EGI Applications On Demand (AoD) service – Catering for the computational needs of the long tail of science

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Service: http://access.egi.eu
Documentation: https://wiki.egi.eu/wiki/AoD
Scientific publication: https://documents.egi.eu/document/3132
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Agenda

- Introduction about EGI
- Some driving considerations and motivations
- Overview of the EGI Applications on Demand (AoD) service
  - List of Service Components
  - Available Science Gateways
  - Value propositions
- List of "Applications as a Service"
- How to get involved ?

EGI: advanced computing for research

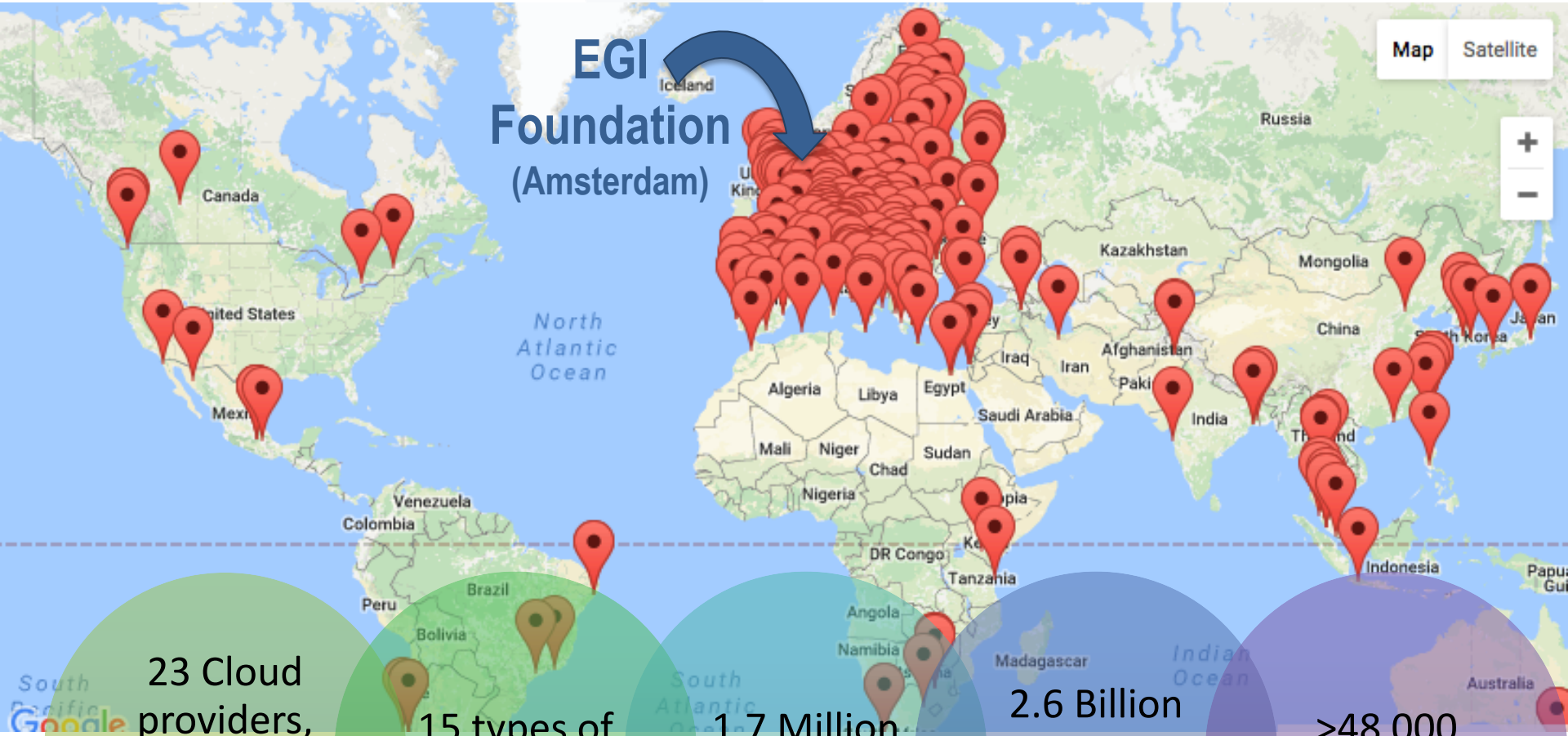
EGI is a federation of over 300 computing and data centres spread across 56 countries in Europe and worldwide

EGI delivers services to support scientists, multinational projects and research infrastructures

www.egi.eu

EGI Federation

The largest distributed compute e-Infrastructure worldwide



23 Cloud providers,

300+ HTC providers

15 types of services

1.7 Million jobs/day

2.6 Billion CPU hours/year

>48 000 users

EGI serves researchers and innovators

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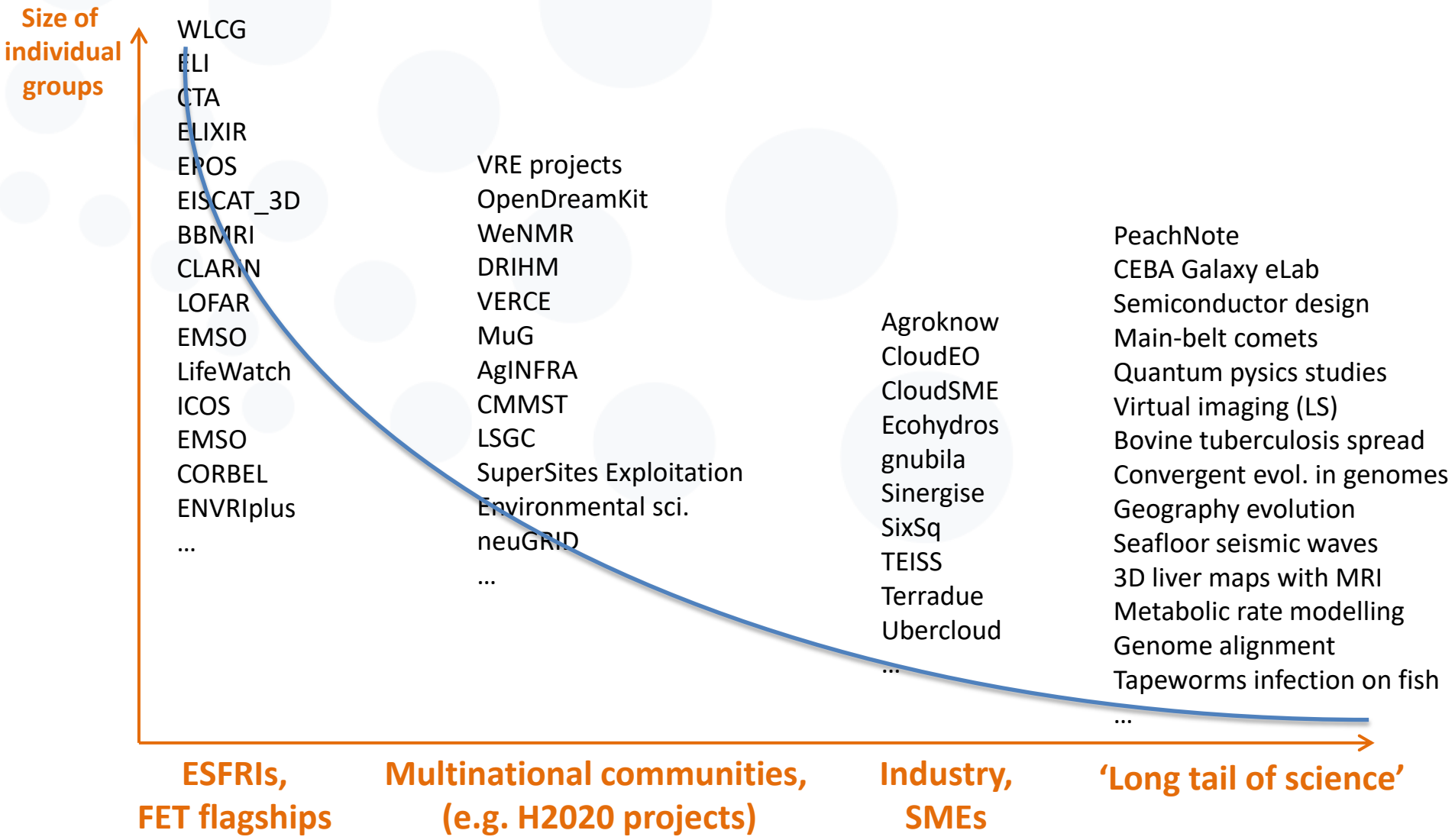


The EGI Applications on Demand service – Motivations

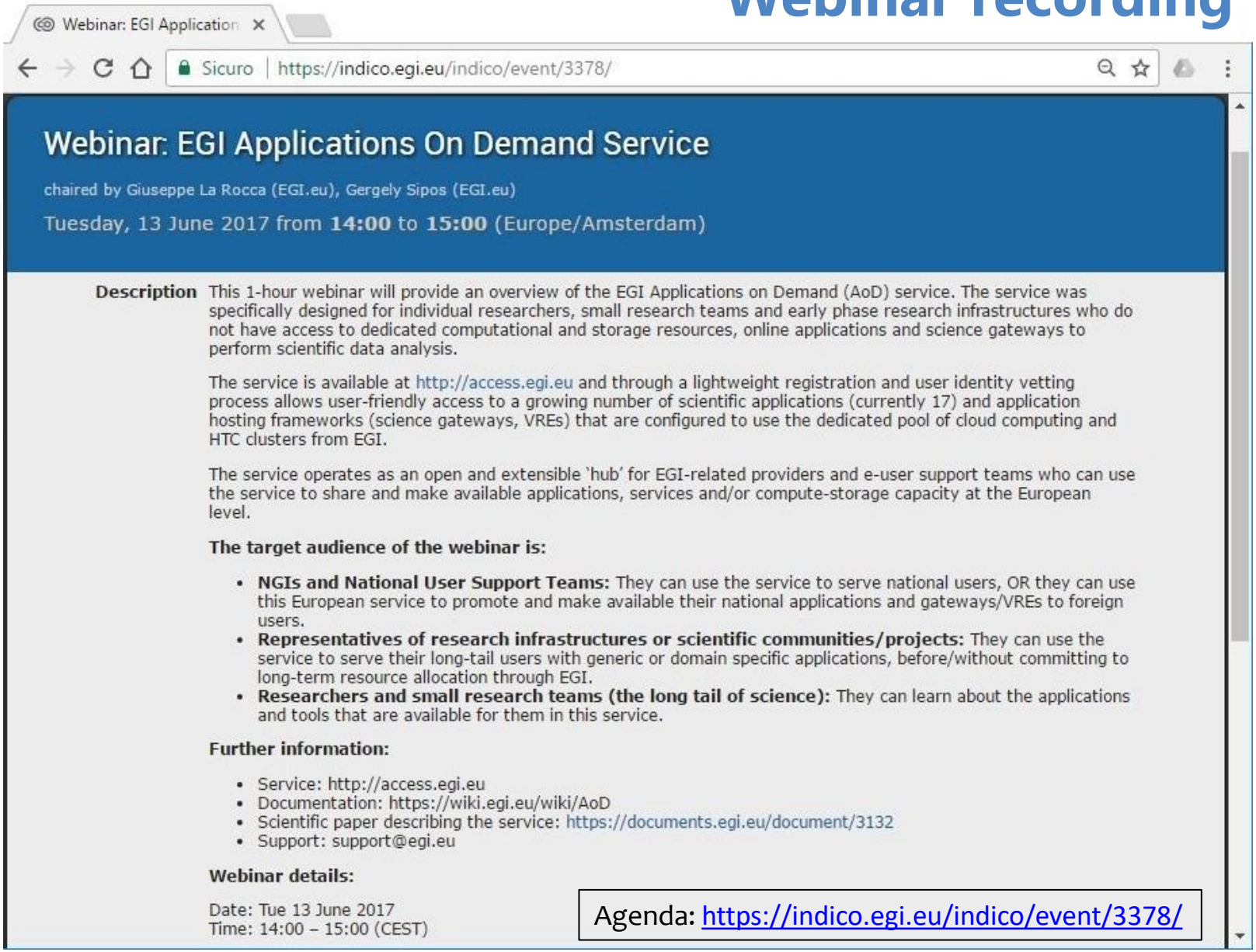
Barriers of application access and reuse

- Fragmented landscape of 'catch-all Virtual Organisation' services (35 VOs at the moment)
  - Barrier for broad adoption
- Abandoned/un-sustained services in some of these VOs
  - Barrier for use
- 'Reinventing the wheel' (same applications, frameworks in several VOs)
  - Waste of effort
- Complicated access (X.509)
  - Barrier for usability

Main design requirements for the service

- **100% coverage:** anyone with internet access can become a user (no X509 certificate; no NGI/VO affiliation)
- **Secure:** provide high level of traceability of user's activities
- **Open and scalable:** can scale up to support large number of application providers, resource providers, technology providers and users
  - Resource providers can join with their own resources
  - Science Gateways/VRE providers can join with custom tools
- **Reuse** existing technological building blocks as much as possible
- **User-friendly:** intuitive GUI, local user support

Webinar recording



The EGI Applications on Demand (AoD) service

What does the Service offer ?

- **Scientific applications** that are offered "as a services" through online graphical environments
- **Science Gateways** and **Virtual Research Environments** that offer integrated development environments to port custom applications with High-throughput computing and cloud resources
- **Cloud** and **High-throughput compute resources** suited for both compute/data intensive applications and for hosting of scientific services
- **Online storage resources** for storing scientific data that serve as input and output for computational jobs
- **Access management** system and a network of **Consultants** who can provide guidance on the use of the service

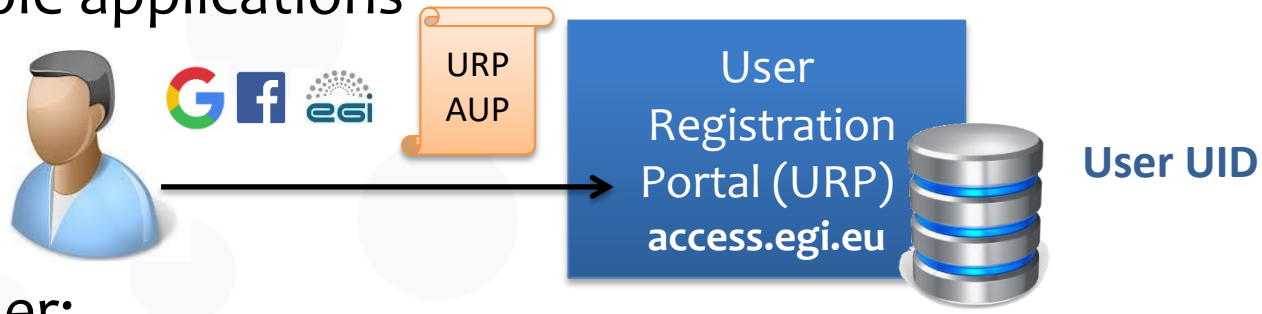
The service is **NOT** here to replace any national services
BUT to facilitate sharing, reuse and standardisation

Service components

- The **User Registration Portal (URP)**
- **Application portals, science Gateways, VREs**
  - Catania Science Gateway (CSG)
  - WS-PGRADE/gUSE
  - Elastic Cloud Computing Cluster (EC3)
- **Scientific applications** (hosted in the gateways/portals/VREs)
  - **R, GNU Octave, The Semantic Search Engine, Chipster, ClustalW2, Galaxy, AutoDock Vina, NAMD, Jupyter**
- **A pool of resources** that the applications can use
  - Cloud
  - HTC (batch computing)
- A **Credentials Management System**

The User Registration Portal (URP)

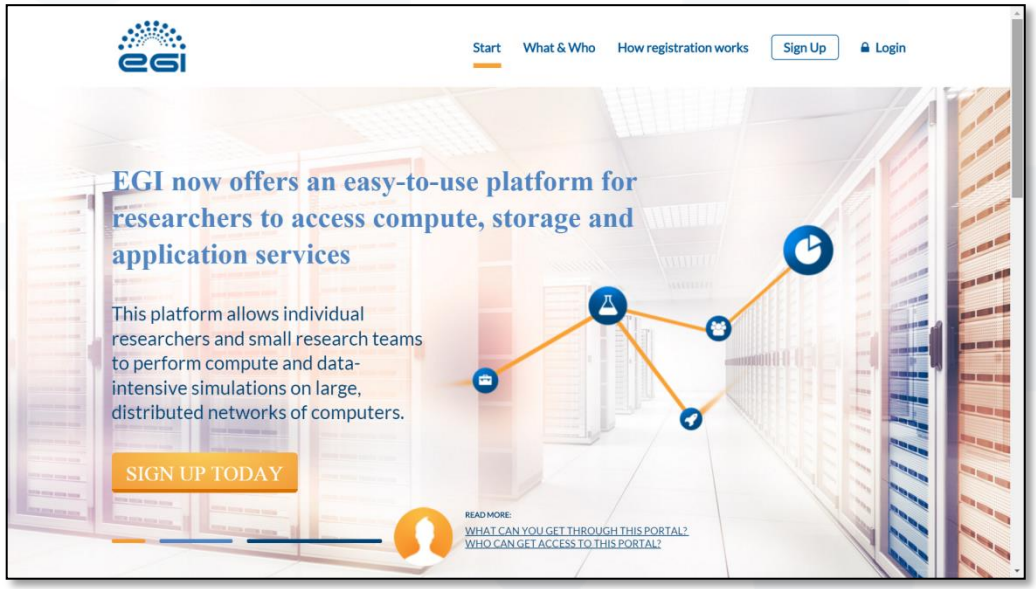
- The **URP** is the entry point to access the Service and uses the available applications



- The user:
  - Logs in using his/her social accounts OR with EGI SSO accounts
  - Provides background information (affiliation, research use case, links)
  - Submits a request for application access with resource allocation
- EGI.eu and resource providers:
  - Approves the user request (remote identity vetting whenever possible)
  - Monitors application/resource usage
- After the user's request is approved, an **unique UID** is assigned to uniquely identify the user across all the service components

How to access the AoD service ?

http://access.egi.eu



Approval by distributed Support Team

1. Register with social or EGI SSO account

2. Complete user profile and submit access request

3. Access or develop applications

Compute and storage resources

- The **pre-allocated, open pool of resources** is operated by various geographically distributed EGI Resource Centres
  - both cloud and HTC resource centres have accepted to enable the vo.access.egi.eu VO on their resources.

Science Gateways/portals/VREs

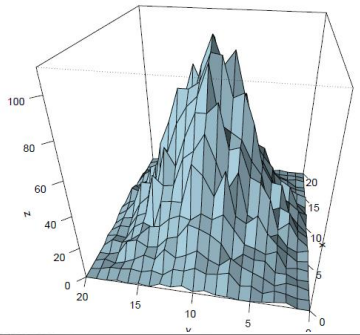
1. To access and use pre-defined applications
2. To port additional applications, such as
   - Computational workflows or parameter sweeps → WS-PGRADE
   - Applications with rich GUI → Catania Science Gateway
   - Cloud applications → EC3

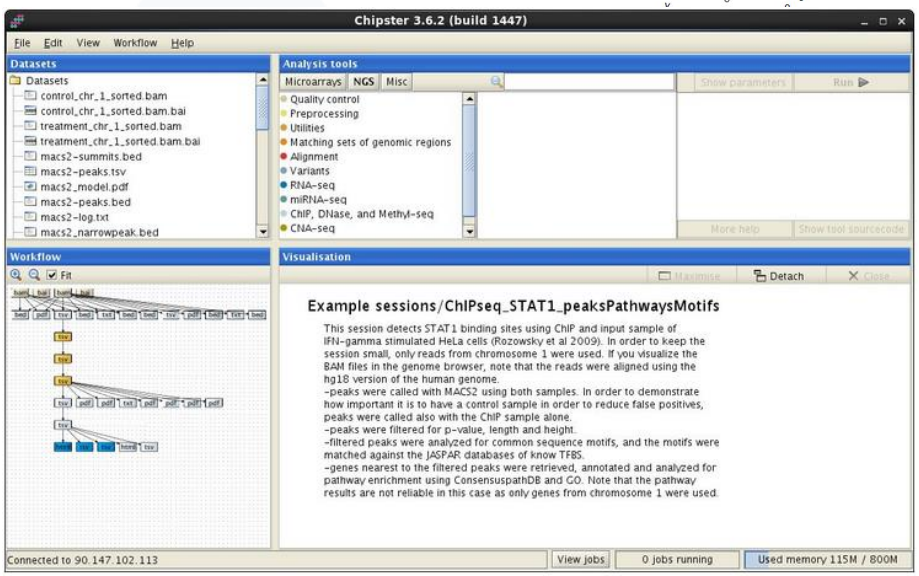
How to join a new Science Gateways/portals/VREs in the Service

- Science Gateways/Portals are configured to:
  - **Register** the SG as new provider in the URP
    - Get a *secretID* and *secretKey* to secure the communication.
  - **Register** the SG in the GOCDB to enable the monitoring based on the EGI ARGO service.
  - **Create** a specific Support Unit in EGI Helpdesk
  - **Consume** authorization information from the User Registration Portal (user UID) and,
  - **Generate** short-term proxies from robot certificates
- For the traceability of user identities proxies have been extended creating **Per-User Sub-Proxies (PUSP)** (see next slide)

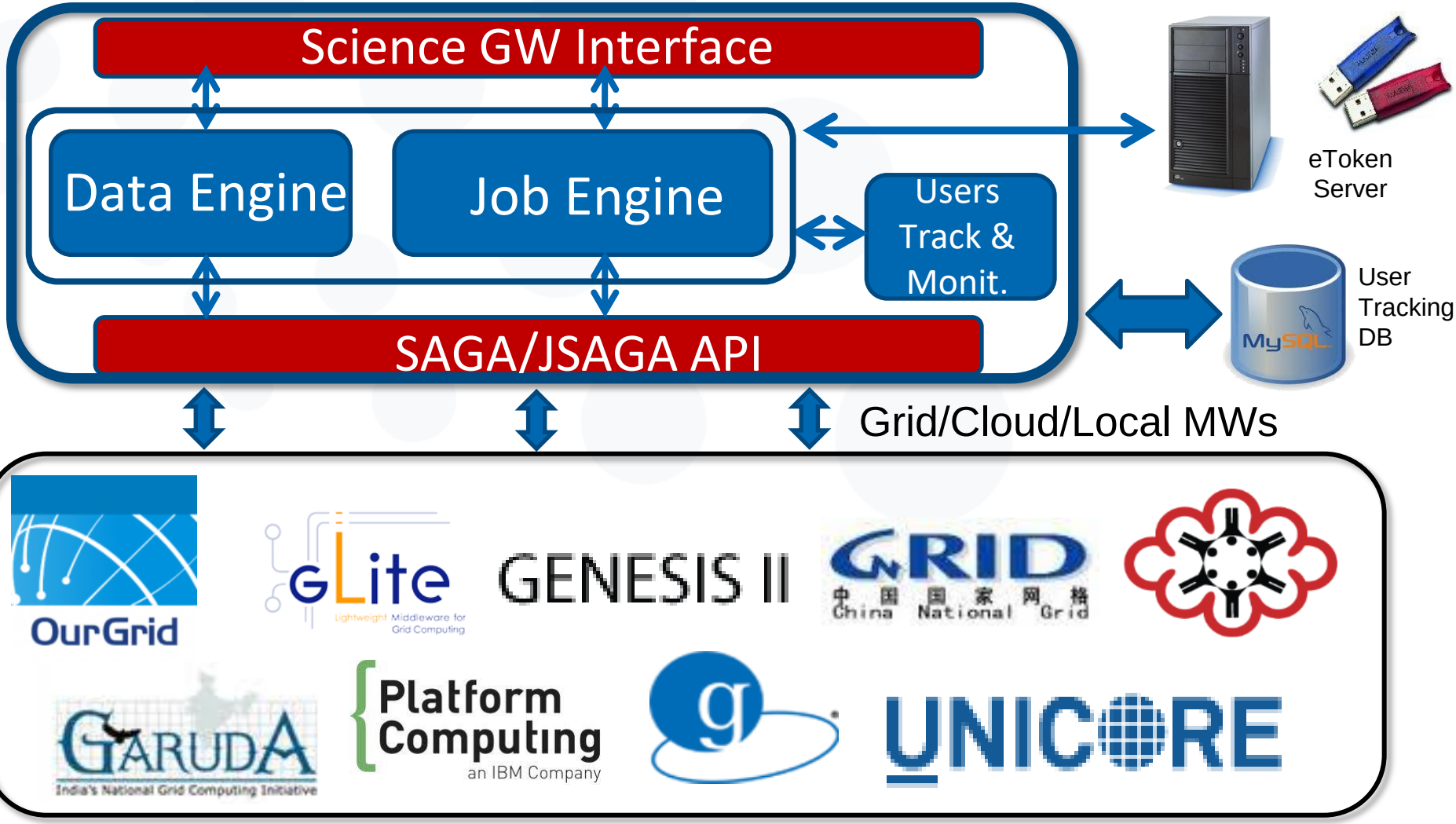
Science Gateway/CSG

The **Catania Science Gateway (CSG)** provides small groups/researchers with the possibility to seamlessly execute scientific applications on the resources supporting the catch-all VO





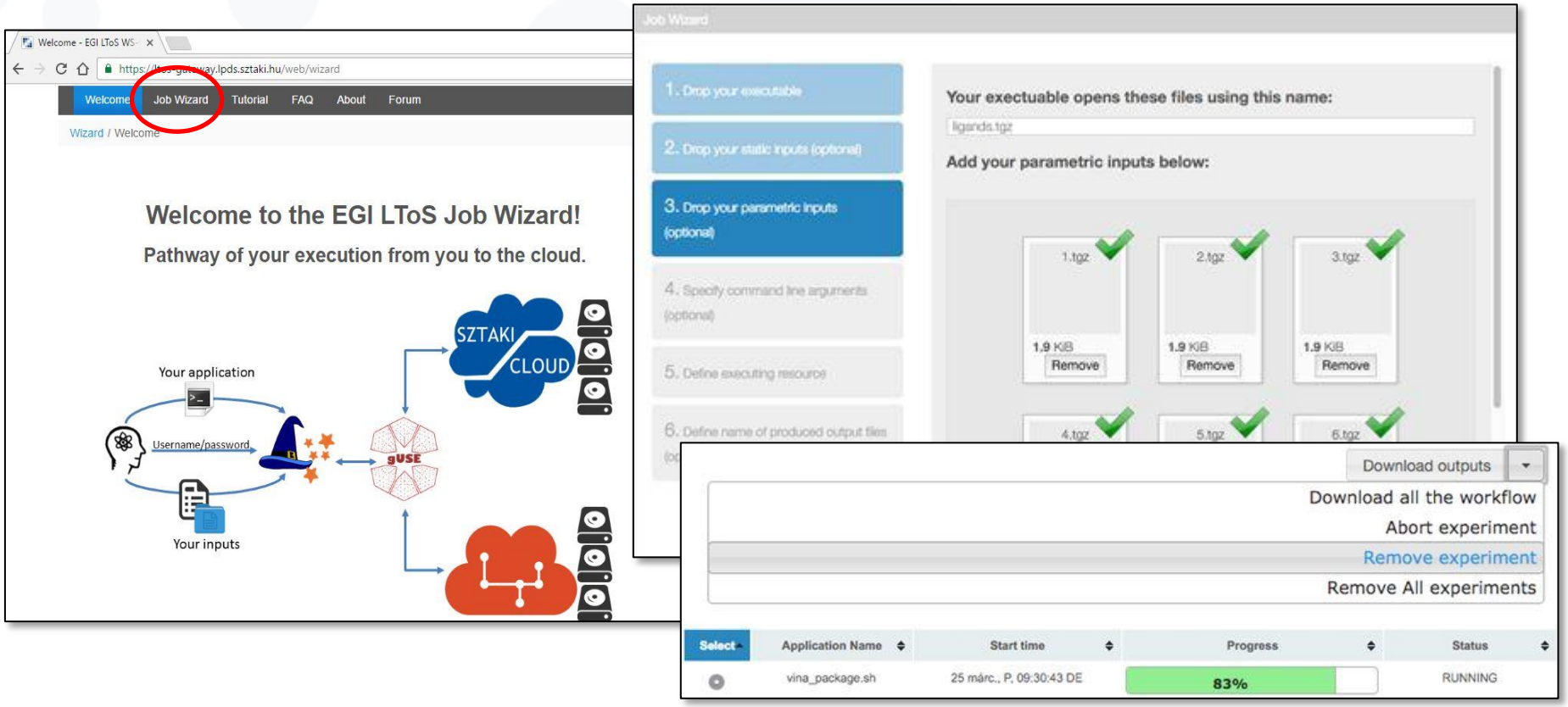
The Catania Science Gateway Framework



Science Gateway/WS-PGRADE

The **WS-PGRADE** Science Gateway offers a workflow-oriented Science Gateway framework with different customization methodologies.

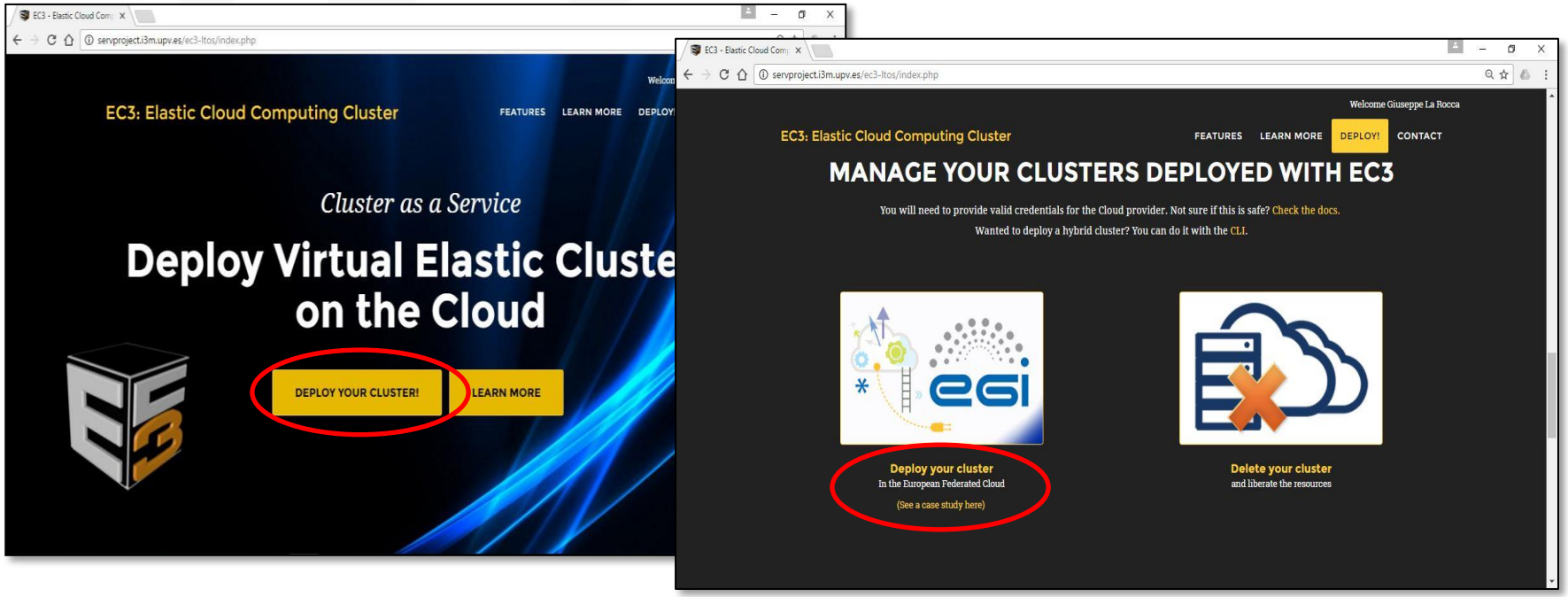
- Developed by MTA SZTAKI and released under the Apache 2.0 license.



Platform/EC3

The **Elastic Cloud Computing Cluster (EC3)** is an open-source software platform to dynamically deploy complex scientific virtual computing infrastructures on top of Infrastructure as a Service Clouds

- Developed by the **Polytechnic University of Valencia** (UPV)



EC3 architecture

- The **Infrastructure Manager (IM)** is a tool that eases the access and the usability of IaaS clouds by automating the VMI selection, deployment, configuration, software installation, monitoring and update of Virtual Appliances.
- The main purpose of the **Resource and Application description Language (RADL)** is to specify the requirements of the resources where the scientific applications will be executed.
- **CLUES** is an energy management system for High Performance Computing (HPC) Clusters and Cloud infrastructures.
  - The main function of the system is to power off internal cluster nodes when they are not being used, and conversely to power them on when they are needed.

OLA agreements with resource providers

- **OLA agreements with cloud resource providers**

Cloud Provider	Resources	OLA Status
INFN-CATANIA	20 vCPU cores, 50GB RAM, 1TB storage	Signed
INFN-BARI	15 vCPU cores, 30GB RAM, 1TB storage	Signed
CESGA	32 vCPU cores, 64GB RAM, 2TB of storage	Signed
BIFI	100 vCPU cores, 100GB RAM, 2TB of storage	Signed

- **OLA agreements with HTC resource providers**

HTC Provider	Resources	OLA Status
INFN-CATANIA	1M HEPSPEC, 1GB RAM per core, 100GB storage	Signed
INFN-BARI	0.5M HEPSPEC, 2GB RAM per core, 100GB storage	Signed
CESGA	1M HEPSPEC, 1GB RAM per core, 2TB storage	Signed
CYFRONET-LCG2	5M HEPSPEC, 3GB RAM per core, 500GB storage	Signed
BEgrid-ULB-VUB	5M HEPSPEC, 2GB RAM per core, 500GB storage	Signed

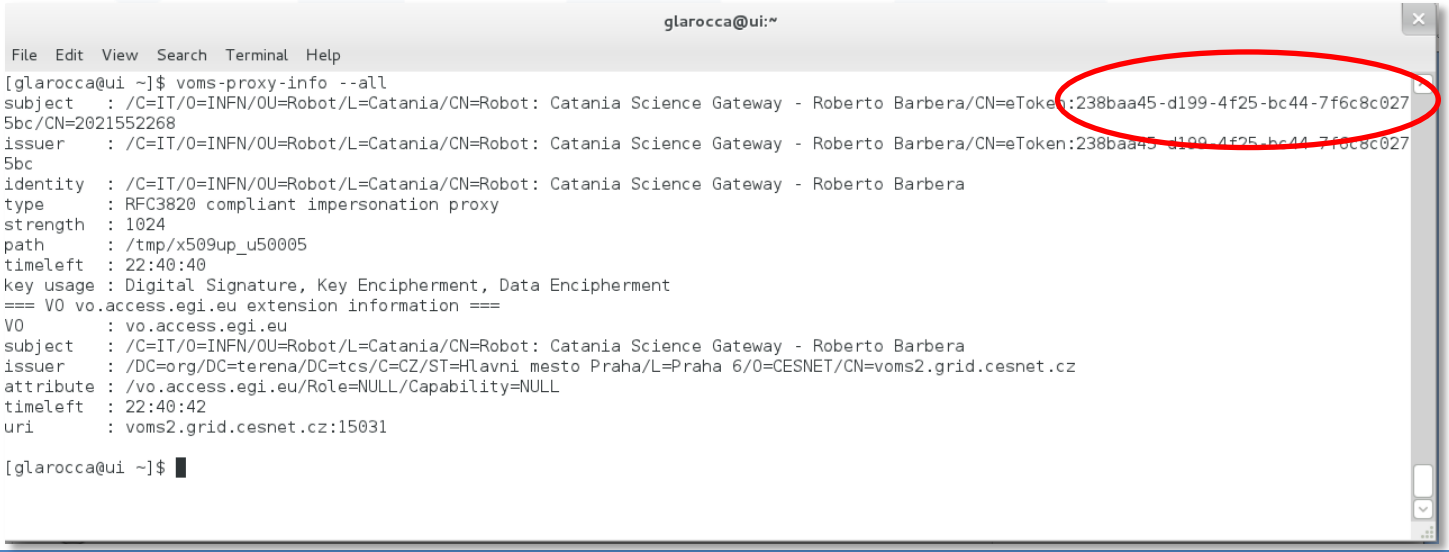
OLA agreements with technology providers

- **OLA agreements with technology providers**

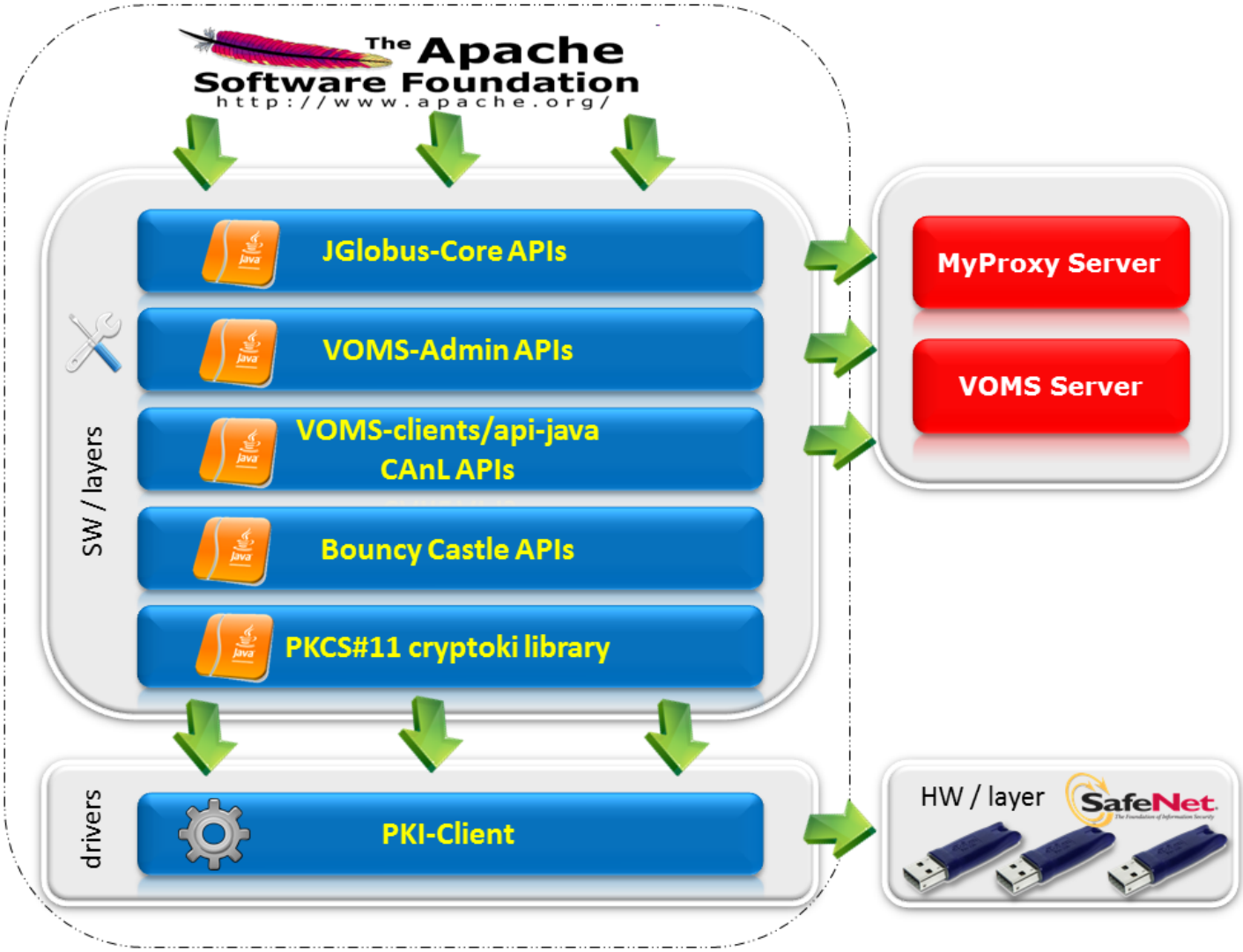
Service	GOCDB registration	OLA Status	Monitor in ARGO	GGUS Support Unit
User Registration Portal (URP)	Registered	Signed	Active	Created
Catania Science Gateway (CSG)	Registered	Signed	Active	Created
WS-PGRADE/gUSE	Registered	Signed	Active	Created
Elastic Cloud Computing Cluster (EC3)	Registered	Signed	Active	Created

Credential Management System

- **In the back-end there is still X509, but this is transparent for the users**
- **Credentials Management System** generates a per-user-sub-proxy (PUSP) from an X509 robot certificate.
- **Per-User Sub-Proxy (PUSP)** identifies the user
  - Proxy CN includes the user ID
  - Accounting information can be grouped by this ID
  - Users can be suspended by the ID

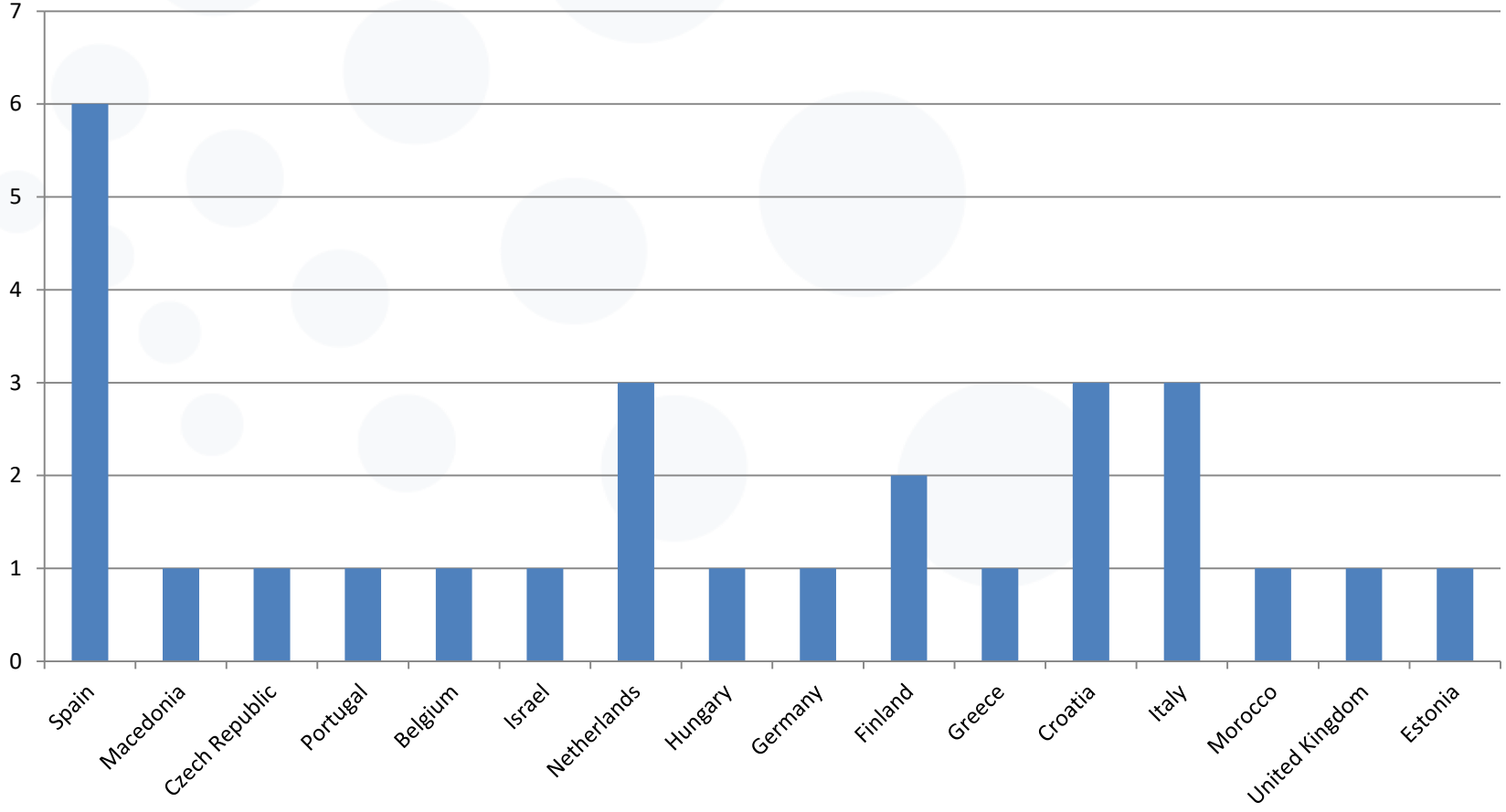


X.509 Credential Management System (cont.)



Applications/tools integrated so far

User requests so far



NIL contact: Macedonia, Croatia, Netherlands and Czech Republic.

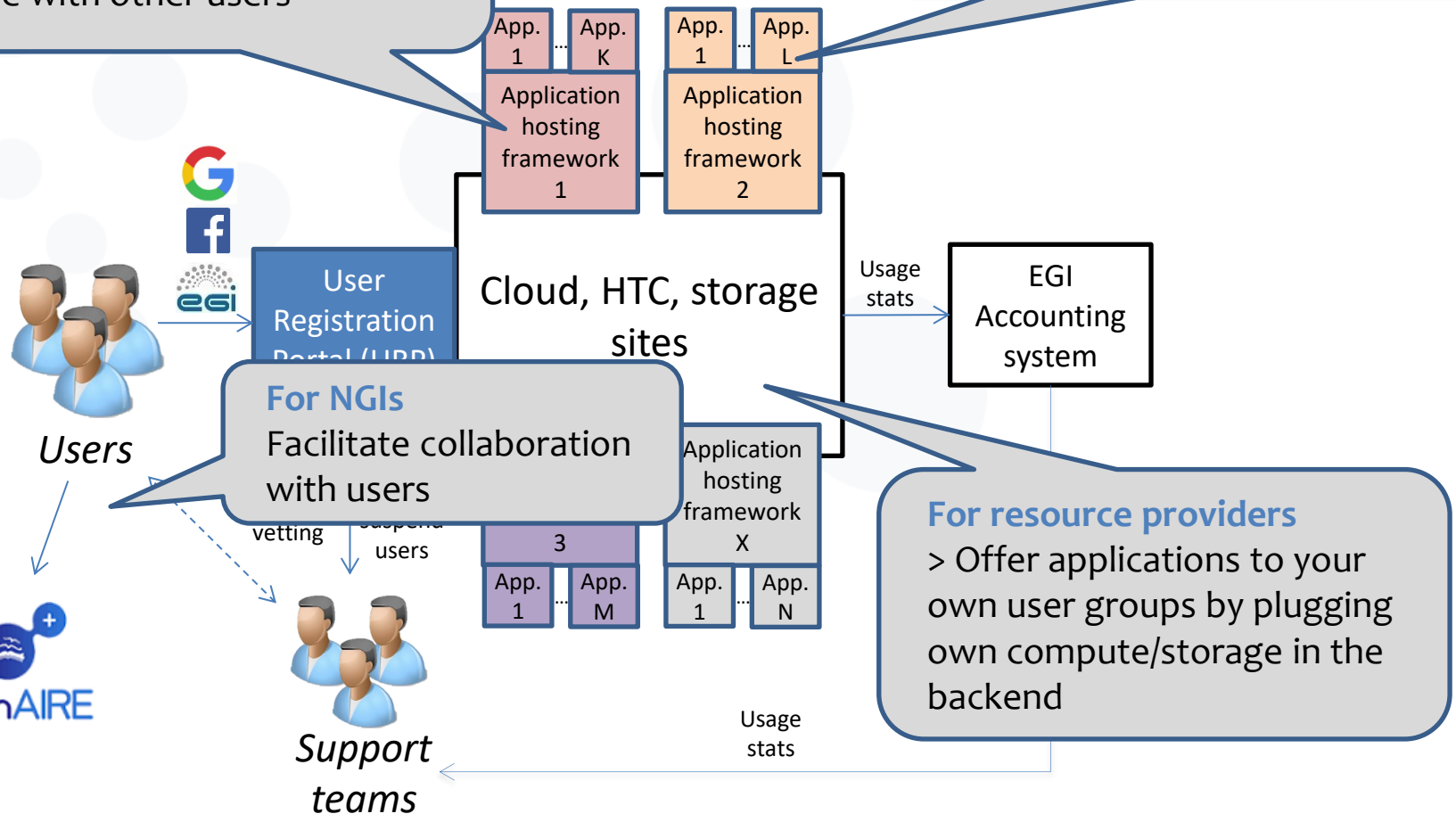
29 requests from **16** countries

Last updates June 13, 2017

Value proposition

For Application Developers:
> Add application to Science Gateway/hosting framework and share with other users

For Researchers
> Use applications from provided library



For resource providers
> Offer applications to your own user groups by plugging own compute/storage in the backend

Benefits (for SGs developers)

- Reaching international user base
- Benefiting from EGI's service promotion
- Belonging to a community of like-minded service providers
- Working towards the EOSC with EGI (incl. bidding together for future grants)

How did we get here ?

What's coming next ?

- Promote the Applications on Demand service to NGIs
- Improve the list of scientific applications available:
  - JupyterHub aaS, Galaxy aaS
- Add AppDB VMOps as another 'gateway'
- Present the service to the EGI council (by the end of June)

How to get involved ?

How can You participate:

- Apply for access as a user
- Join the user vetting and support team
- Integrate additional applications
- Connect a portal/VRE/gateway
- Join with cloud or HTC resources

Contact us at support@egi.eu

www.egi.eu

Credits

Thank you for your attention.

Questions?