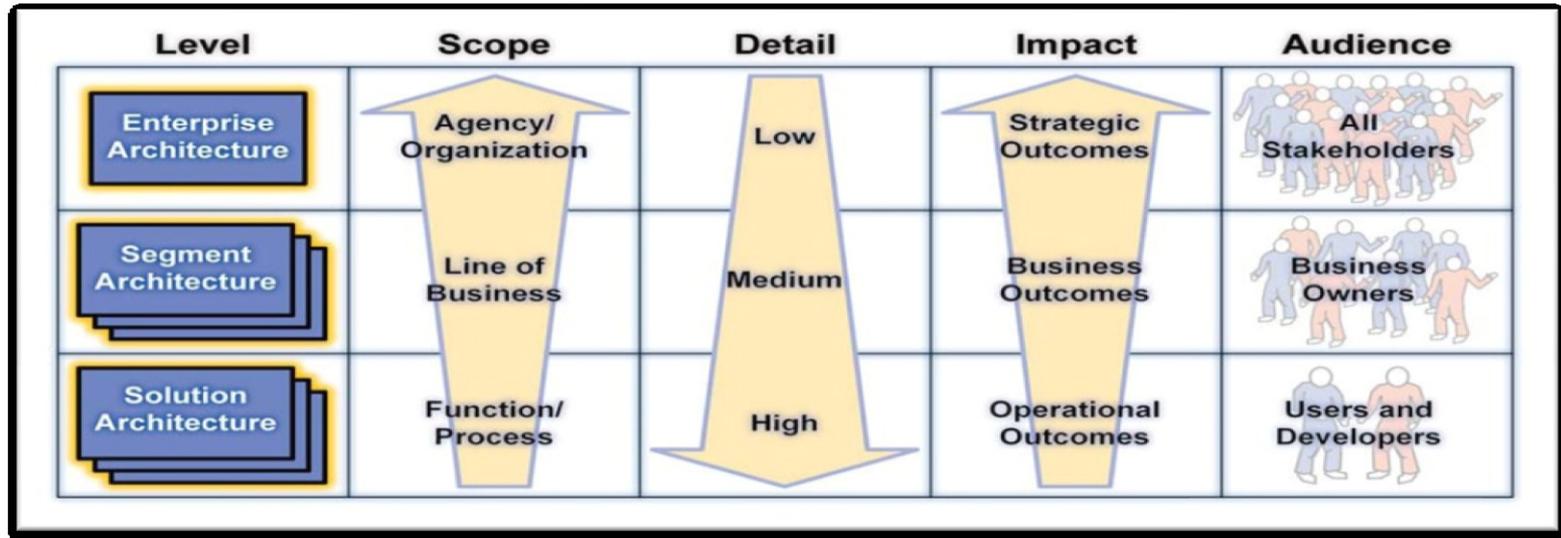
# HPSS Transition to NWSC

- **Nov 2011 – SL8500 Libs install and accept**
- **Feb-Apr 2012 – Servers and disk subsystems install**
- **Jul-Aug – fit out and enable for use**
  - System backups first production use
- **Sept 17 – go live for all traffic from Mesa**
- **Sept 24 – switch metadata server**
- **Week of Oct 22– NWSC clients/ASD (HSI, HTAR)**

# Archive Procurement Update

- **Delay RFP by 2 years and extend current contract for 2-year overlap w next RFP**
  - Will allow more competitive RFP in 2015 (delivery in 2016)
  - Will have better understanding of storage needs (ie – what is yellowstone creating)
  - Will have saved up \$ for increasing investment in this RFP
- **Extension will provide**
  - Continued use of 1-TB tapes (will not do ooze)
  - 45PB by end of 2013 (30PB of 5 TB tapes, and 15 TB of 1 TB tapes)
  - Purchase additional tape drives and media to get to +100PB in 2016
    - New tape drives in ~2014 – ~60% bump in storage density and reuse of C Media (5TB tapes). (ie – 30PB -> ~50PB)

# Enterprise Architecture



“Enterprise Architecture” is the name of the discipline of translating an organization’s vision and strategy into effective business practices and information technology (IT) infrastructure to support those practices.

New Initiative Lead out of CISL & F&A IT

Key CISL Contributors

- Anke Kamrath
- Aaron Andersen
- Mark Bradford
- Steve Beaty

Looking at a rapidly changing IT environment

- Collaboration Tools
- Cloud Services in the more Corporate Sense
- Mobile Devices

# Networking Update

- **Rewiring FL-A FL-4**
- **End-of-life Cisco Equipment replacement**
- **UCAR Wireless Upgrade**
- **FRGP Router Replacement**
- **UCAR Vidyo Pilot Project**
- **BRAN Updates**

# Foothills Lab Anthes (FLA) and Foothills Lab 4 (FL4) Building Rewiring Projects

**Cable media is the foundation of all digital connectivity including computer networking, phones, wireless, building automation, and life safety**

- dictates the speed and reliability of all upper layer networking

**Designed to be very flexible, reliable, and serve NCAR/UCAR for a period of 15 or more years**

**NETS staff designed, installed, tested, and activated all physical layer networking**

**Upgraded redundant backbone capable of 100Gbps intra-building**

**411,000 total feet of cable, 562 wall plates, 23 wireless access points, and 5,200 fiber terminations**

- Cable: 156,000 feet FLA and 255,000 feet FL4
- Wall plates: 258 FLA and 304 FL4
- Wireless Access Points: 11 FLA and 12 FL4
- Fiber Terminations: 2,400 FLA and 2,800 FL4



# Cisco equipment replacement

Computational & Information Systems Laboratory



## • Five year project to upgrade end of life (EoL) Cisco equipment

- equipment must be replaced before vendor service is no longer available
- managed to flatten budget impact over multiple years
- old equipment traded in for discount credit saving roughly 10% on new orders

## • 30 Ethernet switch chassis replacements with

- 46 supervisors – each requiring conversions/upgrades
- 109 modules (10/100) upgraded to 1G capable
- closet cabling upgrade with each module for 1G capability
- 46 power supply upgrades

## • 5 voice gateways

- combined gateways with existing out of band access servers to reduce equipment being replaced

## • Early morning chassis replacements to minimize staff downtime



## Cisco EOL Upgrade Project



| #        | Location | Device         | Slot | Status |
|----------|----------|----------------|------|--------|
| cg1-0103 | cg1-0103 | cg1-0103-cl-gs |      | active |
| cg1-0103 | cg1-0103 | cg1-0103-cl-gs |      | active |
| cg1-0103 | cg1-0103 | cg1-0103-cl-gs | ps1  | active |
| cg1-0103 | cg1-0103 | cg1-0103-cl-gs | ps2  | active |
| cg1-0103 | cg1-0103 | cg1-0103-cl-gs | 1    | active |
| cg1-0103 | cg1-0103 | cg1-0103-cl-gs | 2    | active |
| cg1-0103 | cg1-0103 | cg1-0103-cl-gs | 3    | active |
| cg1-0103 | cg1-0103 | cg1-0103-cl-gs | 4    |        |

| TRADEABLE DEVICES   | QUANTITY | PORTS |
|---|----------|-------|
| WS-X6K-SUP2-2GE, 2 port 1000BaseX Supervisor Mod 2 (GBIC) | 2        | 2     |
| WS-X6348-RJ45V - Catalyst 48 port 10/100BaseTX (RJ-45)    | 7        | 48    |

|   |   |   |   |     |
|---|---|---|---|-----|
| WS-C6K-9SLOT-FAN, Catalyst 6000 Fan Tray for 9-Slot Systems | 1 |   |   | CG3 |
| WS-CAC-2500W, Catalyst 6000 2500W AC Power Supply           | 2 |   |   | CG3 |
| WS-X6K-SUP2-2GE, 2 port 1000BaseX Supervisor Mod 2 (GBIC)   | 2 | 2 | 4 | CG3 |

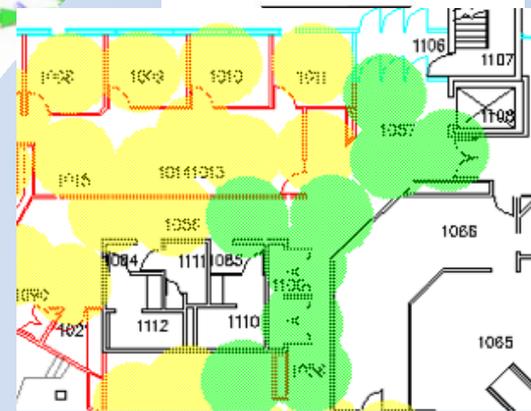
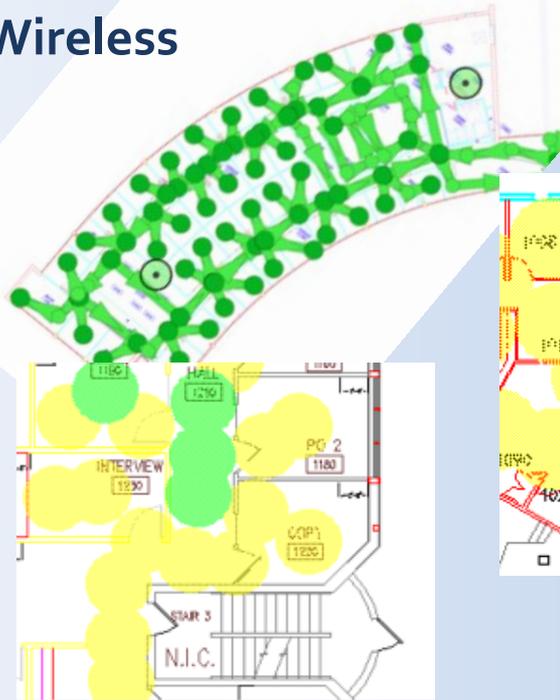
# UCAR Wireless



- **UCAR Guest Wireless Redesign**
  - led by NETS
  - improved scalability and reliability
  - simpler user interface
  - old system retired 06-Sep-2012

- **New UCAR Internal Wireless**
  - provides seamless access to internal network resources for staff
  - industry standard certificate based authentication

- **UCAR 802.11n Upgrade**
  - Replaced over 100 access points
  - Full 802.11 a/b/g/n support
  - Dual radios and GigE uplinks provide a significant capacity increase



**IEEE 802.11™**

|  |   |
|--|---|
|  | signal strength <i>at least</i>         |
|  | signal-to-noise ratio <i>at least</i>   |
|  | data rate <i>at least</i>               |
|  | number of access points <i>at least</i> |
|  | ping round trip time <i>at most</i>     |
|  | Packet loss <i>at most</i>              |



Computational & Information Systems Laboratory

# Front Range GigaPoP router replacement

•The FRGP serves 32 institutions in Colorado and Wyoming, including all major universities and research organizations. The FRGP is a regional connector to national Research and Education networks including Internet2, National LambdaRail, and ESnet

<http://www.frgp.net/>

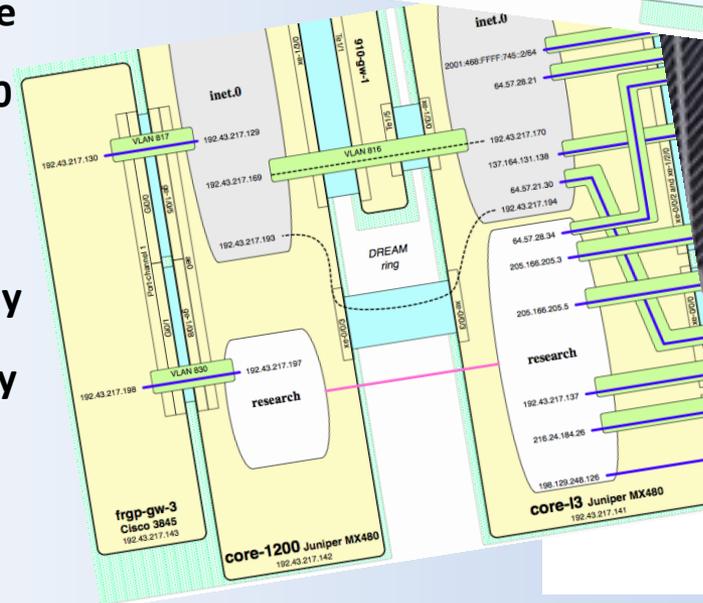
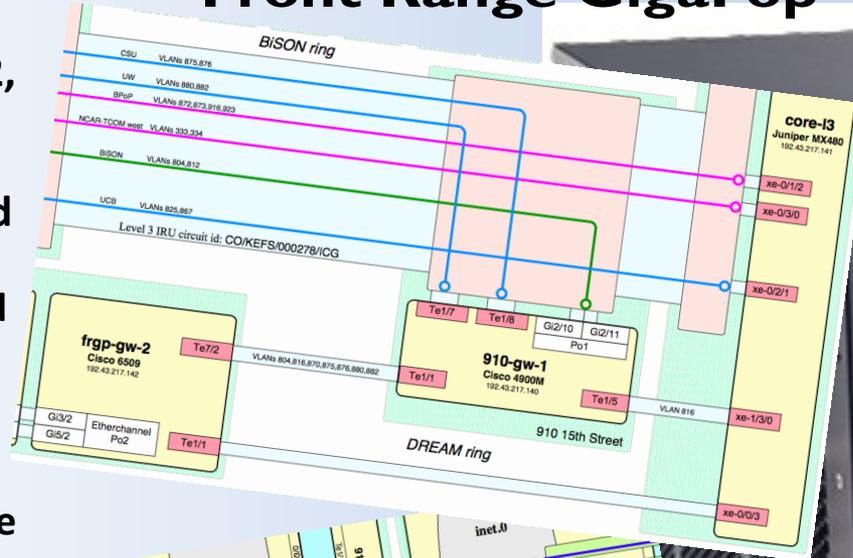
•Routers had reached their 3-5 year end of life

•NETS FRGP engineers provided a detailed evaluation of replacement router options and proposed a replacement plan that would support 10/40/100Gbps member and intra-router links

•The FRGP approved the purchase of three new Juniper routers (plus spare) for the FRGP collocation facilities and support 100 Gb/s fiber optic interfaces and represents more than a 10-fold increase in total switching capacity over the previous generation router.

•The FRGP bandwidth continues to roughly double every two years and the global routing table doubles approximately every five years (currently 450K routes), demanding ever more router speed and capacity

## FRGP Front Range GigaPop



JUNIPER  
NETWORKS



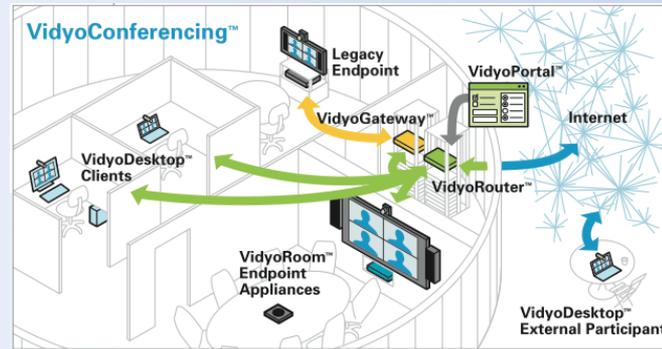
# UCAR Vidyo Pilot Deployment



Computational & Information Systems Laboratory

- Joint effort with staff from
  - CISL/ESS
  - CISL/NETS
  - F&A multimedia services
- Following through on a key recommendation from the Collaborative Technology Advisory Group
- Led by NETS from proof of concept testing to current production pilot
  - Collaboration, management, communication, and coordination between Mesa Lab and NWSC
  - Teleworking and job interview support
  - Business continuity preparedness
- Potential to support many more UCAR users and broader deployment, e.g. NSF, DOE, NOAA collaboration

**Vidyo Conferencing™**  
High Definition Video from the Conference Room to the Desktop



Scalable and Flexible even on mobile devices

SVC Leadership

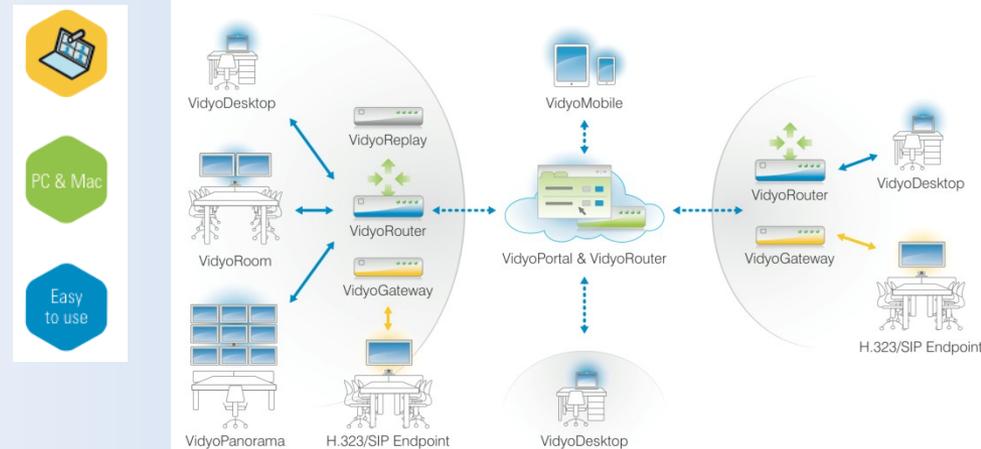
Collaborative Technologies Strategic Planning

Home Settings Control Meeting

## The ROI of Video Collaboration

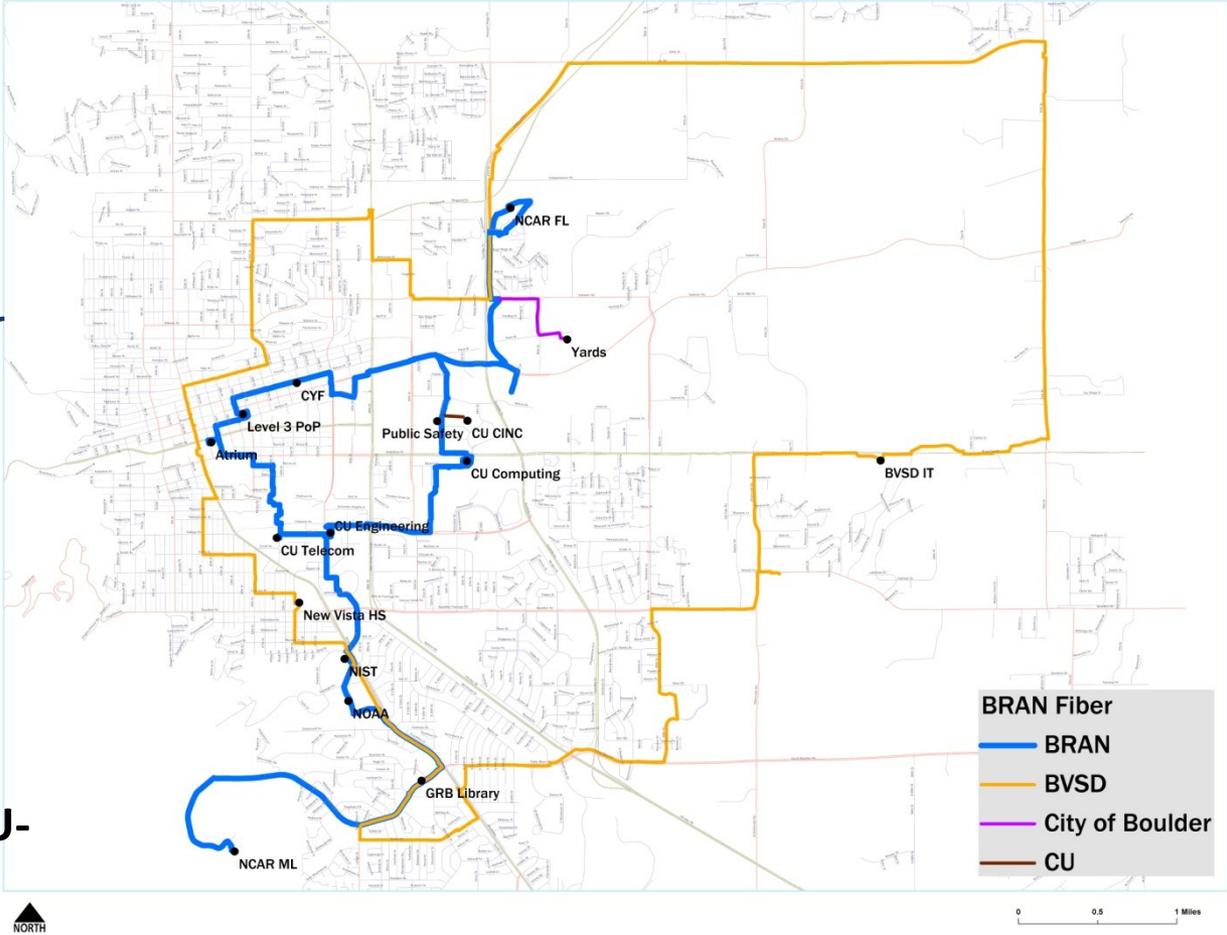
Join Room Call Direct

## The Vidyo™ Conferencing Portfolio



- PC & Mac
- Easy to use





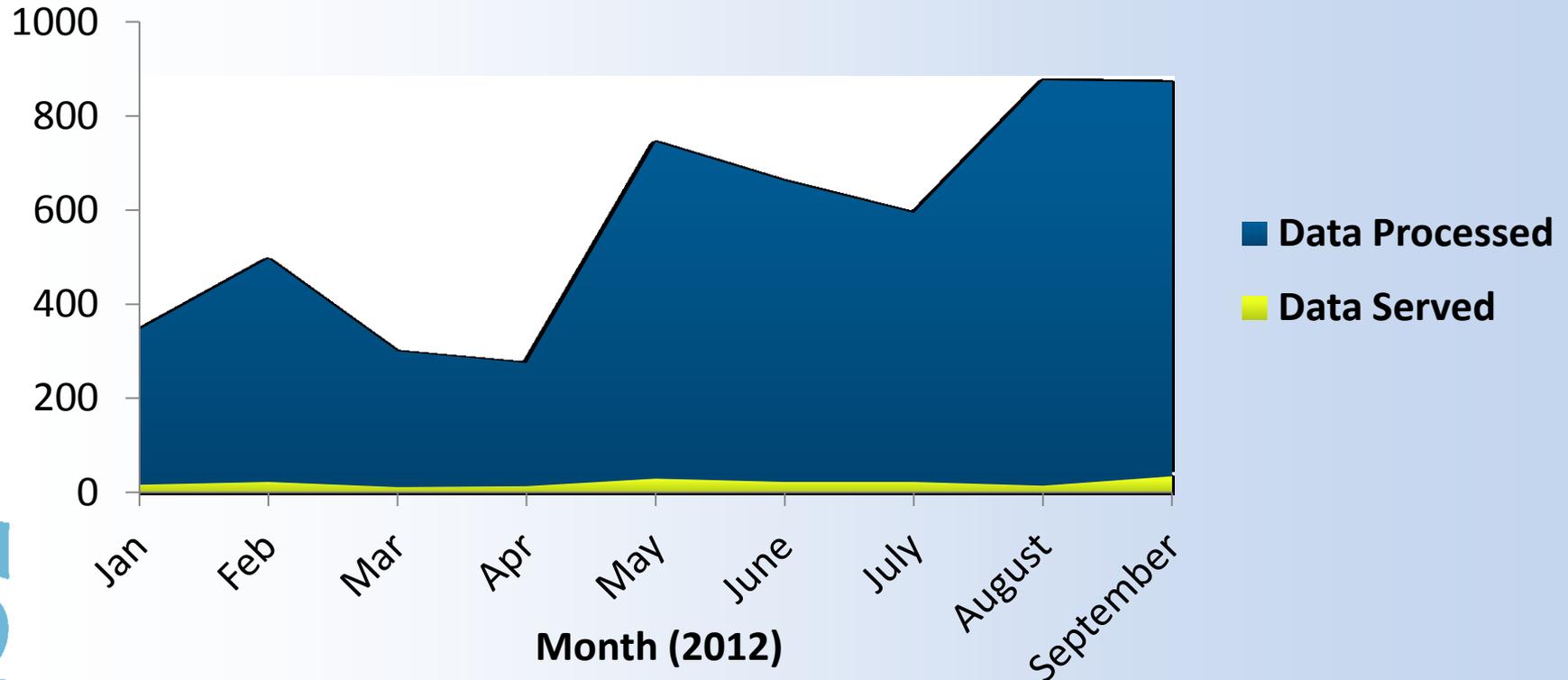
**Boulder Research and Administration Network (BRAN) and Boulder Valley School District (BVSD) Successfully Combine Fiber Optic Assets**

- Led by NETS
- Successful R&E collaboration
- Significantly expands the BRAN fiber optic footprint
- Resolves single point of failure issues for NOAA, CU-Boulder, and UCAR/NCAR
- Enables expansion into related R&E facilities in Boulder including UNAVCO and NEON

Computational & Information Systems Laboratory

# RDA Update

## Volume of Data Processed and Served for 2012 Sub-Set Requests (Across 32 RDA datasets)



| Metrics for Data Services, JAN- SEP 2012           |            |               |   |            |
|--|------------|---------------|---|------------|
| AUTOMATED SERVICES<br>(processed by request RDAMS) |            |               | NON-AUTOMATED SERVICES<br>(direct file downloads) |            |
| #Users   | Served(TB) | Processed(TB) | #users  | Served(TB) |
| 2385   | 190        | 5050          | 6024  | 480        |

# Questions??