Global Network Advancement: Today and Tomorrow

David Wilde

(Chair, GNA-G Leadership Team)

What is the GNA-G?

Global Lambda Integrated Facility

global network architecture

GNA-G

Global Network Advancement Group

Our vision

A unified, collaborative, global advanced network infrastructure

uniquely supporting the needs of research and education.

Our mission

The GNA-G:
- embodies a vision for international collaboration of the global research and education (R&E) networks

The Global R&E network ("GREN"):
- a large and diverse set of networks with differences in speed, accessibility, and capacity

GNA-G's purpose:
- to build on the work of GNA and GLIF to make interconnection of networks more effective for data-intensive research and education

Goals:
- Provide a **forum** which brings together researchers, computer & network scientists, National Research and Education Networks (NRENs), Global eXchange Point (GXP) operators, regional and other R&E providers;
- **Develop innovative architectures, services, and models** for more effective use of GREN resources;
- Provide **testbed resources** for the demonstration of future capabilities;
- Agree on a blueprint for aligning **equitable spending** on intercontinental bandwidth for greatest value;
- Advance **data movement** capabilities, **end-to-end experience** and **visibility;**
- **Promote awareness** of the capability, reach and connectedness of the Global R&E Network.

Some questions we seek to answer

Can we clearly articulate the unique value of the GREN?

➢ How is it better than the commercial internet?

➢ How much is appropriate for each participating org to invest in it? What happens if we don't invest?

➢ How can we assist less well resourced regions?

➢ Conversely, how can we ensure we're supporting key "big science" projects?

Communicate, Contribute, Collaborate

Motivation

- Gather experts worldwide around topics of their interest

- Provide a platform to:

  - **Communicate:** share information, experience, knowledge

  - **Contribute:** establish working groups around immediate opportunities

  - **Collaborate:** establish peer-liaison around common goals and initiatives

- Organise periodic community meetings

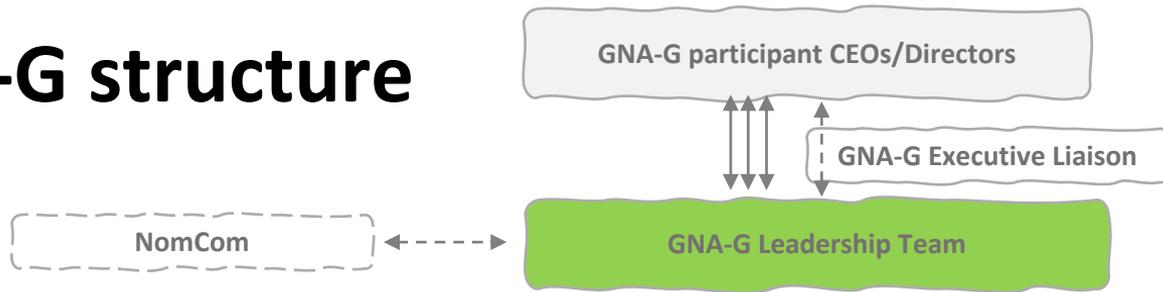- Create knowledge-base of (document, code...) repositories

GNA-G: What is it?

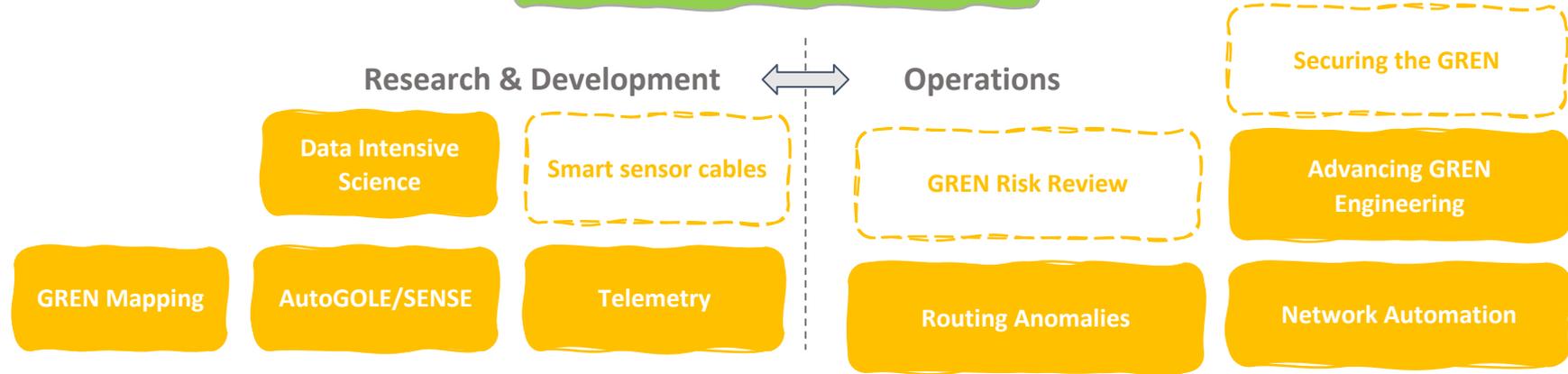A forum for discussion between operators, researchers and key users of the GREN

Action-oriented Working-Groups

A global network providing a testbed for innovation

GNA-G structure

GNA-G - strategic pillars

A forum for discussion.
Support for global big science & data intensive projects.
Engagement with international R&E network consortia.

GNA-G - strategic pillars

GREN operations
- Global network architecture & services
- Coordinated operations
- Automation, orchestration
- Monitoring, reporting, GREN map
- Secure GREN; MANRS

A forum for discussion.
Support for global big science & data intensive projects.
Engagement with international R&E network consortia.

GNA-G - strategic pillars

GREN innovations
- Global test facility
  - *eg SC demos; P4 testbed*
- Innovative network services
- Data movement

GREN operations
- Global network architecture & services
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Strategic objectives

"To advance the Global R&E Network"

1. Bring together network operators, exchange-point operators & researchers

2. Improve operational maturity of the GREN globally

3. Deliver innovative capabilities, services and testbeds to maximise usage of the network

4. Provide focused support for big science projects & data intensive research

5. Increase security maturity

6. Increase awareness

How can you get involved?

Join the GNA-G "all" mailing list

https://lists.gna-g.net/postorius/lists/all.lists.gna-g.net/

Join a working-group

https://www.gna-g.net/working-groups/

Contribute your thoughts & ideas at the next meeting/VC:

https://www.gna-g.net/meeting/

Reach out to the Leadership Team

Web: https://www.gna-g.net/contact-us/

Email: leadershipteam@lists.gna-g.net

Say g'day to the Leadership Team

⊙ **David Wilde, Chair**

AARNet (Australia)

⊙ **Harvey Newman**

Caltech (USA)

⊙ **Buseung Cho**

KISTI (South Korea)

⊙ **Ivana Golub**

PSNC (Croatia/Poland)

⊙ **Marco Teixeira**

RedCLARA (Latin America)

⊙ **Alex Moura**

KAUST (Saudi Arabia)

Thank you

Next Community VCs:
Tue 16 April 8-10pm UTC / Thu 18 April 6-8am UTC
Next in-person meeting:
Mon 10 June 2-5.30pm - TNC24, Rennes France

Additional slides

GNA-G Working Groups

- AutoGOLE/SENSE
- Data Intensive Science
- GREN Map
- Network Automation
- GNA-G Routing WG
- GREN Engineering Advancement
- Securing the GREN
- NomCom

Proposed:
- Subsea cable sensing and smart cables
- GREN vulnerability risk review

AutoGOLE/SENSE

- AutoGOLE = **Auto**mated **G**lobal **L**ambda **I**ntegrated **F**acility (GLIF) **O**pen Lightpath Exchanges
- SENSE = Software-defined Network for End-to-end Networked Science
- Intelligent network services for Science Workflows
- Collaboration of open exchange points and R&E networks to deliver services end-to-end in a fully automated way using Network Service Interface Connection Service (NSI-CS)

<u>Objectives</u>:

- Delivering automated network (de)provisioning on the trans-Atlantic ANA fibre system
- Researching and Implementing of SENSE within the AutoGOLE networks, exchanges and end points
- Building a persistent infrastructure for science on top of dedicated connectivity, NSI and SENSE

<u>WG Chairs:</u> ESnet, KISTI, RNP, SURF

Data Intensive Science

- Collaboration between science and network communities on addressing the growing demand for network—integrated workflows, cross-institution data management, automation, resource management, etc.

<u>Objectives</u>:

- Share, deploy, develop tools and services, provide a forum to support science programs across network and science communities
- Looks for new tools and services, new modes of R&E network operations
- Moving towards (globally) federated infrastructures including networking, compute and storage

**<u>WG Chairs:</u>** Caltech, ESnet, AmLight/FIU

GREN Connecting Offshore Students

- GREN = Global Research and Education Network
- Investigate whether a collaborative international effort can deliver improvements in performance and/or lower costs for network connectivity to support teaching, learning and research for international users.

Objectives:

- Review delivery of services
- Investigate feasibility
- Identify performance improvements of capacity for connectivity and peering

WG Chairs: AARNet, Jisc, CANARIE

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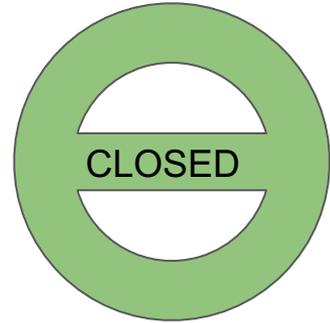
GREN Map

- Guiding the development of a unified system for visualizing the high-level connectivity of and participation in the community of R&E networks around the globe
- Achieving a dynamic visualization, without maintenance activities
- A joint development of a reference data model used also for other visualizations

Objectives:

- Provide dynamic visualization of the GREN that is perpetually up-to-date without requiring parallel data collection and maintenance activities

WG Chairs: CANARIE, GÉANT

Network Automation

- Develop a catalogue of tools to drive automation in network configuration, security auditing, change control activities and intra-domain automation activities
- Facilitate collaboration on common tools and practices

Objectives:

- Create a standardised glossary of network automation tools
- Create and maintain a catalogue of network automation tools
- Set up network automation training
- Identify a common set of network automation activities each NREN could re-use
- Identify common APIs that NRENs use
- Identify and agree on a common API set for communicating between NRENs

WG Chairs: AARNet, SURF

GNA-G Routing WG

- Optimal data routing, good performance, determined/expected data paths in single and multi-domain networks
- Engages network owners and NRENs to discuss and address ineffective routes and act proactively across community to systematically create policies to prevent ineffective routes

Objectives:
- **Engineering** – promoting and supporting advanced tools to identify and resolve routing issues
- **Collaboration** between network owners and operators to resolve network issues
- **Policy** – collaboration with higher-level networking operators to detail their routing policies and be able to check if the traffic follows the policy

WG Chairs: Indiana University, AARNet

GREN Engineering Advancement WG

- The aim of this workgroup pioneer, try, test, experiment with solutions to better/more efficiently/redundantly run services over links part of the GNA-G.

Objectives:

- **To enhance operation** on systems between production networks.
- Effective and efficient **multi-domain** service orchestration.
- Disseminate gather knowledge and work results.

WG Chairs: SURF, Internet2, ESNet

NomCom

- NomCom = The Nominations Committee
- Differs from other working groups
- Gathers in November of every odd calendar year to nominate candidates to serve on the leadership team
- Consists of volunteers from the GNA-G community

Objectives:

- Elect members of the GNA-G Leadership team

Thank you