

ESnet Update for ESCC

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ESCC 2013

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A Tale of Two Updates



Tuesday's talk at TIP: "10-Year Strategy in 20 minute," destined for a broad audience that included many from APAN.

Today's talk: selected updates on topics relevant to ESCC community.
Warning: some overlap with Tuesday's content (draft strategy plan).

Please interrupt me at any time for questions!

Topics



- 1) highlights of past six months
- 2) announcements, initiatives, and projects
- 3) ESnet strategic plan

But First: Recap of ESnet TIP Participation



Building a Science DMZ (tutorial, Brian Tierney)

DNNSEC: Signing, Validating, Troubleshooting (tutorial, Michael Sinatra)

Scientific User Outreach: Challenges and Strategies (BOF, Lauren Rotman, with Jason Zurawski)

Network Abstractions: the First Step Towards a Programmable WAN (talk, Inder Monga)

ESnet Update: a Ten-Year Plan in Twenty Minutes (talk, Greg Bell)

Science DMZ Security (talk, Eli Dart)

Science Gateways and Web APIs for HPC (talk, Lauren Rotman, with David Skinner)

Recap of ESnet TIP Participation, part II



Feeling the Brady Bunch's Pain: How Two Networks Became a Family
(talk, Michael Sinatra)

Network Monitoring with the perfSONAR Dashboard (talk, Brian Tierney; Andy's slides)

Experiences on ESnet's 100G Testbed (panel, Brian Tierney)

ScienceDMZ Deployment Issues (BOF, Eli Dart, with Kevin Thompson)

Lessons Learned Deploying a 100G Nationwide Network (talk, Joe Metzger)

Going Green: Network Energy-Efficiency Research (talk, Inder Monga)

Network Power Management Experiences at ESnet (talk, Jon Dugan)

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2012: Our Year of Unprecedented Change



We built our first optical network, deployed a new routing platform, transitioned to ESnet5, and said goodbye to ESnet4.

- with 4-5 critical retirements + departure of Facility director

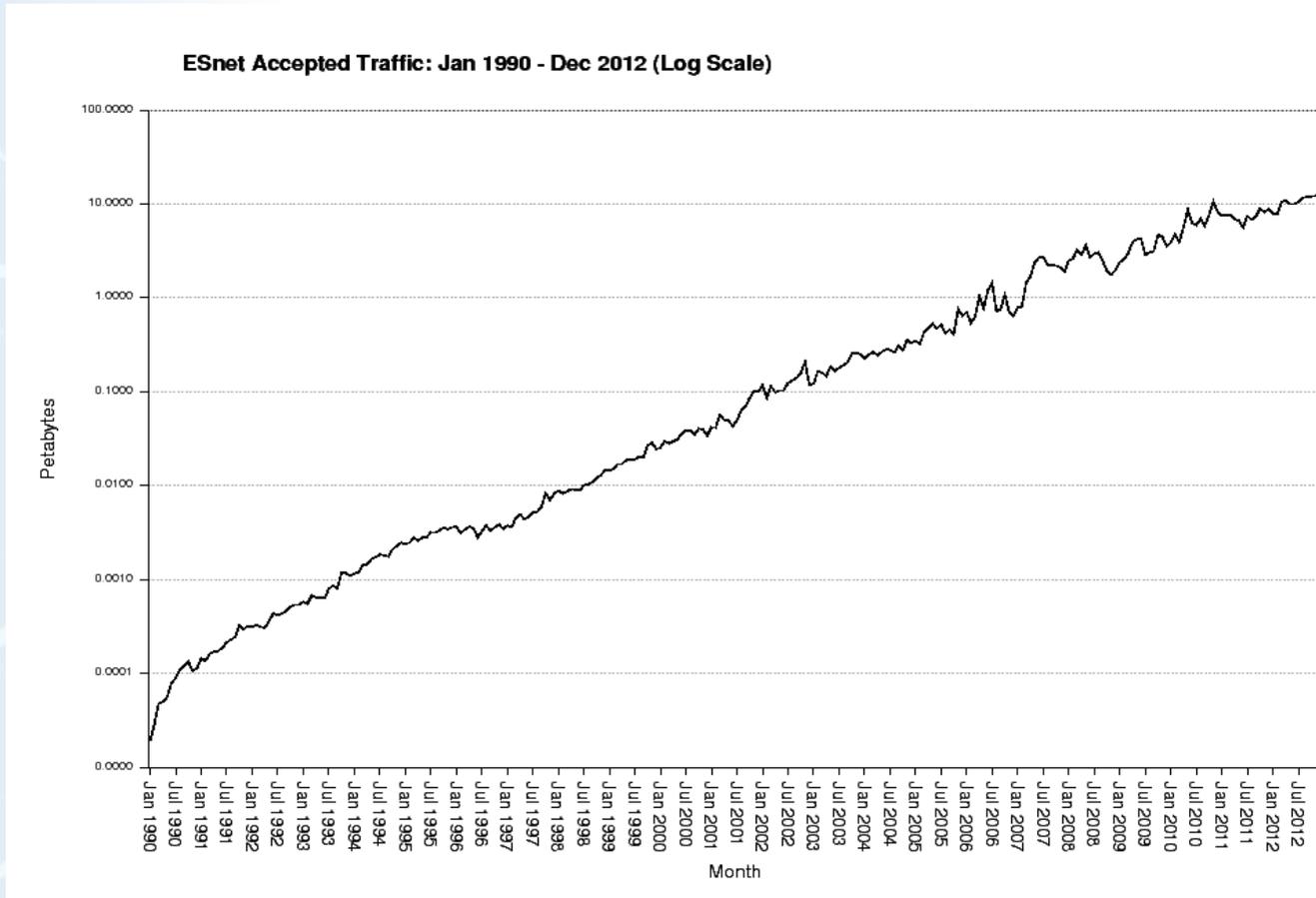
We completed the ANI testbed (closeout report under DOE review).

- future testbed strategy an important topic for discussion at ESCC

We demonstrated major OpenFlow / SDN innovations:

- WAN virtual switch
- OpenFlow optical transport [BNL!]
- NSI in OSCARS for SC12, plus ongoing leadership of standardization effort.

Meanwhile...



Awards...



InformationWeek
Government

Some Additional Highlights from Past Six Months



Several staff participated in review panels for CC-NIE award.

- ScienceDMZ continues to gain influence (clear from TIP!)

Close engagement with HEP for 10 year networking strategy.

- Snowmass Process; special LHCONE meeting on intelligent network services

Network as instrument message (CANARIE, NORDUnet)

Michael Sinatra gives a keynote!

Requirements workshops – ASCR, Belle II, BER

Briefings on science networking for congressional staff.

The LHCONE has doubled in size to include 33 autonomous systems (networks) serving 115 uniquely--routed prefixes since July.

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Announcements, initiatives, and projects



Overarching Themes for 2013

- return to balance
- focus on strategy
- clarify roles, responsibilities, processes



Staffing Changes

Officially Designated as ESnet Veterans

- Lauren Rotman
 - role: Lead, Partnerships and Outreach
- Patty Giuntoli
 - role: Area Lead, Infrastructure, Collaboration, Identity, O&D
- Mike Bennett
 - role: Group Lead, Network Engineering

New to the Organization

- Brendan White
 - role: Infrastructure Group Member
- Daniel White
 - role: Infrastructure Group Member
- Cody Rotermund
 - role: Ops and Deployment Group Member



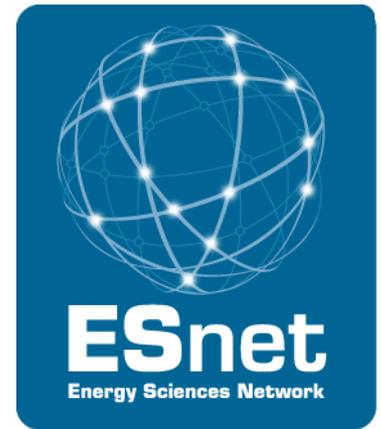
Staffing Changes

Brand New to the Organization: Susan Lucas

- Deputy for Operations [business Ops]
- competitive recruitment (>100 applications)
- job a nutshell: virtuoso at 'getting to yes', process excellence, metrics, business operations, making Vince very happy ;-)
- 15-year history at Joint Genome Institute, serving as Department Lead for Production, and Group Lead for Strategic Planning
- managed teams of 100 people, budgets @ \$25M
- 53 peer reviewed journal articles
- recent MBA
- we're delighted Susan has decided to join our team!

Shifting to a New Role: Gizella Kapus

- will transition to project coordinator
- balance of strategic / tactical / project tasks, with transition occurring starting after we higher contracts admin



ESnet Director & Scientific Networking Division Director
Greg Bell

Senior Advisor
William Johnston *

Deputy for Operations
Susan Lucas

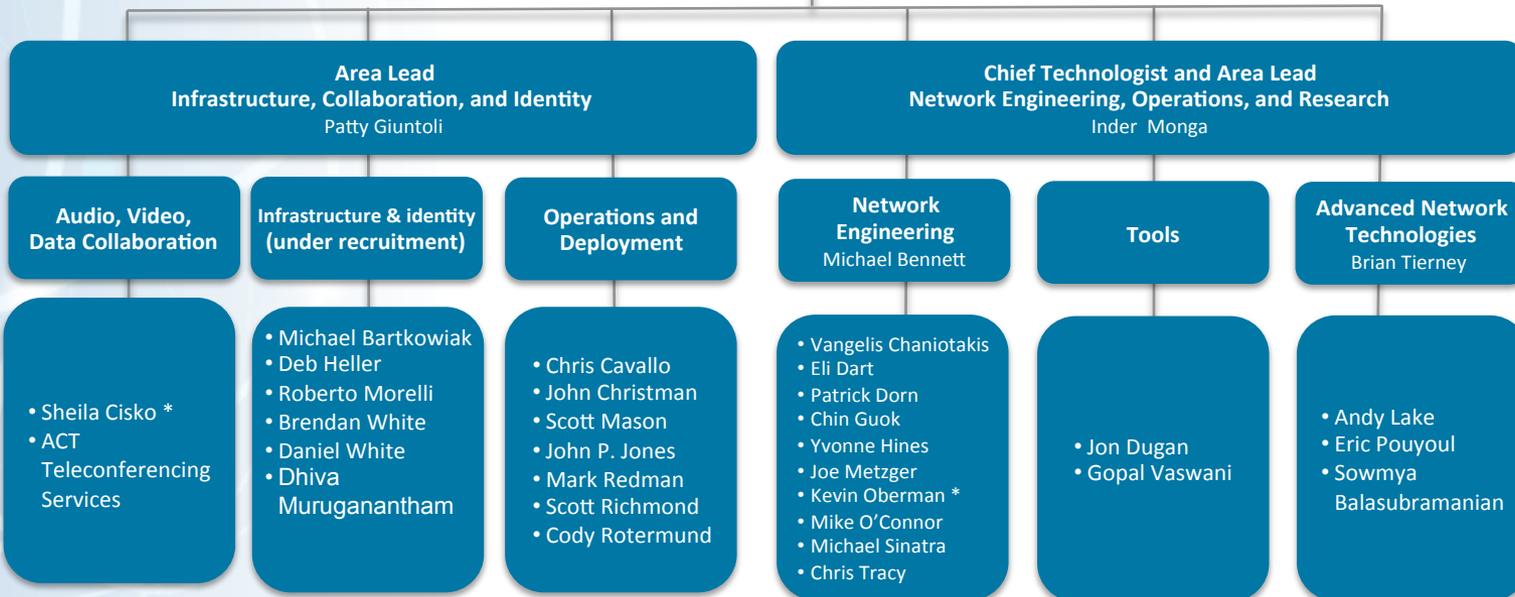
Security and Disaster Recovery Officer
Dan Peterson

Project Manager
Hing Chow

Program Administrator
Gizella Kapus

Strategic Partnerships and Outreach Lead
Lauren Rotman

- Shorei Butler
- Open Administrator



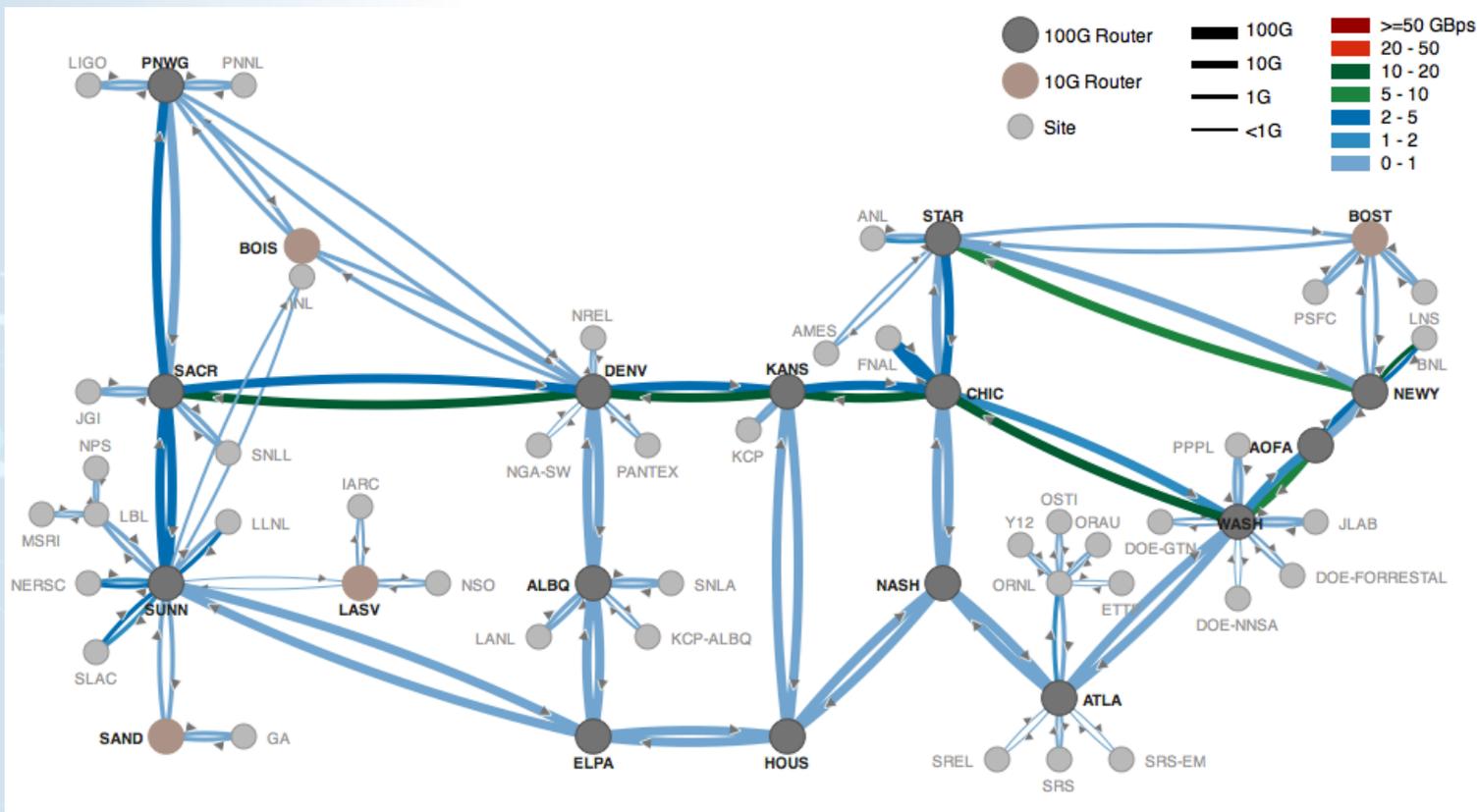
ESnet and Globus Online Partnership



Collaboration goals:

- Position the integration of data mobility, data sharing tools + networking as indispensable enablers for data intensive science
- Develop joint outreach efforts targeting small and medium-sized collaborations to accelerate adoption
- Evangelize Globus Online-enabled Science DMZ deployments
- Coordinate on research efforts to refine, evolve our services with particular emphasis on improved integration





MyESnet Portal Interactive Maps Platform

First use case is a map of ESnet 5:

- aggregates parallel circuits (no redundant connections shown)
- click on nodes and edges for more details
- traffic is updated every 30 seconds

Beta is online at <https://my.es.net/esnet5/map/>

This is a data driven **platform** for creating maps and we envision several others, including:

- detailed ESnet 5 map
- site “neighborhood” maps
- possibly regional maps

Light-Weight RFI for European Extension

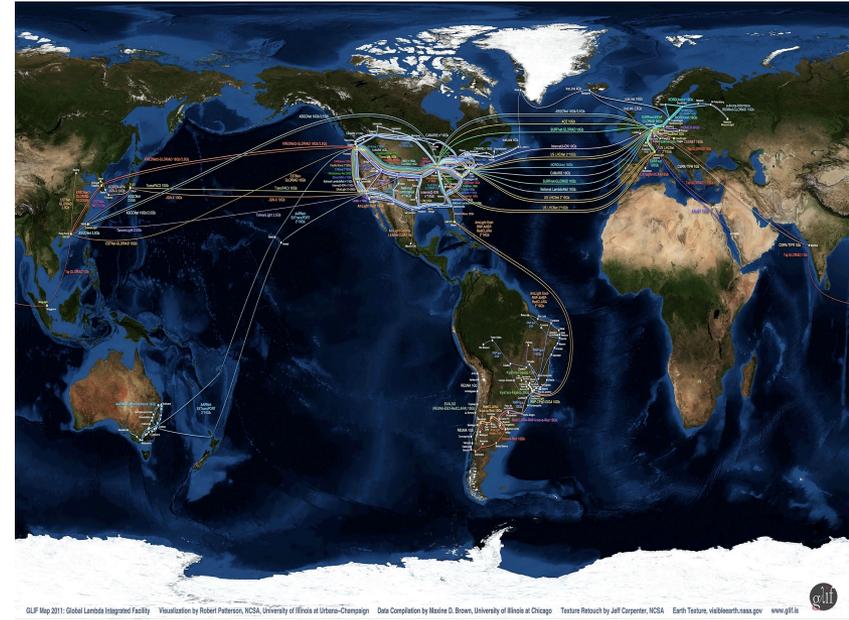


Motivation:

- Provide dedicated network capacity for DOE science that does not entirely depend on goodwill or continued funding from other agencies or networks.
- Assure that ESnet's advanced capabilities for science are available on expanded footprint.
- Support LHC traffic flows.
- Support other science data flows (eg climate, genomics) terminating in DOE complex.

Process:

- We are at the information-gathering and risk analysis stage. With DOE approval, next step will be RFP.



NNSA Relationship ~~Evolving~~ Evolved



We have moved to new direct-funded model for FY13.

- Reduces our distraction, increases efficiency
 - we **had** 20 separate agreements, **now just one**
 - sites didn't always pay in the past, but we think NNSA OCIO will pay ;-)
 - this aligns NNSA model with model for SC
- Allows ESnet to focus on our technical / service interface
- Site Coordinator relationship stays exactly the same
- NNSA OCIO developing governance process for coordinating and evaluating capability enhancement requests that have budget implications.



Metrics Reform

Central question: ***how do we measure success?***

It's easy to count bits and bytes, but harder to quantify (or evaluate) our impact on DOE Science Missions.

Can we do a **better job** of identifying metrics that help us show the role our network plays in accelerating discovery?

1. broad survey
2. JT BOF
3. presentations / public discussions
4. ongoing dialog
5. provisional metrics for CY 13
6. extensive discussion at OAR

rough process

For Example



Availability	What is the average network availability for the ten SC Labs? [target = 99.9%]
ESCC Satisfaction	What is the composite satisfaction score for the ESCC customer survey? [target = 4]
Tools	Have we deployed major new functionality that meets customer-articulated needs and advances the facility mission? [red-yellow-green]
Efficiency	Have we recovered cycles for science impact by improving internal efficiency?

Communication and Marketing	Have we improved our ability to understand and communicate with targeted segments of our scientific user community? [red-yellow-green]
	Have our external communications advanced the Facility mission? [red-yellow-green]

Disruptive Change	Are we allocating 20% of our staff time to activities that produce and harness disruptive change to impact science? [red-yellow-green]
Networking Science	Have we advanced networking science by conducting or participating in research that promotes the facility mission? [red-yellow-green]
	Have we submitted four papers with ESnet staff as primary authors?
Knowledge Base	Have we substantially improved 'knowledge base' resources for scientists and network operators? [red-yellow-green]

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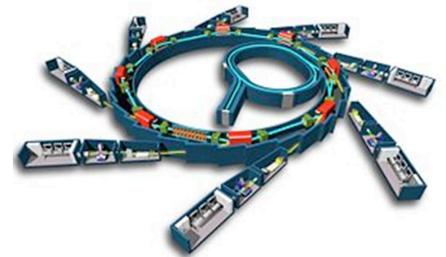


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 - why in the world are we having this conversation now?

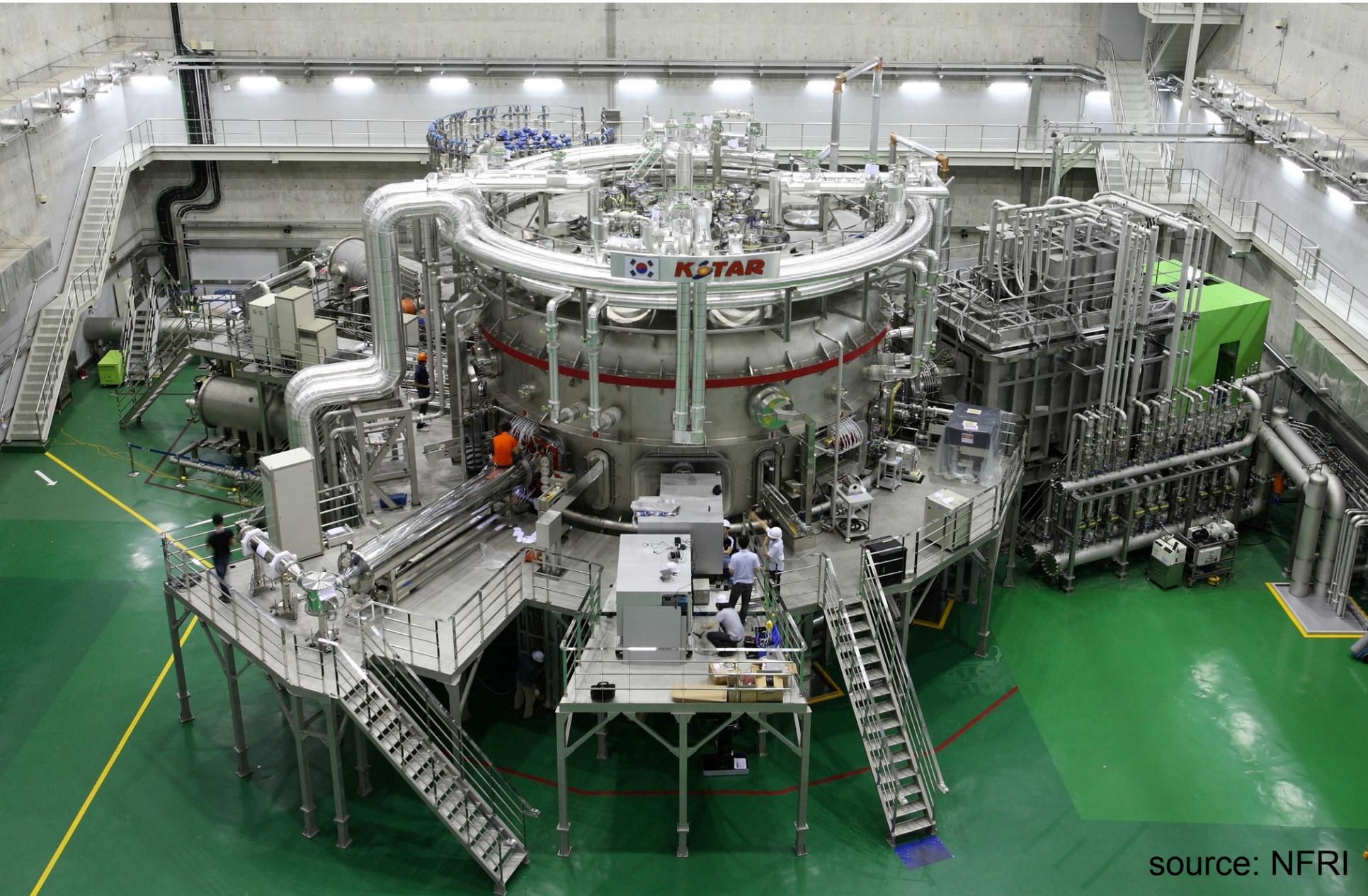
How We Want the World to Be, Part #1



Scientific progress will be **completely unconstrained** by the physical location of instruments, people, computational resources, or data.



KSTAR: Korean Superconducting Tokamak for Advanced Research

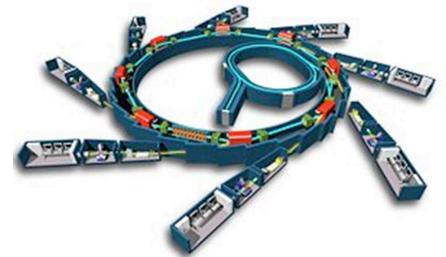


source: NFRI

How we Want the World to Be, Part #2



Collaborations at every scale, in every domain, will have the **information and tools** they need to achieve maximum benefit from scientific facilities, global networks, and emerging network capabilities.



Derived from the Vision: 10-Year Strategic Goals



1. Deliver highly-resilient data transport, optimized for the requirements of large-scale science, and **scaling to accommodate the exponential traffic growth** of our science mission.
2. In response to data revolution, build capacity **to assess and rapidly improve** how collaborations use advanced networks.
3. **Pioneer, develop, and sustain** architectures, protocols, and software.
4. Influence Labs, campuses, and networks worldwide to **optimize their infrastructures** for end-to-end data mobility.

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Tiger Teams for Data Mobility



'...undomesticated and uninhibited **technical specialists**, selected for their **experience, energy, and imagination**, and assigned to track down **relentlessly** every possible source of fault...'

J. R. Dempsey, W. A. Davis, A. S. Crossfield, and Walter C. Williams,
"Program Management in Design and Development."



Two recent collaborations of this kind at Berkeley Lab.

Real-Time Network Discovery & Correlation Tools, Scaling Beyond 100Gbps



Create **discovery and visualization tools** to identify significant network flows in real time, correlate them with scientific collaborations, and make **useful interventions**.

ESnet has been building a capacity to make world-class tools for two years.

The public face of this effort is MyESnet (my.es.net), but this is just the beginning.

Things we might could do, in real time, with 'interesting' flows: diagnose performance problem; drop large flow into circuits; apply security policy; measure traffic with fine-grained discrimination of science impact.

Next-Generation Network Testbed



Develop a **next-generation network testbed architecture** that is flexible, coordinated with other network testbeds, and **accommodates resources from DOE Supercomputing centers, Labs, and Facilities.**

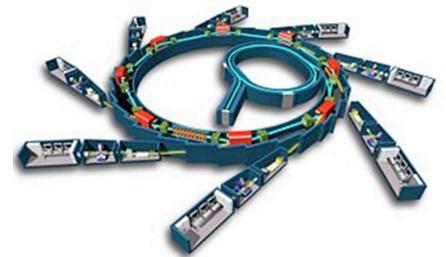
Flexible in every respect

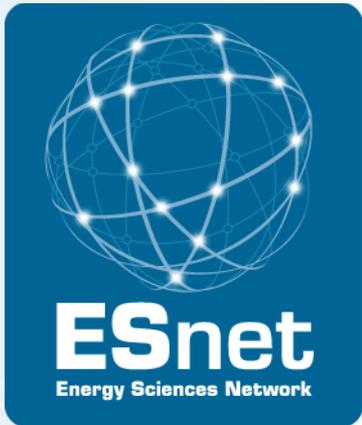
- usage model: internal / external
- topologies built as needed using SDN (OSCARS), using spare ESnet (n x 100G) capacity; some dedicated 100G
- **DOE Supercomputing centers, Labs, and Facilities contributing resources – as/when/how they wish**
- multi-layer, multi-vendor environment - with dark fiber
- supporting research on many topics relevant to our science missions: post-TCP protocols, >>100G security models, SDN, NDN/CDN, better tools & instrumentation, middleware, integration, cloud-sourcing, GENI work....

Once Again: the Primary Vision



Scientific progress will be **completely unconstrained** by the physical location of instruments, people, computational resources, or data.





Thank you.
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