Overview: The Engagement and Performance Operations Center

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Agenda

- ***Who we are / What we do***

- Focus Areas

- Conclusion

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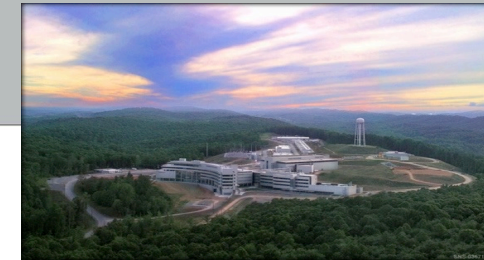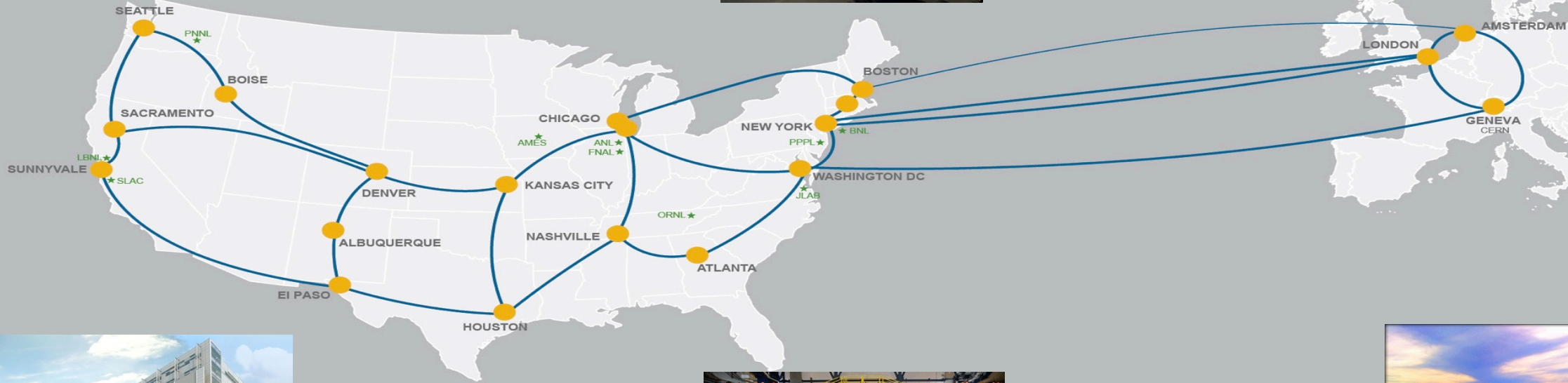Operations Center

Engagement and Performance Operations Center

- Joint project between Indiana University and ESnet
- Part of CC* program for domestic science support
- Award #1826994, $3.5M over ~~3~~ 4 years
- Partnerships with regional, infrastructure, and science communities that span the NSF and DOE continuum of funding

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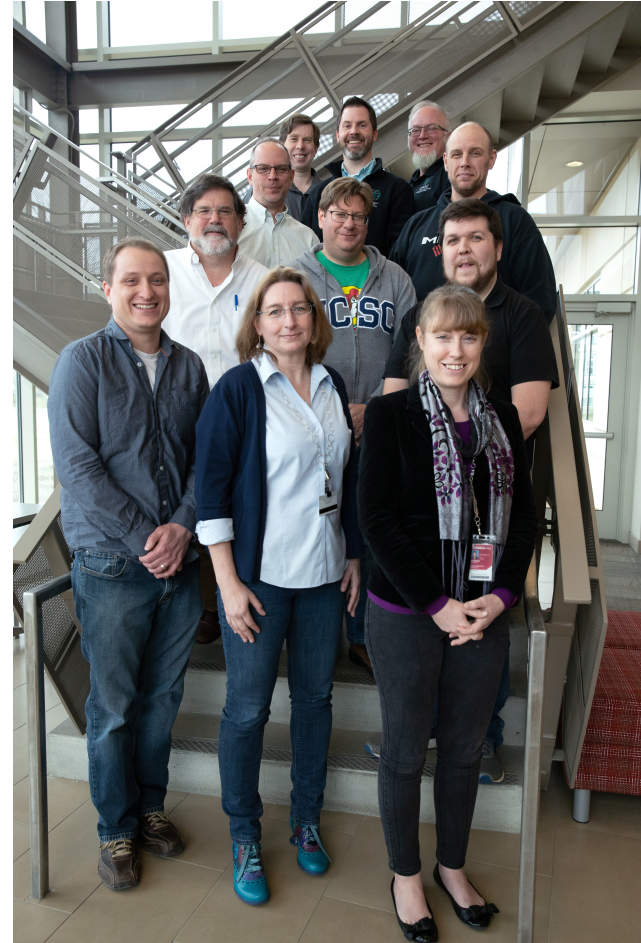
Why an Engagement Operations Center?

- Today's science is collaborative science
- Collaborative science
  - Multiple partners
  - Multiple data sets
  - Many points of connection
  - Cross agency cooperation
- With better access to data we ask harder questions
- Interactive data sources change the science we do

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Network as ~~Infrastructure~~ *Instrument*

***Connectivity*** is the first step – ***usability*** must follow

Move Slow, and Build Relationships

- ***Implementing*** technology is 'easy' in the grand scheme of assisting with science
  - Move away from the model of: '<u>here is your infrastructure, good luck!</u>'
  - Move toward the model of: '<u>Lets think critically about the best fit, even if it takes longer/requires more attention to detail</u>'

- ***Adoption*** of technology is different
  - Does your climate research group care what 'NFV' is? Can you say for certain that 'XaaS' is going to change their world for the better?
  - *Does your climate group want to get data from sensors each day, on a predictable schedule, using easy to operate tools, on computational resources that deliver prompt results, so they can be productive?*

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Move Slow, and Build Relationships

- Convince all parties (leadership, technology support, end users, funding bodies) of the need to articulate a "*data vision*", and then back it up with a "**data architecture**"
  - More fully featured than a "network" architecture – and there needs to be additional layers of complexity built into the model
  - E.g. *software, hardware, computation, storage, etc*.

- Does not have to be 'discipline specific'
  - We often try to find common and fungible solutions based on a cross section of use cases

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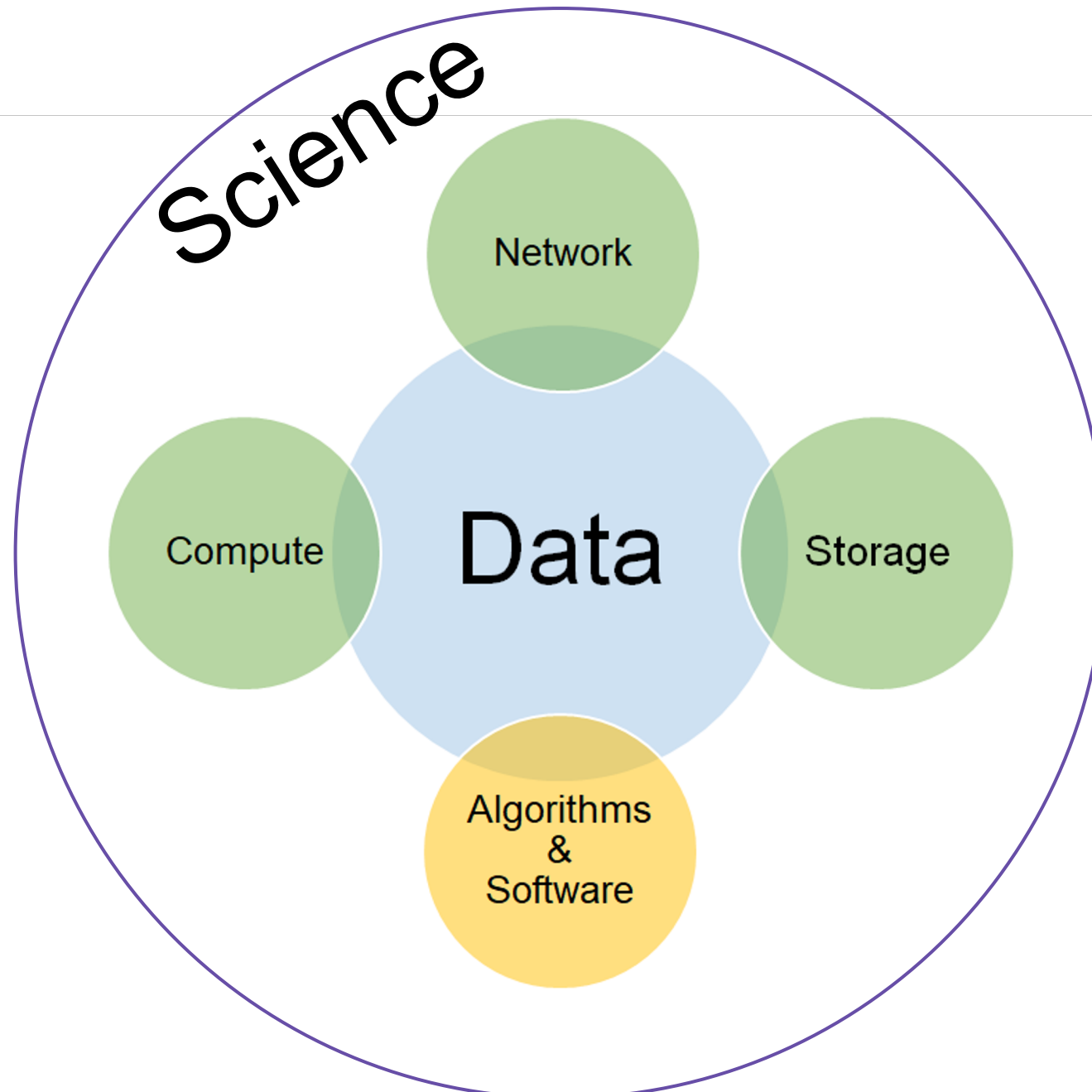
Some specific issues for Network providers are:
- Development of services
- Planning capacity growth
- Creation & support of collaborations

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Early EPOC Observations

- *Reporting a problem (engineering-based):* focused on concrete details/facts (e.g. paths, interconnections)

- *Reporting a problem (end user/science-based):* focused on experience over time, less understanding of physical details

- **The 'wizard' gap is alive and well. Why can't the two communities speak a similar language?**

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  - *Roadside Assistance for Performance Problems*
  - Network Analysis (NetSage)
  - Services "in a box" (DMZ, testpoint in a box, etc)
  - Application Deep Dives
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Understanding End-to-End Performance is Hard

- Lots of pieces - Host system through networks to host system

- No one controls all the pieces

- Unknown expectations for what performance should be

- Soft failures are hard to find

- Many, many points of coordination

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Scaling Engagement – Operations Center Approach

- Central point of contact: epoc@iu.edu

- Operations Center Approach
  - Ticketing, Service center framework
  - Dedicated team- NOT just volunteers with found cycles

- Coordination
  - Ties to the community
  - Take advantage of the "coalition of the willing"

- Strategic partnerships are critical

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Roadside Assistance Process

- Anyone can submit
  - Don't have to be NSF funded, specific university
- Contact epoc@iu.edu
  - Within 24 hours, gets triaged
  - Some initial investigation to verify the issues
  - A Case Manager and Lead Engineer are assigned
  - Shareable infrastructure set up

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Roadside Example(s)

- Multi-domain data transfer/network performance problems
  - perfSONAR shows packet loss/low throughput, help us understand why/how to fix?
  - Data movement tools seeing lower than expected values, help understand/fix?
- Routing Abnormalities
  - Commodity vs. R&E paths
  - Those that don't understand MTU shouldn't mess with it

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Need for Network Instrumentation

- Performance and measurement are 2 sides of a coin
- Common basic measurement data is the first step to understanding performance issues
  - E.g. Global perfSONAR Deployment, http://my.es.net

- NetSage framework
  - SNMP, perfSONAR, Flow, Tstat Data
  - Grafana-based dashboards to visualize performance
- http://portal.netsage.global

Live Instance: http://portal.netsage.global

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How to increase adoption/deliver value to partners of smaller size?

- Observations by IU/ESnet after several years of community events (e.g. OIN Workshops):
  - Lots of "interest" in new technologies
  - May not know of (immediate) use cases
  - Resources (time/$) to design/specify/build is hard to come by
    - Easier to pay for a service that is build for you, or maintain something someone else builds
  - *"Why would I need that?"*

- ***Unfunded mandates have a way of being ignored***

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What is a "Service-in-a-Box"?

- Goals
  - Offer a way for traditionally smaller/less resourced facilities to use emerging technology to support scientific use cases
  - Create new paths for regionals to interact with/learn about/support scientific use cases
  - Reduce cost for service deployment and operation
  - Increase adoption/improve outcomes on a larger scale

- Known Examples: LEARN deploying Science DMZ as a servie, ESnet deploying DTN as a service.

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EPOC Deep Dive Vision

- Think of this as regular maintenance, oil change, or planning to buy a car

- Based on ESnet facility req'ts reviews*

  - Walk through science workflow with the actual scientists

  - Way to understand needs and planning

- Often identifies issues that have **_nothing_** to do with technology specifics, and everything to do with sociology

We Walk Through Scientific Components…

1. Background information
   - Brief overview of the facility, nature of the science being performed
2. Collaborators
   - Identify people and institutions that a science group interacts with
3. Instrumentation
   - Local and remote scientific instruments and facilities.
4. Process of Science
   - Explain 'a day in the life' of the science group
   - Should tie together the instruments, the people, and the resources

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And Also More Technical Aspects…

- 5. Software Infrastructure

- 6. Network and Data Architecture

- 7. Cloud Services

- 8. Outstanding Issues and Pain Points

→ Local and regional IT staff are critical to these parts, and help form valuable partnerships that may not exist, or could use strengthening

When This Is Done

- Better understanding of the science, data movement, who's using what pieces, dependencies, and time frames
- Identification of bottlenecks or pain points becomes more obvious
- Relationships build between layers (engineering, science, administration)
- Clear path toward improvement and success

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Common Themes

- Most problems are not technical
  - Lack of contact points across a campus/system
  - Lack of understanding of use cases
  - Lack of understanding of available resources
- When they are technical, its:
  - Storage – I need more of it, and I need it local (e.g. 'cloud' doesn't always scale)
  - Compute – I need access to it (local | remote)
  - 'IT People' to help me convert a workflow, or improve a process

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Common Themes

- When they are technical, its (cont.):
  - Networking: everyone wants 'faster', but listen carefully to hear if this means:
    - 'better response time' – e.g. interactive for visualization or communication
    - 'downloads/uploads' – e.g. is this the tool they are using, the hardware that is running it, or the network? Bet $1 you can't figure out which it is, until you sit with them …
    - 'file access' – e.g. this just may be how they are accessing their data in cloud storage, or across campus. Still requires that sit-down …

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EPOC Take Aways

- EPOC is an NSF-funded operations center to help scale science engagement and problem resolution
- Single point of contact to help with end-to-end performance issues
  - epoc@iu.edu
- More about EPOC:
  - http://epoc.global
- Jennifer Schopf, jmschopf@iu.edu
- Jason Zurawski, zurawski@es.net
- Dave Jent, jent@iu.edu

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