Networks for Large Experiments:
Impacts and regional potential

RNP Educação, Pesquisa e Inovação em Rede

Leandro Ciuffo, RNP
Associate Director for e-Science and Advanced Cyberinfrastructure

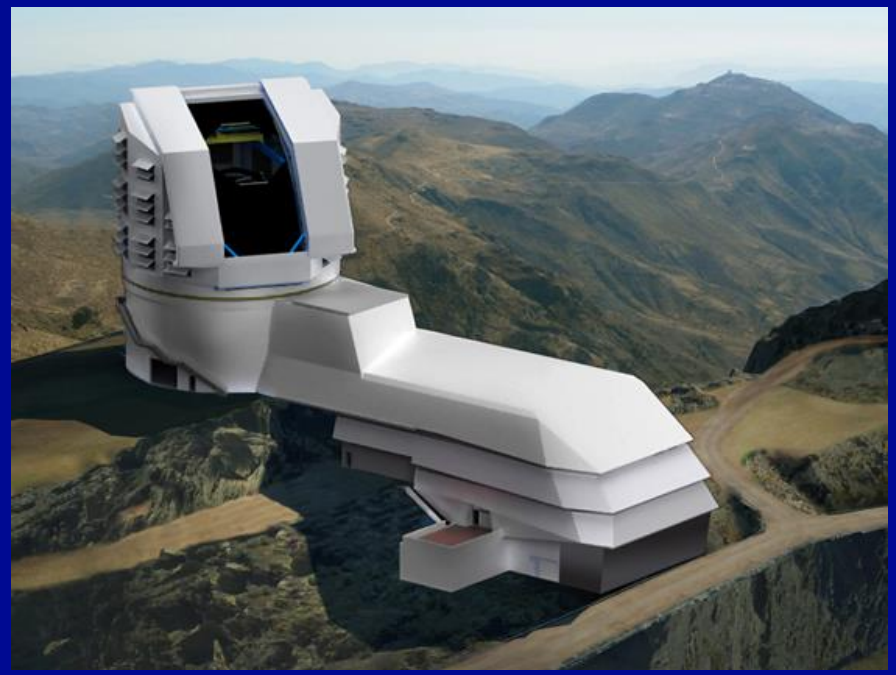
Opportunities for the Latin-American Participation and Cooperation in Astro-particle Physics and the SWGO Project

20-Abr-2023

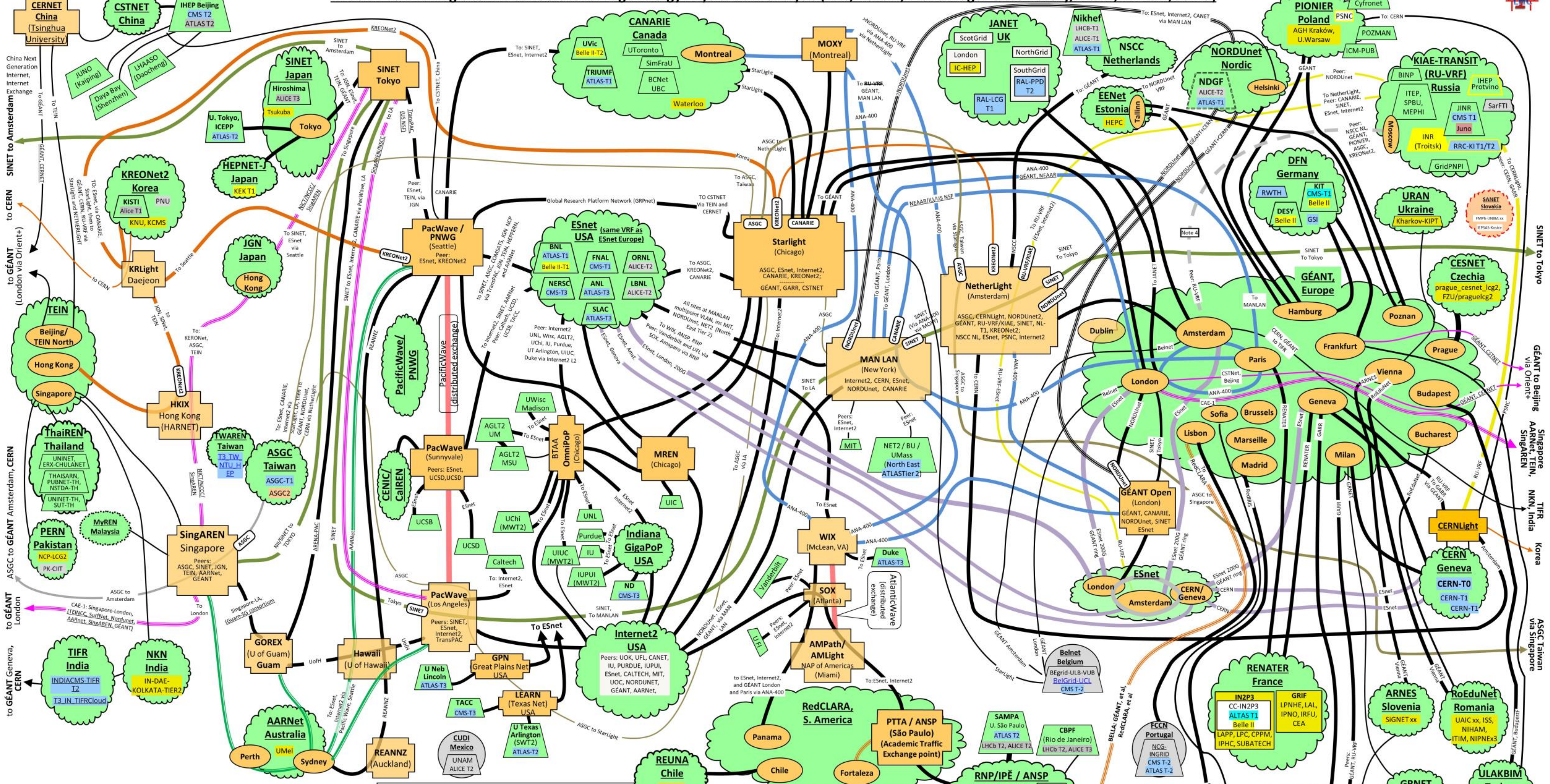
NREN
National Research and Education Network


GÉANT
NORDUnet
Nordic Gateway for Research & Education
Amsterdam
London
Moscow
EaPConnect
Eastern Partnership Connect
SURF NET
CAREN
Beijing
Seoul
Tokyo
Lahore
Thimphu
Hong Kong
Taipei
Thuwal
Mumbai
Dhaka
Hanoi
Bangkok
Manila
Guam
Colombo
Kuala Lumpur
Singapore
Bandung
TEIN
UbuntuNet Alliance
WACREN
Cape Town
aarnet
Australia's Academic and Research Network
Perth
Sydney
Auckland
Suva
Honolulu
Mauna Lani
canarie
Seattle
Montreal
Boston
INTERNET2
Palo Alto
San Jose
Los Angeles
New York
Washington
Boca Raton
Miami
cudi
RedCLARA
Cooperación Latino Americana de Redes Avanzadas
cedia
RNP
Santiago
RELNA
Ciencia y Educación en Red

Large scientific collaborations are the main drivers to evolve NRENs



LHCONE L3VPN: A global infrastructure for High Energy Physics data analysis (LHC, Belle II, Pierre Auger Observatory, NOvA, XENON, JUNO)



LHCONE Map Ver. 6.0, 2022-11-15 – WEJohnston, ESnet, wej@es.net

- LHCONE VRF domain/aggregator - A provider network.
- Connector network – provides, e.g., an L2 path between VRFs.
- Provider network PoP router
- WLCG sites that are not connected to LHCONE
- Exchange point
- NREN/site router at exchange point
- Communication links: 1/10, 20/30/40, and 100Gb/s or N x 100G
- Underlined link information indicates link provider, not use
- Double dash outline indicates distributed site
- Future site

International infrastructure by provider/collaboration

- various
- AARNet
- GÉANT
- SINET, Japan, global ring
- ASGC, Taiwan
- ESnet transatlantic, USA
- NICT/NCCC/ SingAREN
- ANA-300/400 - Various links provided by CANARIE, ESnet, GÉANT, Internet2, NORDUnet, SURFnet, SINET,IU/NSF
- SINET
- NORDUnet
- KIAE, Russia
- KREONet2, Korea
- BELLA: GÉANT, et al, RedCLARA, et al

- LHCB-T1 LHC ALICE or LHCb site
- CNAF-T1 LHC Tier 1 ATLAS and CMS
- UChi LHC Tier 2/3 ATLAS and CMS
- KEK Belle II Tier 1/2
- JUNO JUNO
- UNL Sites that are standalone VRFs

NOTES

1) ONLY links involved in LHCONE are shown
2) LHCOPN links are not shown on this diagram
3) For map explanation see "Interpreting the LHCONE Map" at https://www.dropbox.com/sh/padxfo58j0j1raz/AADsB5K8fISH9FfhCjA4eCtea?dl=0
4 GÉANT and CANARIE have shutdown the peering between their VRF and KIAE, as as a result of the Ukraine war.

Cloud
EPO Data Center

Dedicated Long Haul Networks

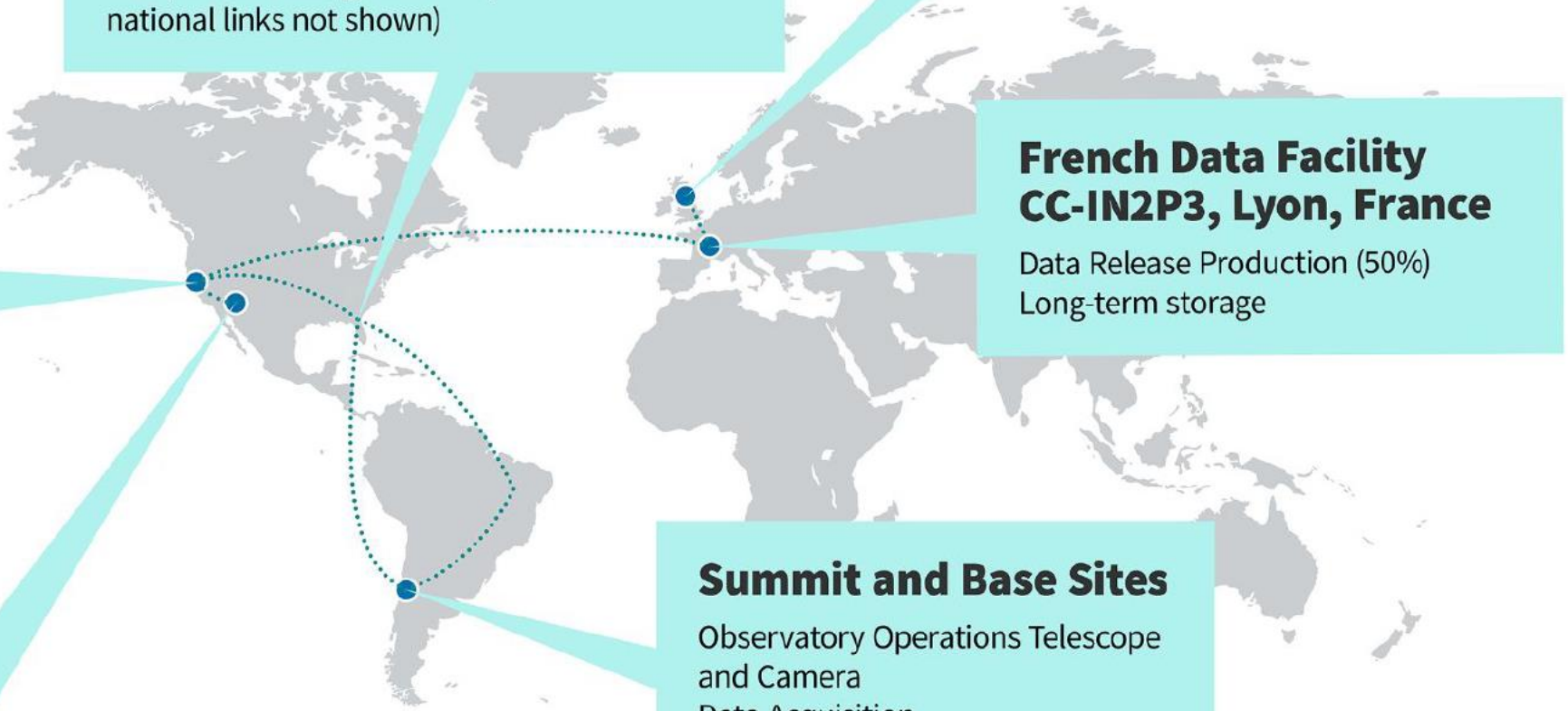
Two redundant 100 Gb/s links from Santiago to Florida (existing fiber)
Additional 100 Gb/s link (spectrum on new fiber) from Santiago-Florida (Chile and US national links not shown)

UK Data Facility
IRIS Network, UK

Data Release Production (25%)

US Data Facility
SLAC, California, USA

Archive Center
Alert Production
Data Release Production (25%)
Calibration Products Production
Long-term storage
Data Access Center
Data Access and User Services



French Data Facility
CC-IN2P3, Lyon, France

Data Release Production (50%)
Long-term storage

HQ Site
AURA, Tucson, USA

Observatory Management
Data Production
System Performance
Education and Public Outreach

Summit and Base Sites

Observatory Operations Telescope and Camera
Data Acquisition
Long-term storage
Chilean Data Access Center

Rubin Observatory operates as an integrated system with unified management and clear lines of authority

VERA C. RUBIN OBSERVATORY

ttps://www.gna-g.net

GNA-G
Global Network Advancement Group

HOME ABOUT WORKING GROUPS RESOURCES

Networking – it's in our GNA

The Global Network Advancement Group (GNA-G) embodies a vision for the international collaboration of national research and education (R&E) networks to help meet humanity's challenges. Our mission is to ensure the technologies, infrastructures and investments of the partners and participants are utilised for interconnecting R&E networks on a global scale.

DISCOVER MORE

- AutoGOLE/SENSE
- Data Intensive Science
- GREN Connecting Offshore Students
- GREN Map
- Network Automation
- GNA-G Routing WG
- NomCom
- GREN Engineering Advancement

Data Intensive Science

The GNA-G Data Intensive Science working group (DIS WG) is designed to provide a forum for discussion and a framework for both short term and longer term joint developments with the goal of meeting the needs of major programs in data intensive sciences, coexisting with the needs of individuals and smaller groups, while at the same time advancing the concepts, tools and systems needed to operate and manage the global ensemble of research and education networks while addressing the programs' needs.

Global Network Advancement

Next Generation Networks

Páginas
Notícias

ATALHOS
Next Generation Networking Home

ÁRVORE DE PÁGINAS
- 6th SIG-NGN Meeting
- 4th SIG-NGN Meeting
- 3rd SIG-NGN Meeting
- 2nd SIG-NGN Meeting
- 1st SIG-NGN Meeting
- TF-NGN Reboot Meeting - 2016022
- List of Meetings
- 7th SIG-NGN Meeting
- 8th SIG-NGN Meeting
- 9th SIG-NGN Meeting
- 10th SIG-NGN Meeting
- 11th SIG-NGN Meeting

Ferramentas do espaço

Next Generation Networking Home

Criado por Brook Schofield, última alteração por Lars Fischer em abr 10, 2023

GÉANT Special Interest Groups (SIGs) are established under the auspices of GÉANT in order to create an open forum where experts from its community exchange information, knowledge, ideas and best practices about specific technical or other areas of business relevant to the research and education networking community.

SIG-NGN is a community for knowledge exchange and collaboration on developments in networking technologies.

Subscribe to the mailing list...

SIG Objectives

The main topic areas for SIG-NGN are:

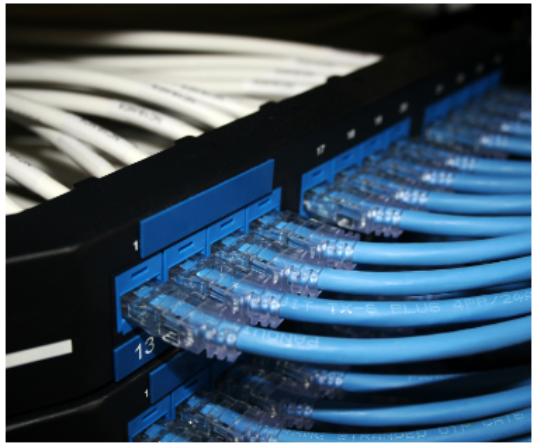
- To facilitate knowledge exchange and collaboration on developments in networking technologies.
- To promote and coordinate development and testing of innovative networking technologies.
- To define, develop and test new networking services, which can subsequently be introduced by national research and education networks and/or the European backbone infrastructure.
- To provide a forum for wider discussion of the work of the GÉANT "Joint Research Activities" and "Service Activities". This might include active collaboration on GEANT related research with organisations who are not GÉANT partners.

SIG KPIs

- Re-vitalize the SIG. (2018)
- Encourage diversity from our community. (2017)
- Panel discussions must encourage diversity of participants (based on economic standing, gender, race, or other criteria). (2017)
- At least one presentation per meeting from non-NREN participants (such as the network research community or commercial entity). (2017)
- Support the NREN community through face-to-face meetings, online meetings and mailing list discussions. (2016)

Useful Links

- Topics for future meetings
- Planning the next meeting



About SIG-NGN

Steering Committee members

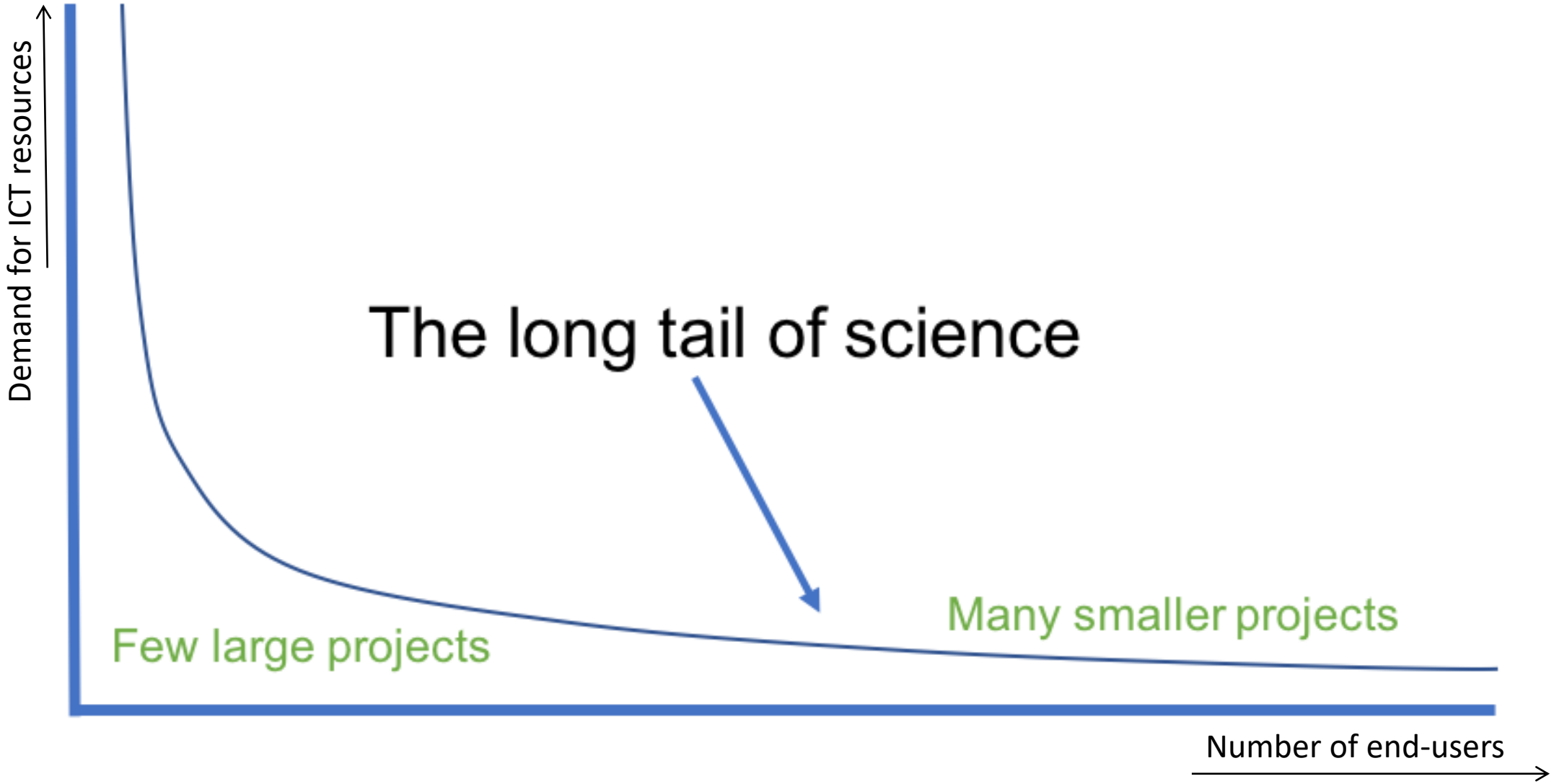
SIG-NGN is supported by a Steering Committee and a secretariat at GÉANT:

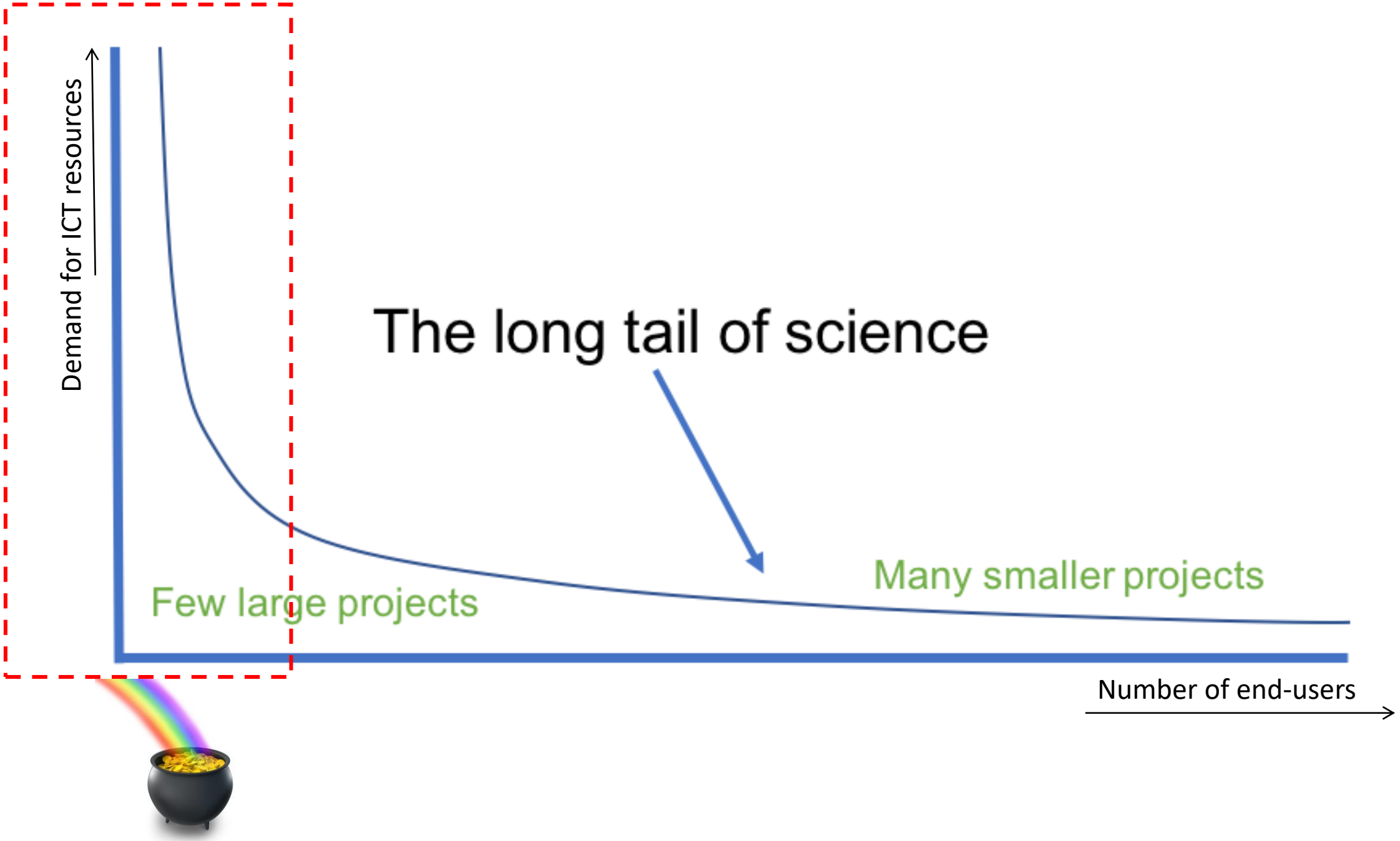
- *Rob Evans (Jisc)*
- *Edoardo Martelli (CERN)*
- *Rudolf Vohnout (CESNET)*
- *Yatish Kumar (ESnet)*
- *Lars Fischer (NORDUnet)*
- *Mian Usman (GÉANT)*
- *Gyöngyi Horváth (GÉANT)*

The Steering Committee can be contacted at ngn-sc@lists.geant.org

List of active SIG participants:

NRENs are eager to identify and support compelling applications w.r.t. advanced network use


Demand for ICT resources
The long tail of science
Few large projects
Many smaller projects
Number of end-users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GB
FR
CA
CA
US
US
US
PT
MX
CU
HN
GT
SV
NI
CR
PA
CO
VE
EC
BR
PE
AO
BO
BR
PY
CL
AR
UY
ZA
Red CLARA
Cooperación Latino Americana de Redes Avanzadas
N x 100 Gbps
100 Gbps
10 Gbps
L2 VLAN ≥ 10 Gbps
6 Gbps
5 Gbps
3 Gbps
2 Gbps
1 Gbps
500 Mbps
NN
Connected Latin American country
NN
Not connected Latin American country

Enlighten Your Research BELLA: Boosting International Research Cooperation with RedCLARA & GÉANT

POSTED BY LUIZ ALBERTO RASSELI JUNIOR | 16 NOVEMBER 2021 | NOTICIAS - REDCLARA

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English EN

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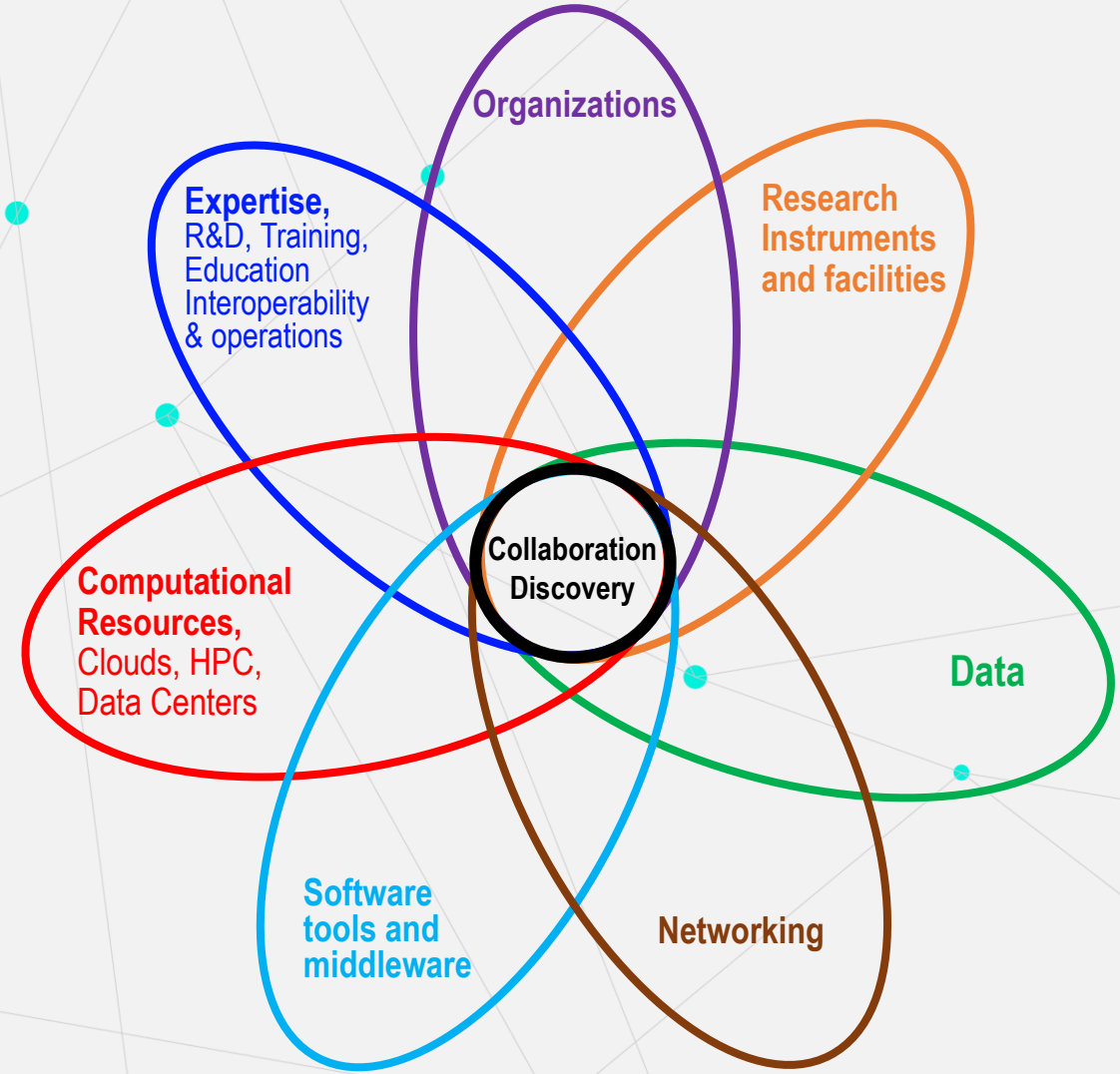
R&I cooperation with Latin America (Mexico, Brazil, Argentina, and other countries in the BELLA network or members of RedClara) (CSA)

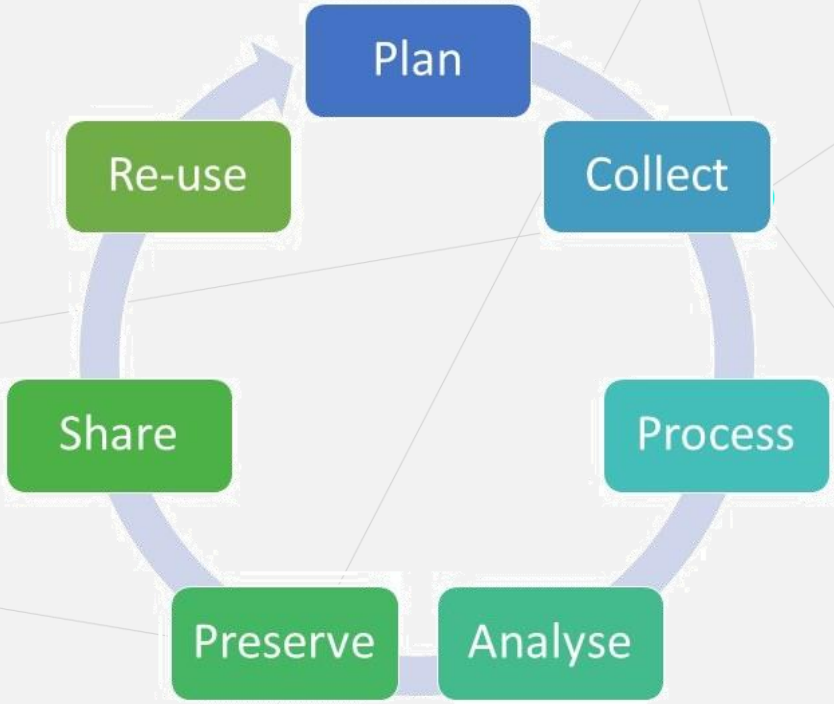
TOPIC ID: HORIZON-CL4-2023-HUMAN-01-93

Grant

It’s not only about high speed networks

Services for research ecosystem





R&E Identify Federations

FIM4R

Federated Identity Management

For Research

Conclusions and takeaways

- NRENs work together across borders
  - NRENs + Large Scale Global Science = Global Research and Education Network (GREN)
- Large scientic projects bring opportunities to:
  - Advance the state of the art of networks (and ICT in general)
  - Expand / upgrade networks and deploy new network links
  - Foster capacity building in the region (e.g. data schools, training courses)
  - To deploy new services and APIs (even if the scientific project has its own specific software tools)
- The backbone infrastructure in South America can support large data transfers to Europe and US
  - New local/last-mile links may be needed to be deployed. NRENs can help with feasibility studies, quotations and troubleshooting.

Thank you

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