

Federated services

Supporting users, today and into the future

Enzo Capone

Head of Research Engagement and Support

TICAL2018, Cartagena de India (Colombia)

5 September 2018

www.geant.org



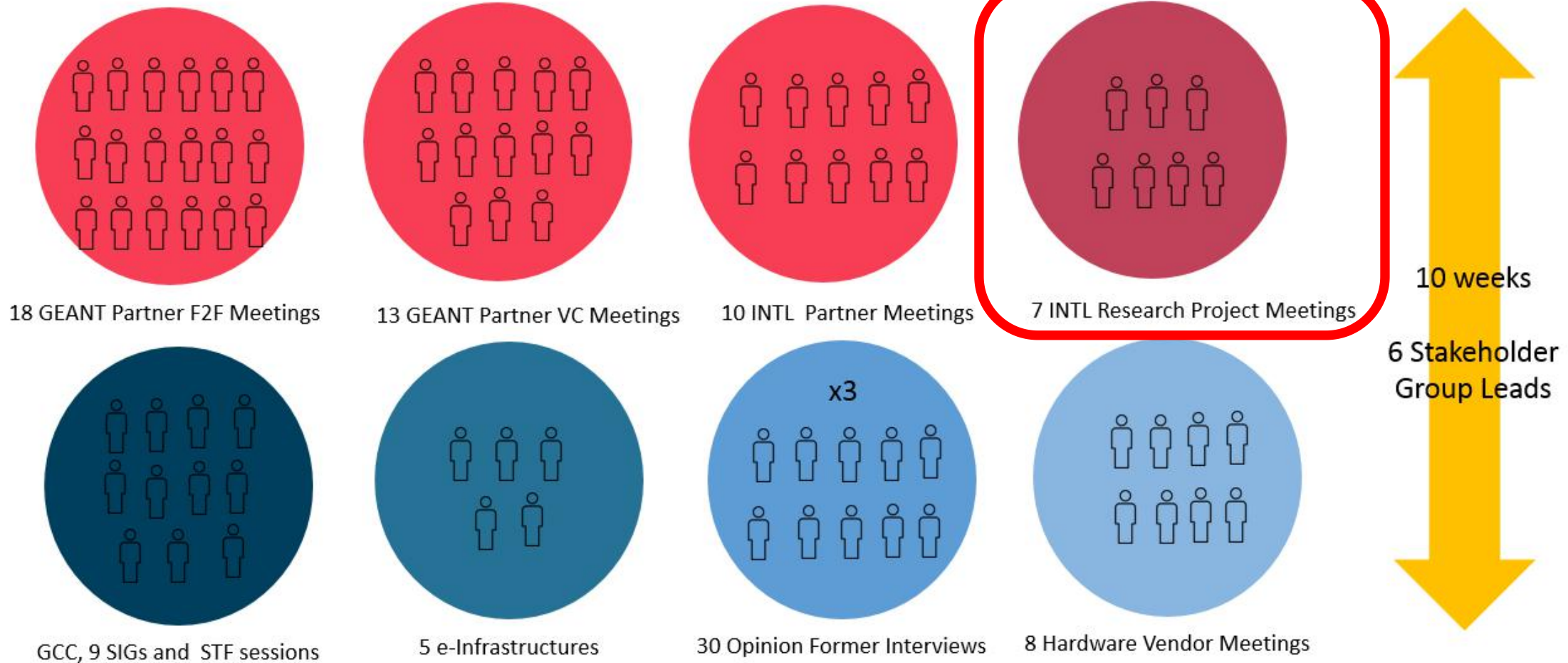
The mission of R&E networks

- Empower users
- Create services to help them
- Make services easy to use

In short... solve their problems!



What are their problems?





Who we've asked to



EUROfusion



EMBL-EBI



www.geant.org





#3 - Integrated AAI





Federated Identity Management

- Identities from their Home Organizations
- Guest identities support and stronger authentication
- Access based on the role(s)
- One persistent identity when changing institution
- Ease of use for users and service providers

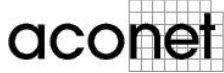




eduGAIN depends on federations



SWITCHaai



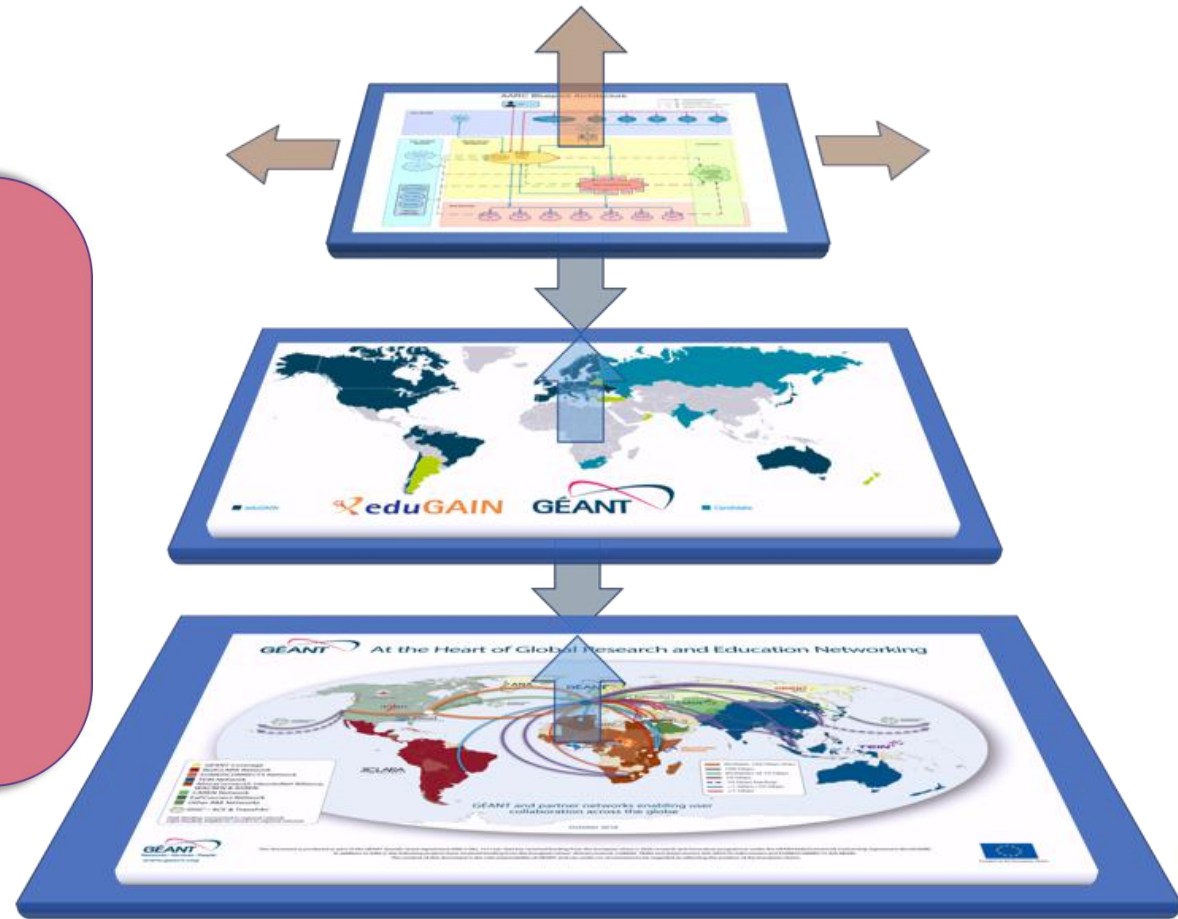
www.geant.org





AARC Blueprint Architecture

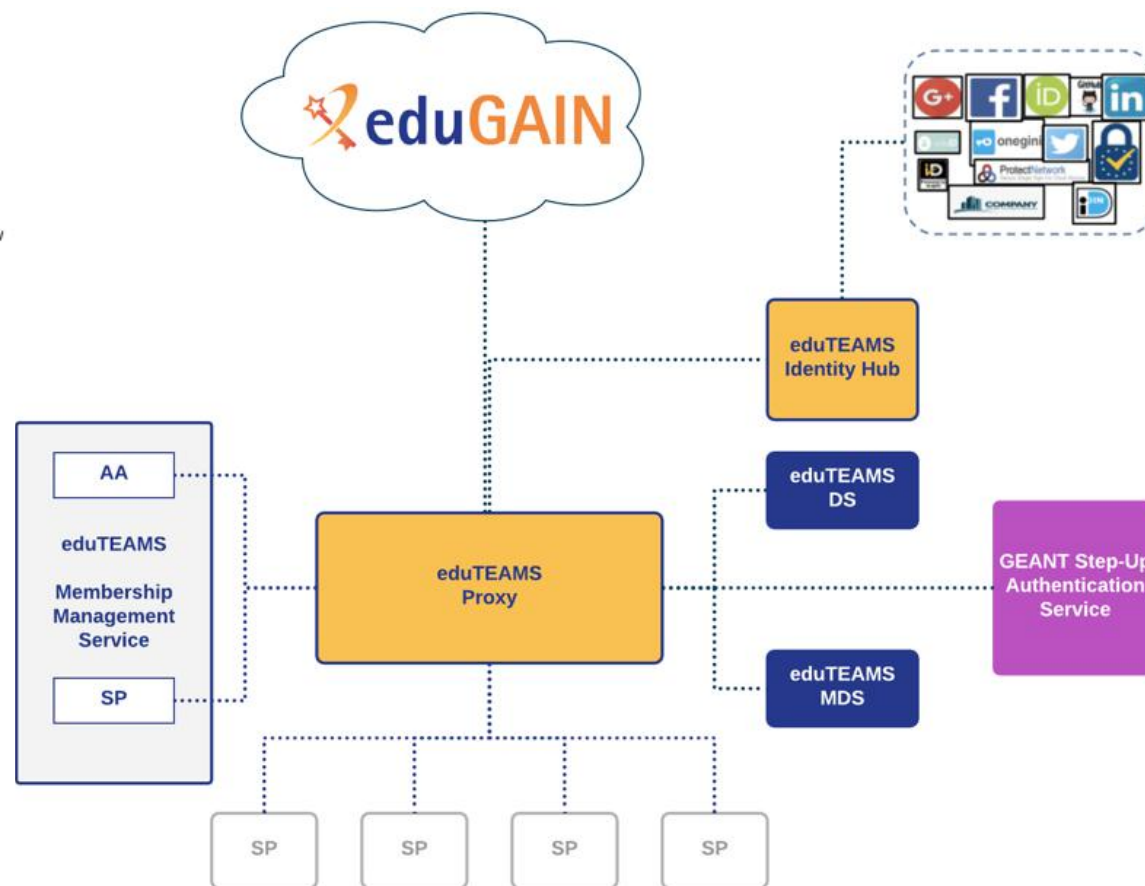
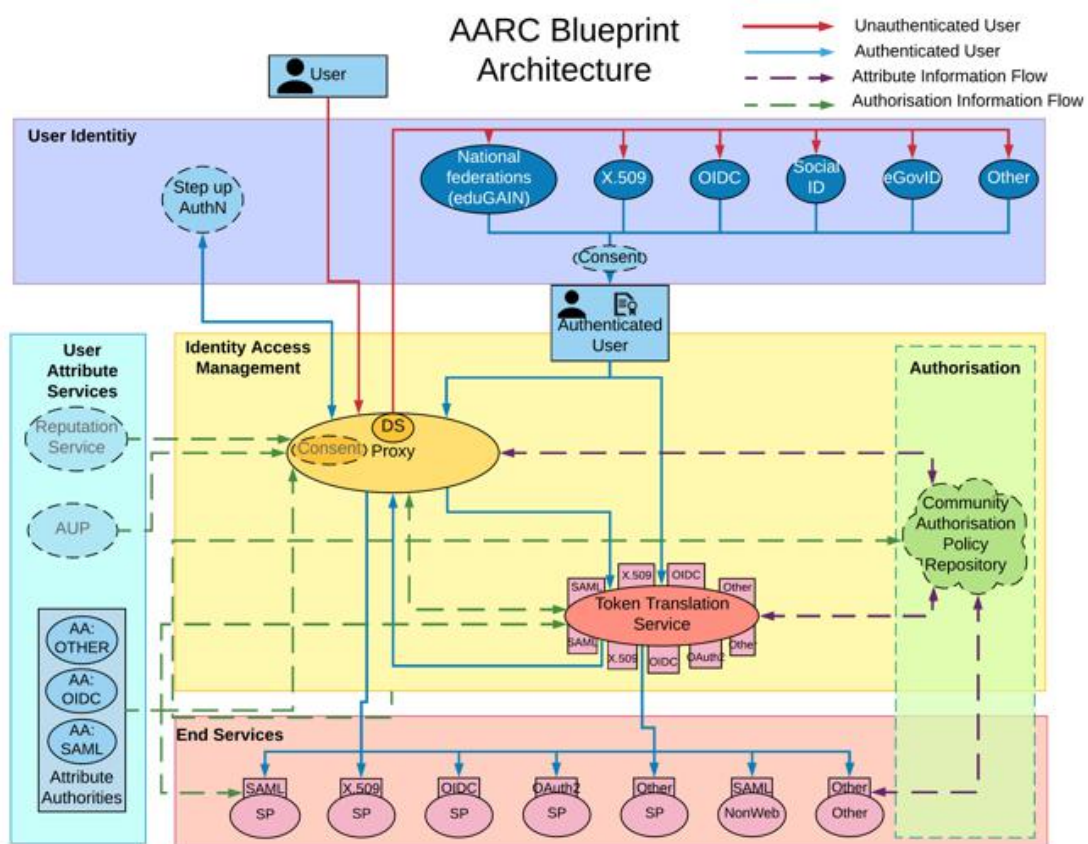
- A Blueprint Architecture for authentication and authorization
- A set of architectural and policy building blocks on top of eduGAIN
- A solid foundation for federated access in Research and Education





eduTEAMS

managing virtual teams made easy





#2 - Access to cloud services

- Procurement is still an issue
- Clear justification of cost-effectiveness (vs. in-house)
- Performances (or lack thereof...)
- Integration with local infrastructure/contextualization



Procurement



BRINGING THE CLOUD TO THE GROUND

Making online services accessible: easy and safe to use through pan-European collaboration and agreements

Discounted prices for all institutions, large and small

Ready-to-use agreements, which comply with EU data protection law

Invoice billing, no credit card needed, accommodating capital expenditure through upfront commitments

Transfer existing educational licenses to the cloud

Manage usage and spending

Sign your contract under local law

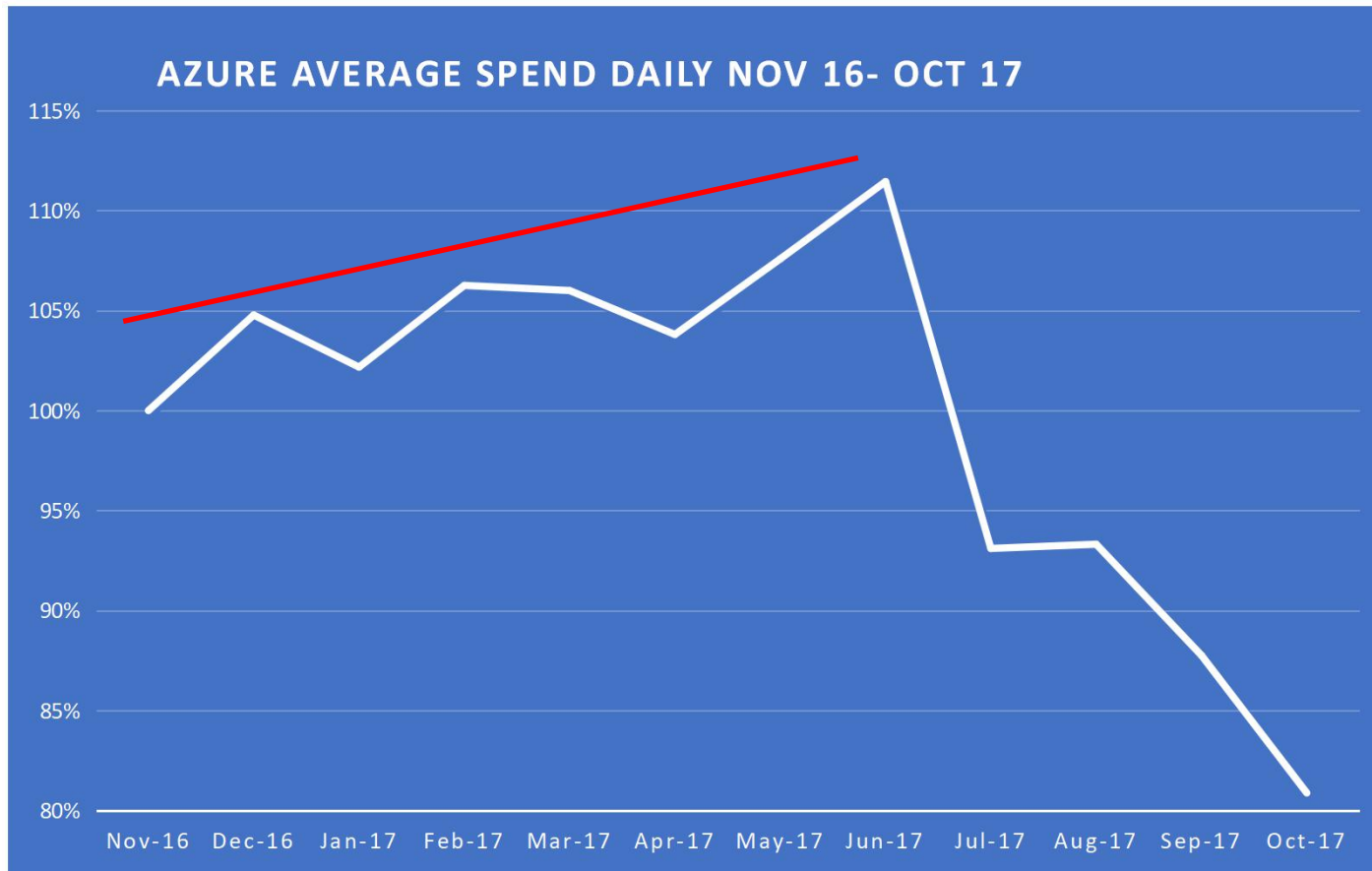
Reduced traffic costs, through suppliers' connections to the GÉANT network

Single sign-on support (SAML2)



Cost

Average daily spend Nov 2016 – Oct 2017



Quality & Qualifications institute (QQI)
in Ireland

Replaced their previous individual
contract with a new one based on the
GÉANT IaaS Framework, via HEANet





Collaboration



Objectives

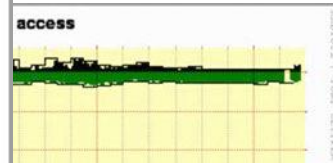
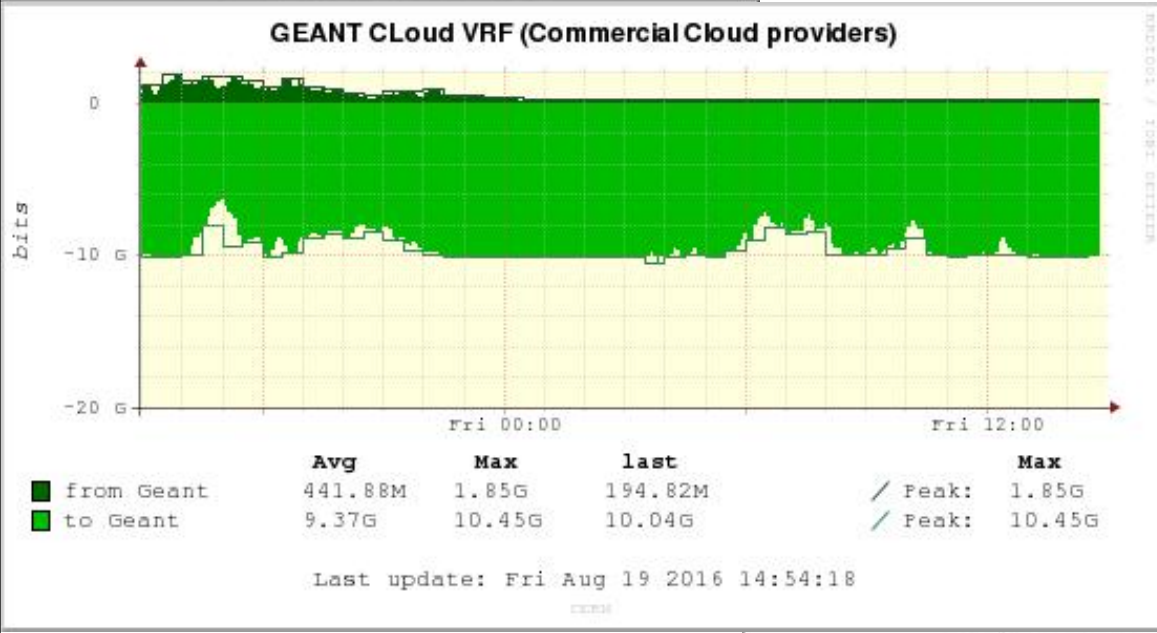
- Facilitate **transition towards cloud computing** and building **native cloud applications**
- Allow **resource sharing**, maintaining **control of use**
- Exchange **best practices** on management and use
- Share **catalogue of cloud applications**
- **Large Scale Service** to the whole research community

GARR Offer

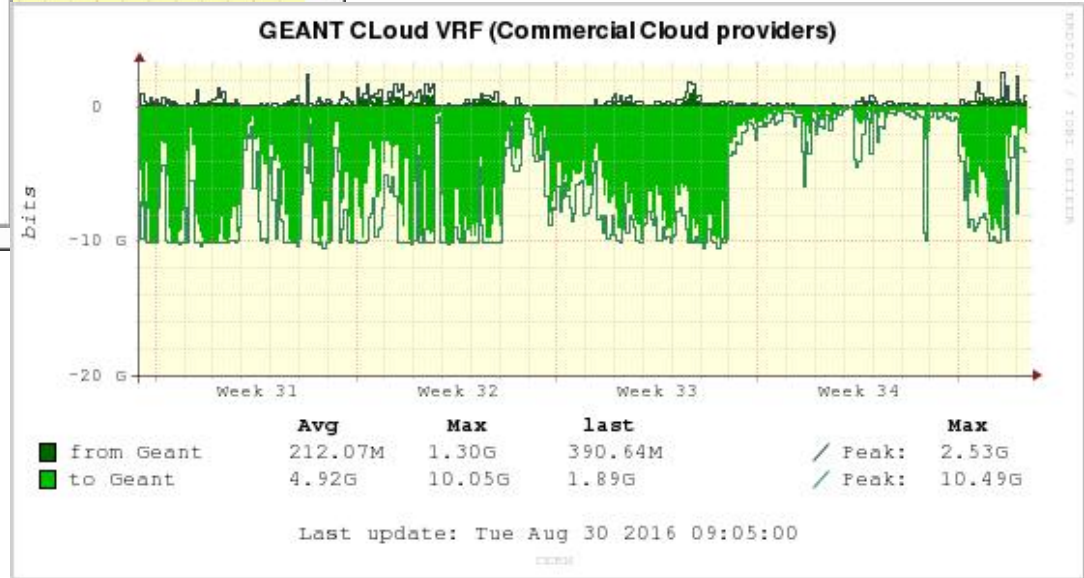
- Evolving Architecture:
 - OpenStack, Kubernetes
- Coordination of Federation
 - Automated Region Deployment
 - Upgrades and Maintenance
- Solutions for:
 - Multiple Tenancy
 - Federation and Delegation
 - Federated Authentication
 - Accounting and Billing of resource usage



Performances



Monthly

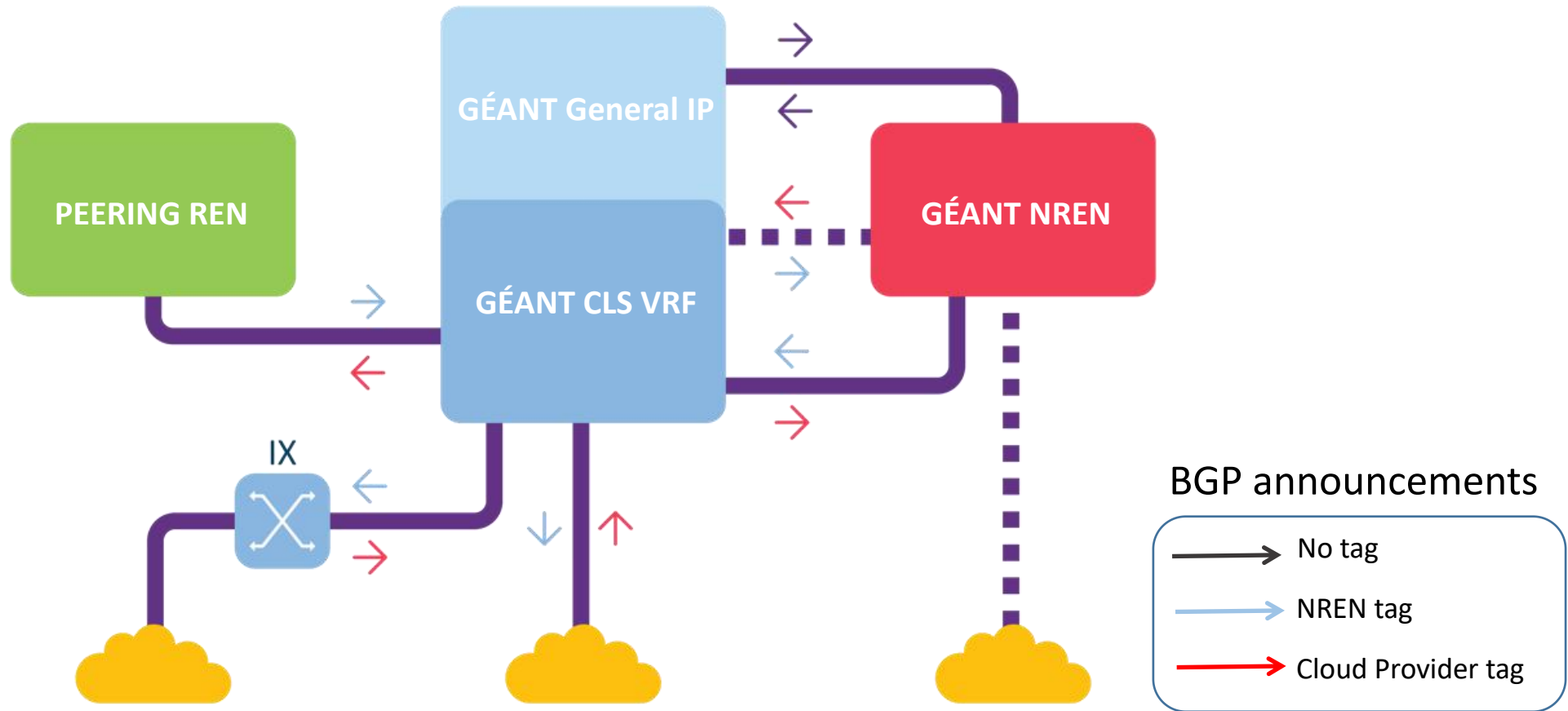


Daily

Courtesy of CERN



Infrastructure



Integration



To support the computing capacity needs for the ATLAS experiment

EMBL



Setting up a new service to simplify analysis of large genomes, for a deeper insight into evolution and biodiversity

esa



To create an Earth Observation platform, focusing on earthquake and volcano research



To improve the speed and quality of research for finding surrogate biomarkers based on brain images



- Bringing together researchers, data providers, e-Infras and commercial providers
- Establish multi-tenant, multi-provider cloud infrastructure
- Promoting Public/Private interoperability
- CPs required to be connected to GÉANT



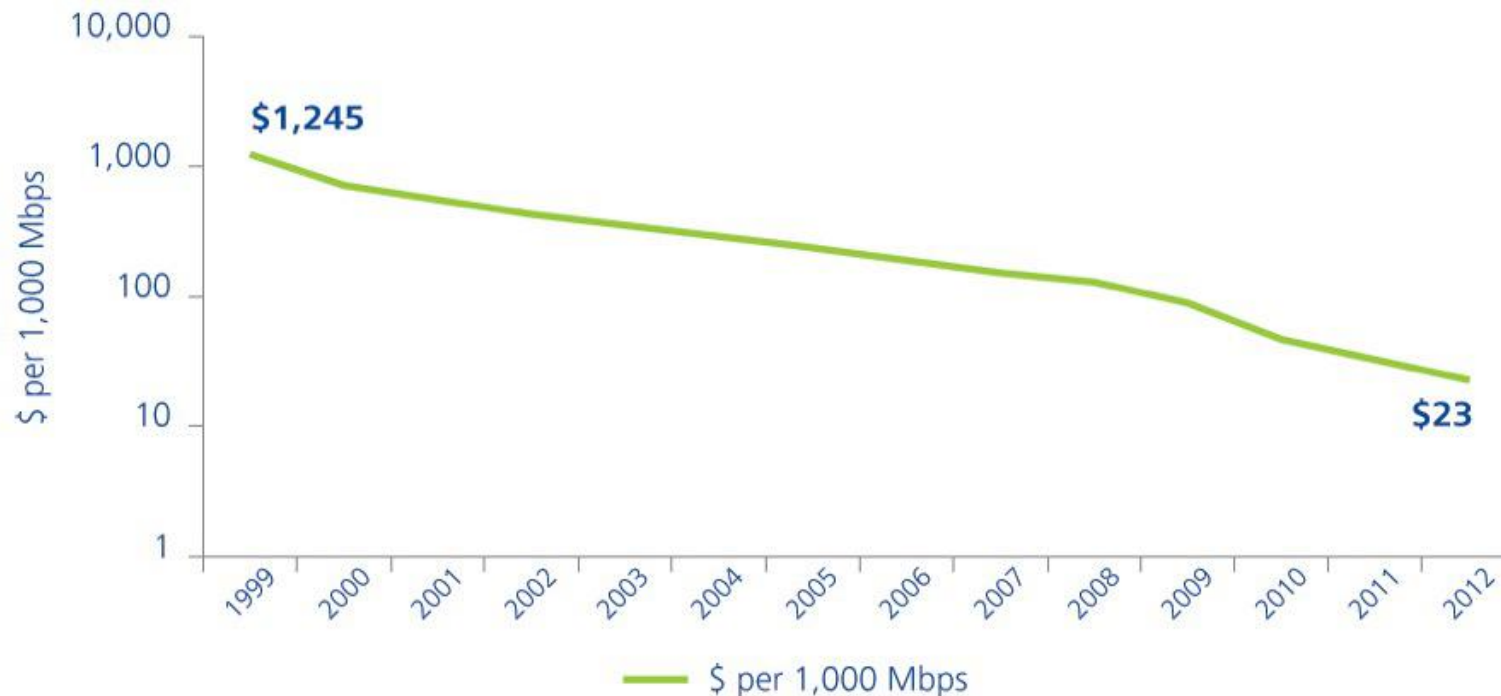
Suppliers

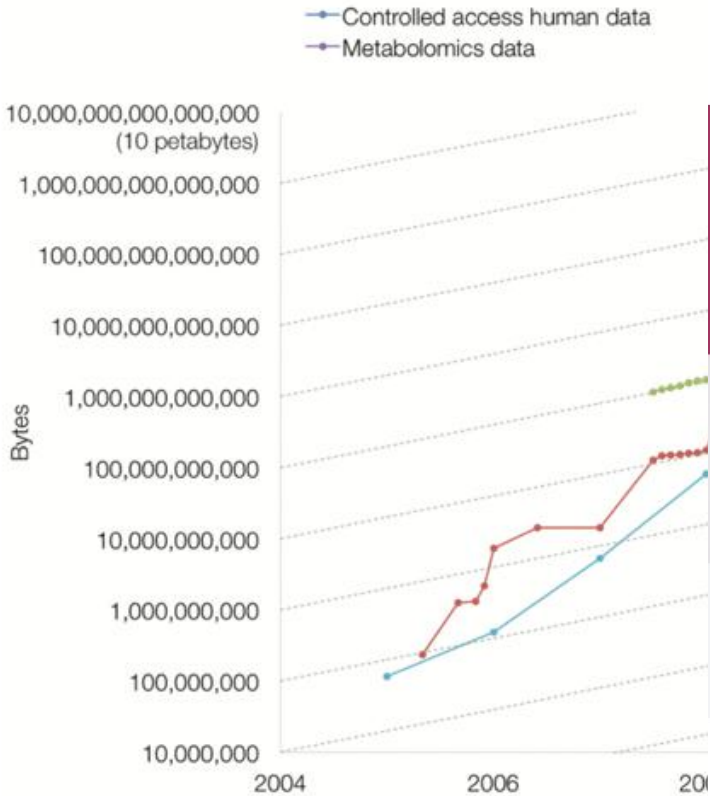
Adopters



#1 – Storage TCO vs. expected growth


- Assuming (optimistically) flat budgets, data growth won't be sustainable in ~5 years
- Cost of storage (CAPEX+OPEX) is not decreasing fast enough (not like CPUs and network access)





← Most Recent 🔍


Suggested Post ...



Sponsored • 🌐

LIKE PAGE

€399 Whole Genome Sequencing (100% of your DNA).
Now with a customized report on your condition!



Full DNA analysis

NOW ONLY 399€

30X Coverage Next Generation Sequencing (N...)

LEARN MORE

👍 🤔 ❤️ 33

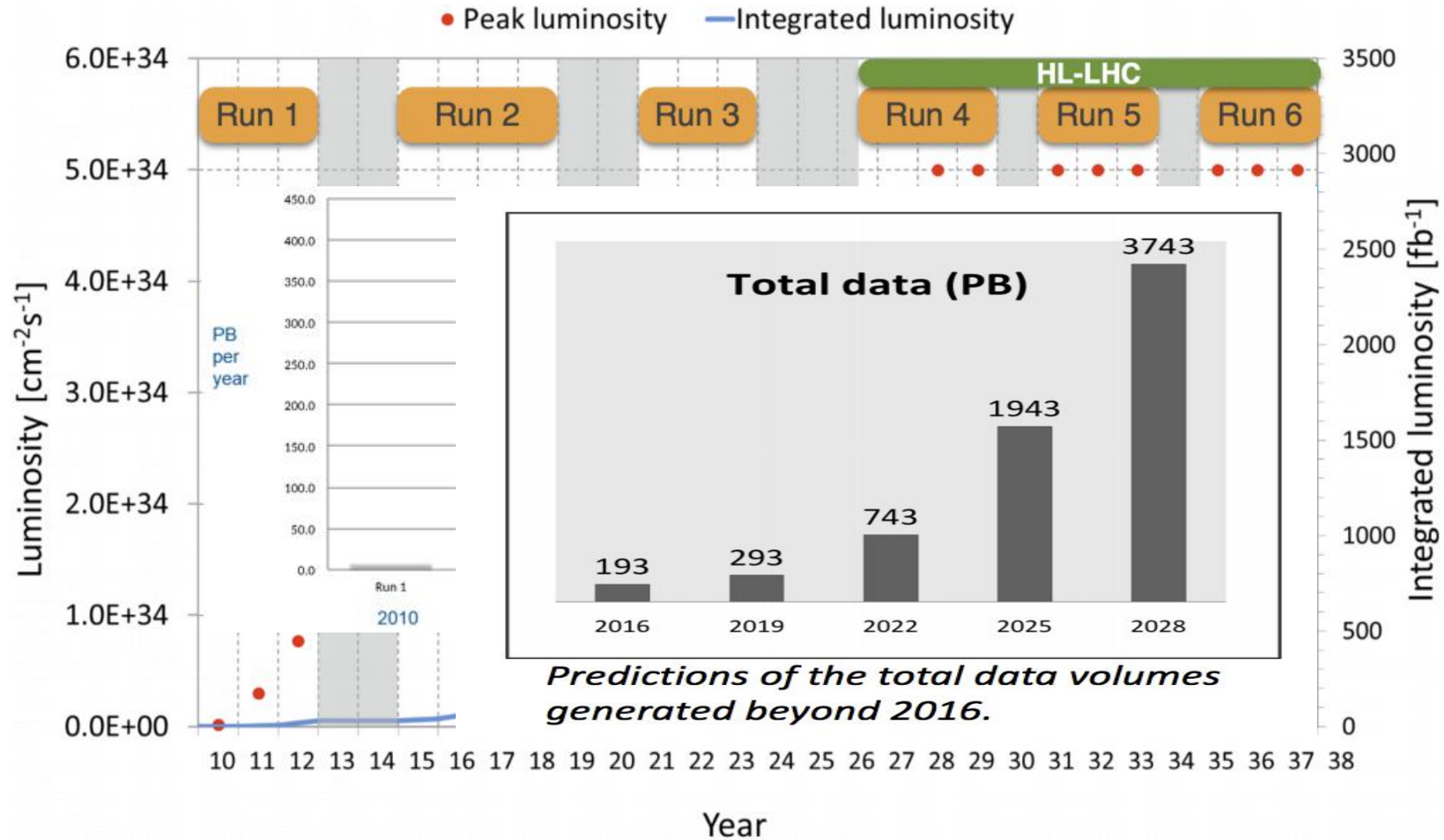
10 comments • 9 shares

Like Comment Share



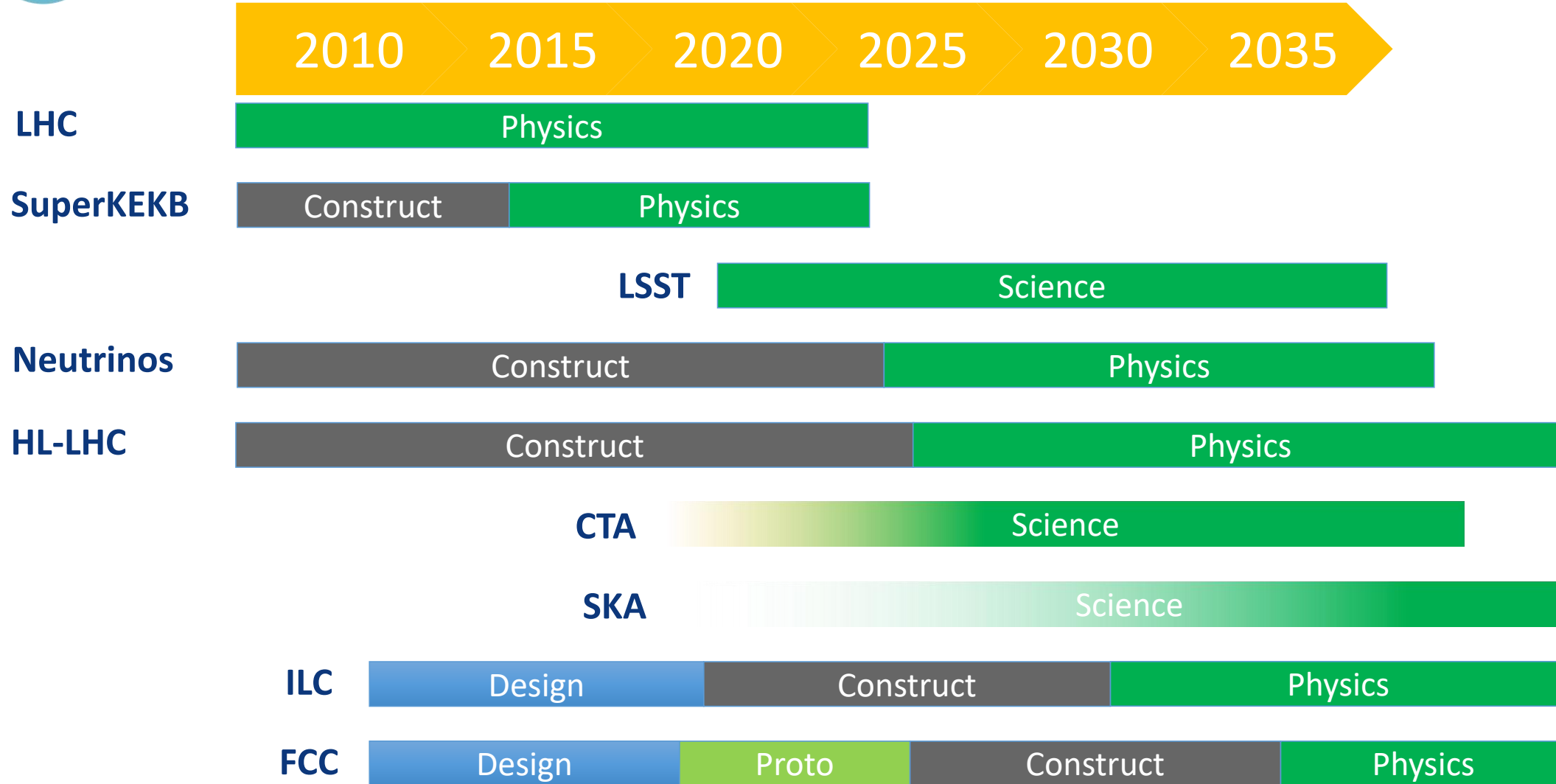


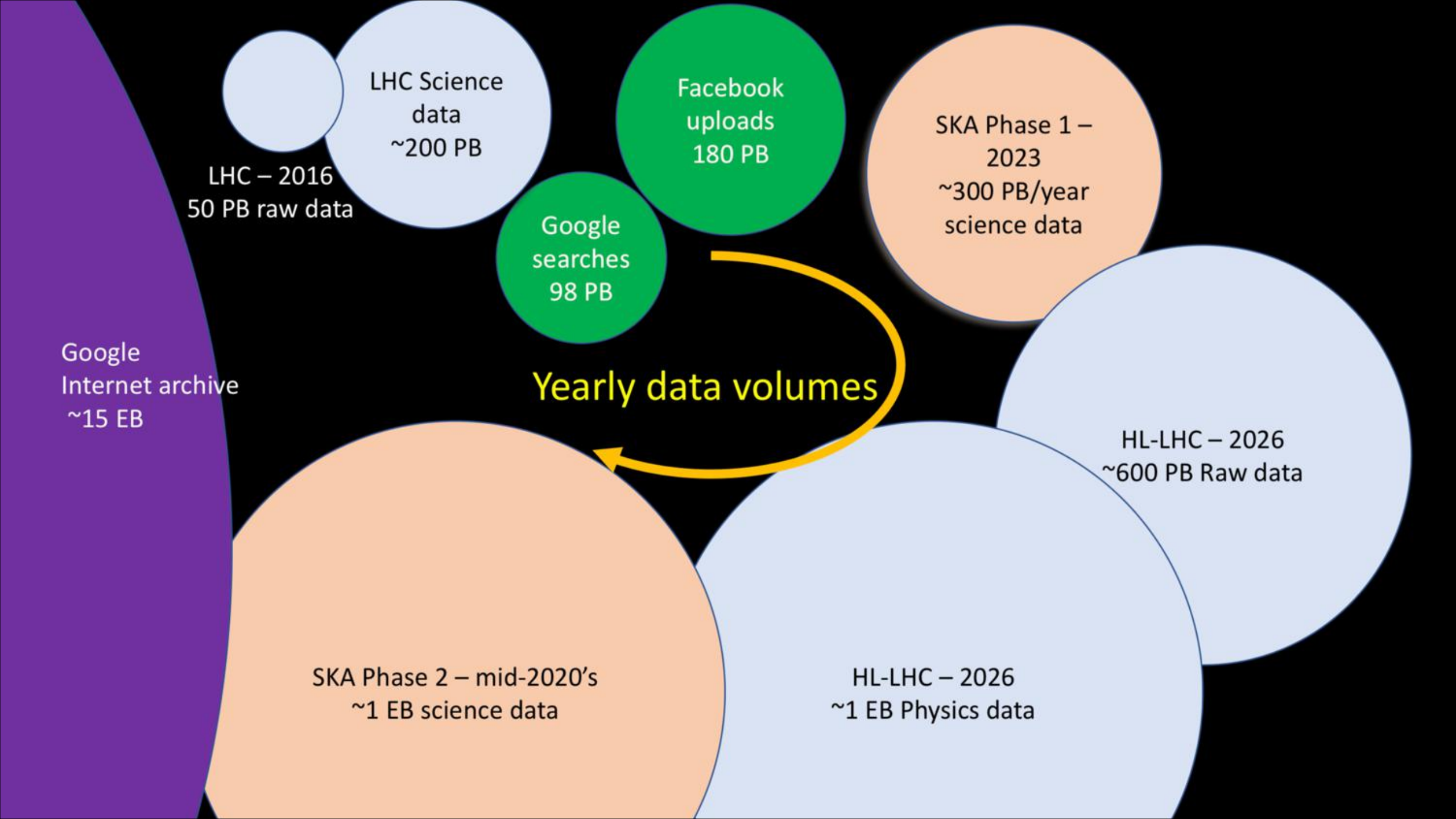
High Energy Physics





Science facilities timescale





LHC – 2016
50 PB raw data

LHC Science
data
~200 PB

Google
searches
98 PB

Facebook
uploads
180 PB

SKA Phase 1 –
2023
~300 PB/year
science data

Google
Internet archive
~15 EB

Yearly data volumes

HL-LHC – 2026
~600 PB Raw data

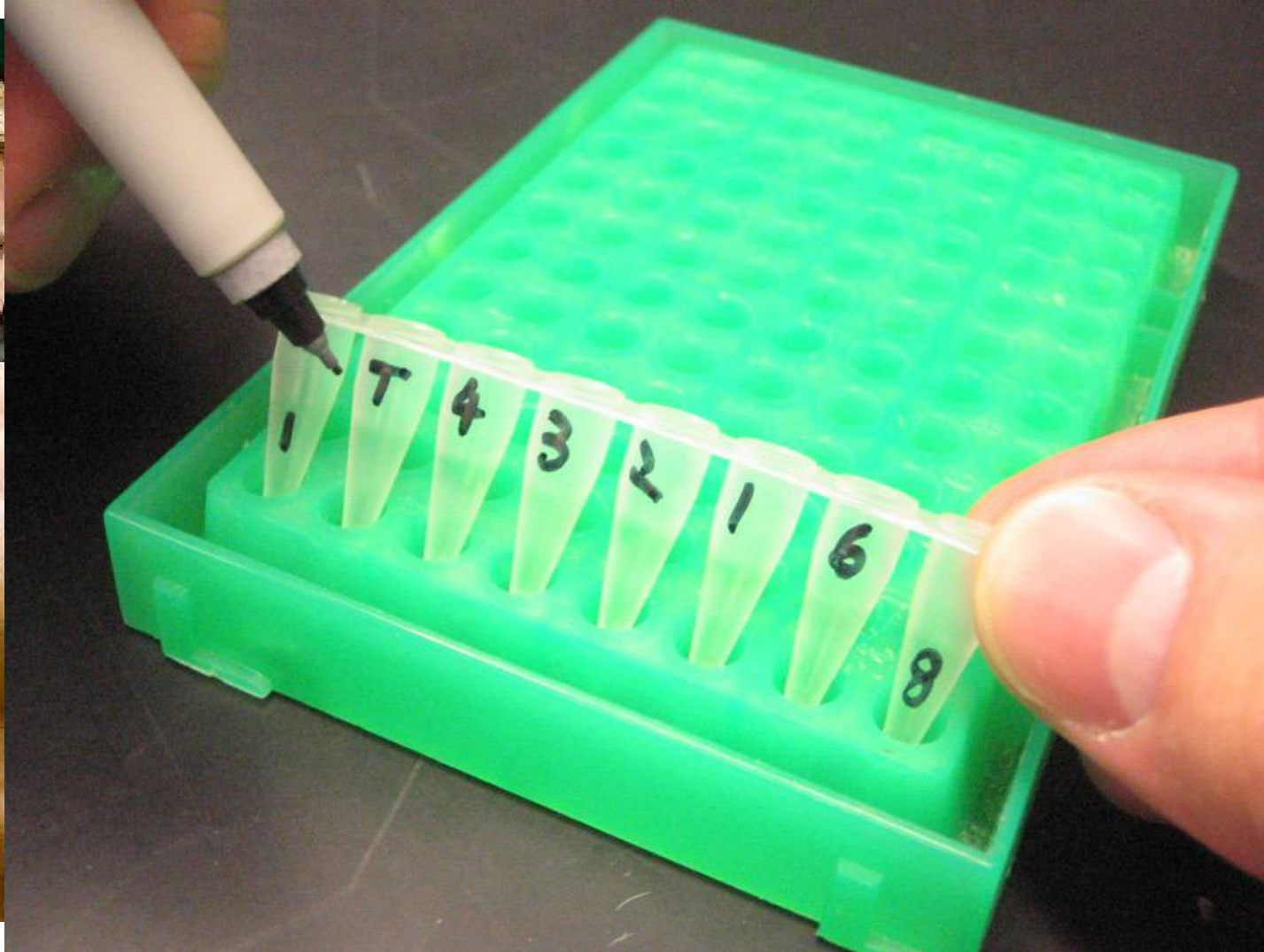
SKA Phase 2 – mid-2020's
~1 EB science data

HL-LHC – 2026
~1 EB Physics data





Delete and re-sample





Other countermeasures

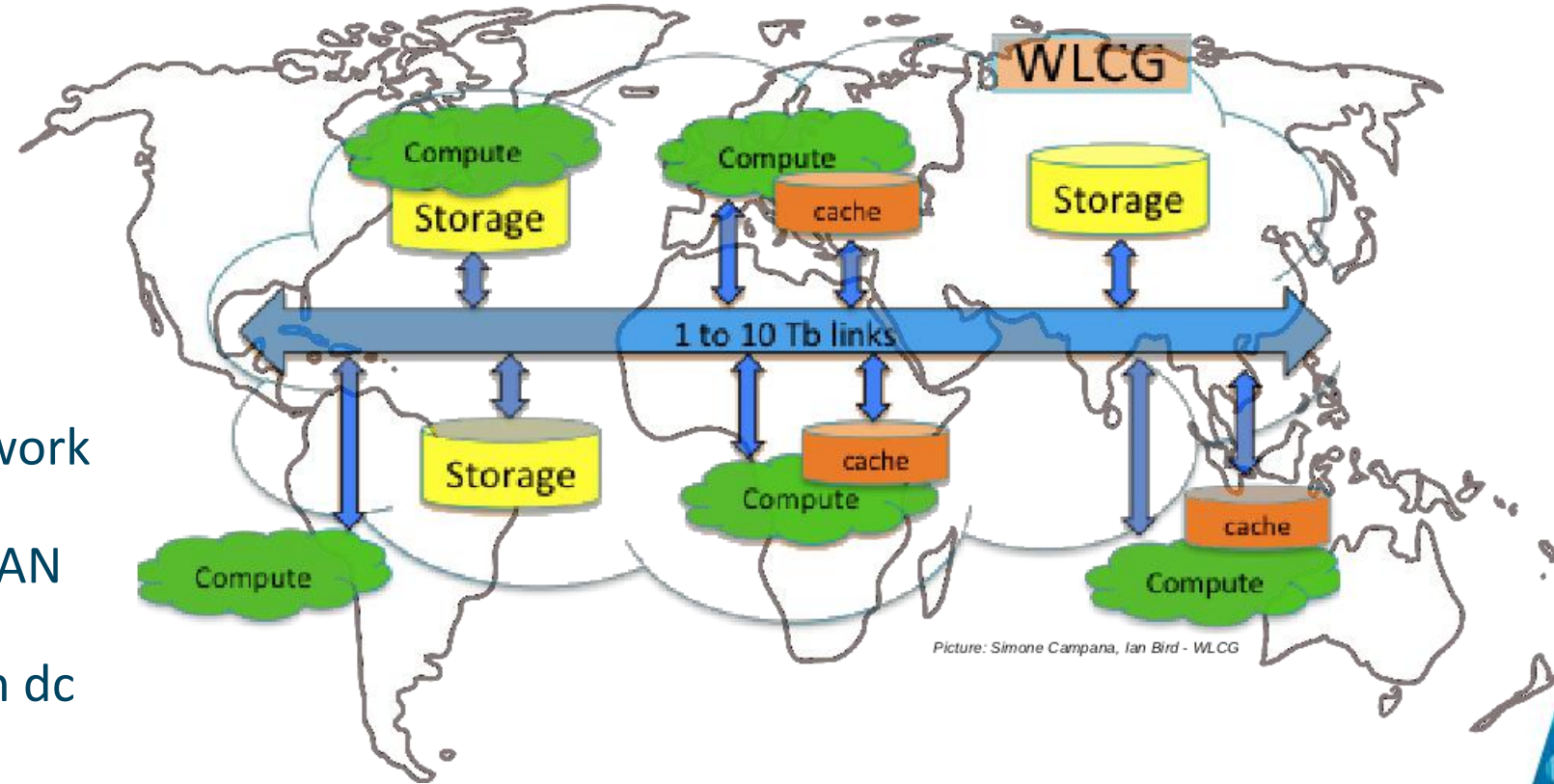
- Reduce replicas
- Shorter data rotation
- Elastic use of cloud resources (*but still problem #2*)
- Delete and re-compute



New approaches

Data lake model

- Reliable and resilient network
- Data retrieval from the WAN
- Large bandwidth between dc
- Flexible capacity





Tweak the computing model

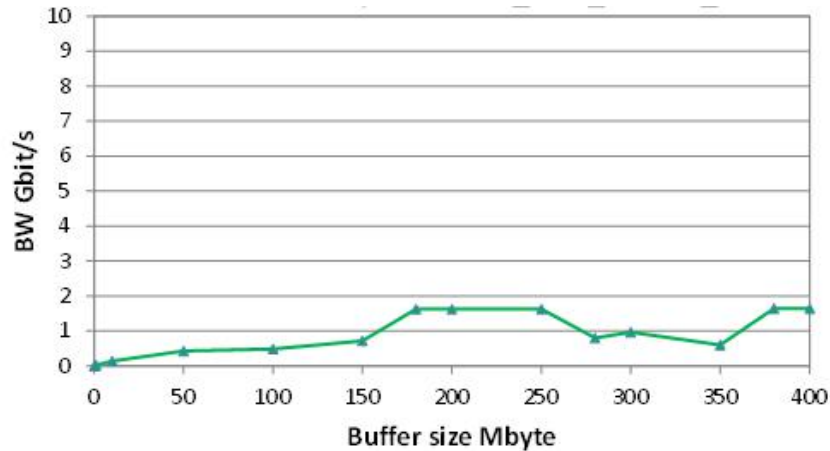
- Detach storage from computing
- Disk-less computing sites
- On-the-fly data retrieval from the WAN
- Heavy reliance on the network
 - Must always be available and has to be fast!



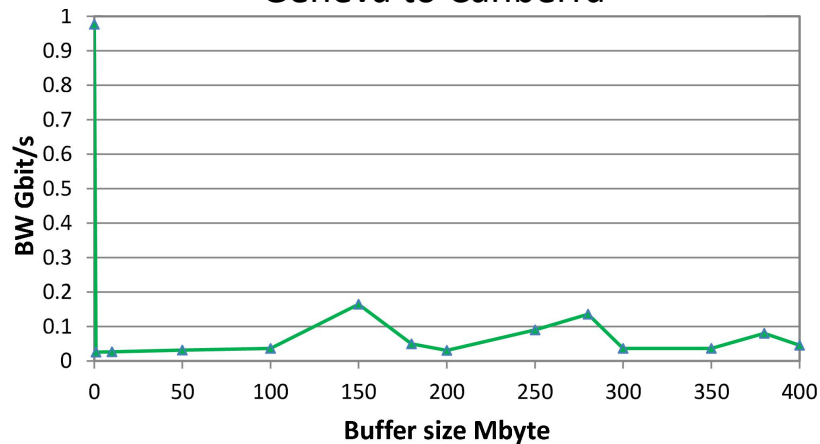
R&E Networks – Optimised for research data transfers

Public Internet

Geneva to Canberra

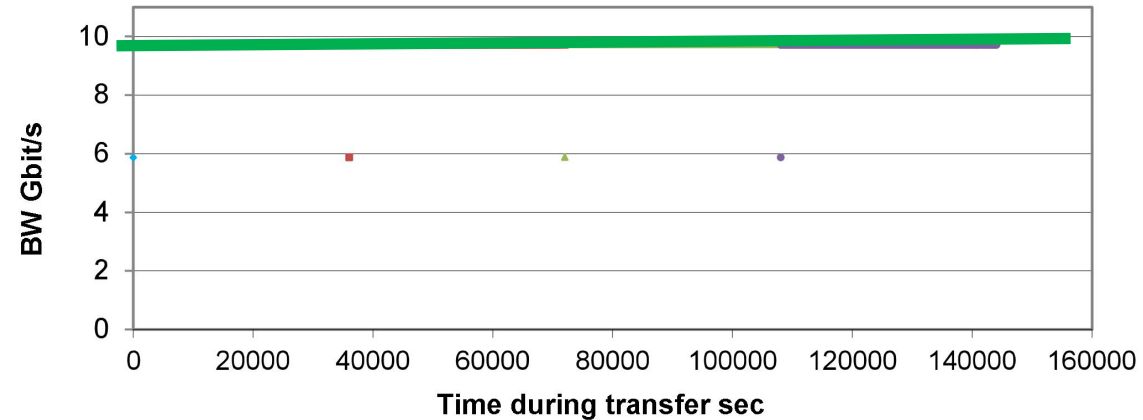


Geneva to Canberra



GEANT and R&E partners

Geneva to Canberra GEANT + R&E networks US to Australia



R&E networks are designed for different goals than Internet

Comparative Times for a 100TByte data transfer.

File Size (TB)	Data rate (Gbit/s)	Time taken (Hours)	Time Taken (Days)
NREN 100	9.27	34.0	1.4
ISP A 100	1.72	183.2	7.6
ISP B 100	0.11	2864.3	119.3



#0 – Ubiquitous (secure) access



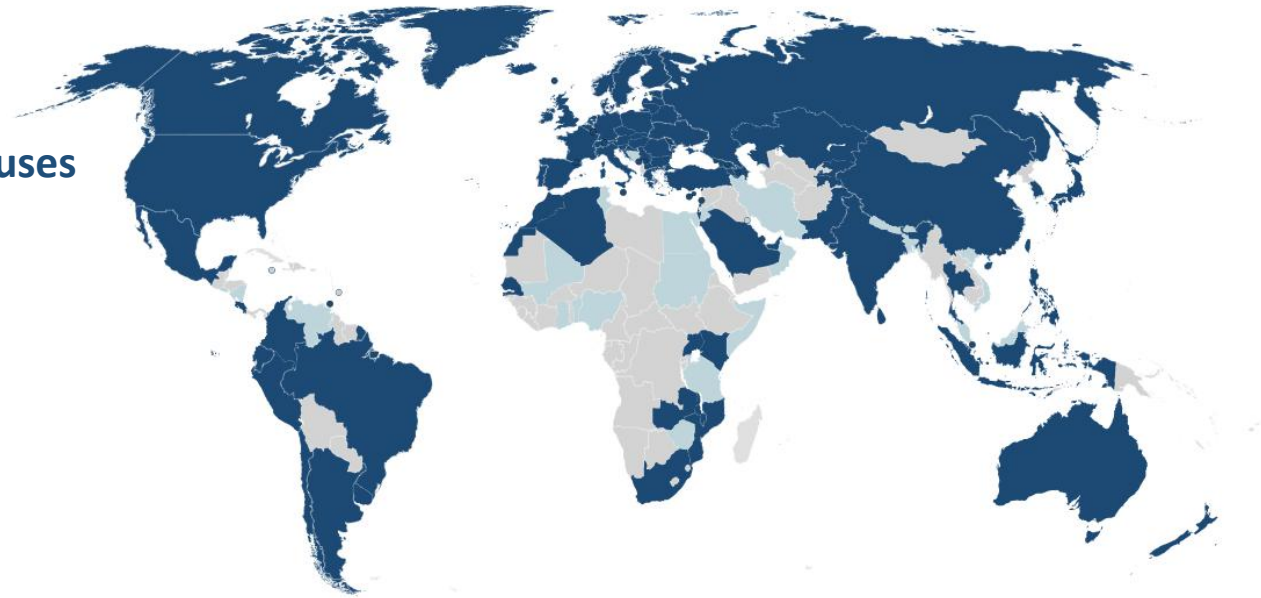
Free secure Wifi provided by NRENs between campuses

A global network of users across 89 territories.

More than 2 billion international authentications
and counting...

eduroam.org

@eduroam 





eduroam managed IdP



Cloud based institutional eduroam IdP infrastructure



Secure and Managed by experts from eduroam Operations Team



High availability, professionally managed central infrastructure

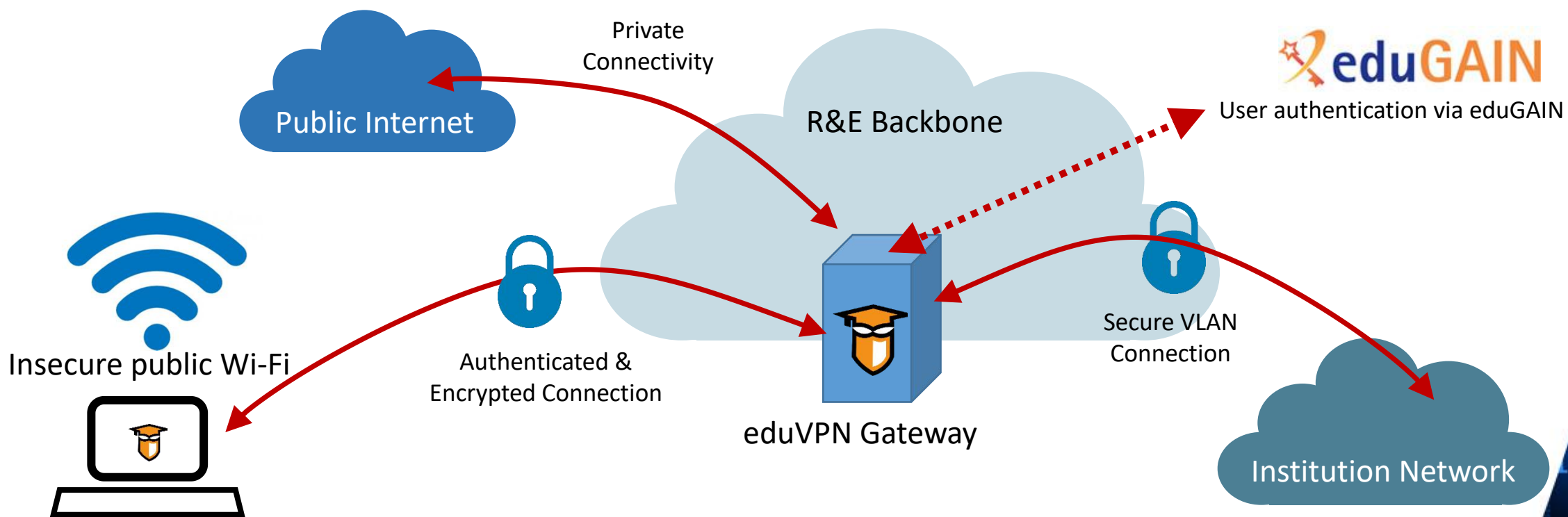


Controlled by the institution from a web browser



eduVPN – securing access for remote users

eduVPN provides easy-to-use client software and a secure gateway to authenticate users and encrypt data



¡Muchas gracias!

vincenzo.capone@geant.org

@EnzinoCapone 

www.geant.org

@GEANTnews 



© GÉANT Association on behalf of the GN4 Phase 2 project (GN4-2).
The research leading to these results has received funding from
the European Union's Horizon 2020 research and innovation
programme under Grant Agreement No. 731122 (GN4-2).