



**Standard-based Interoperability amongst Local, Grid and  
Cloud Resources to enable an Italian Distributed  
Computing Infrastructure**

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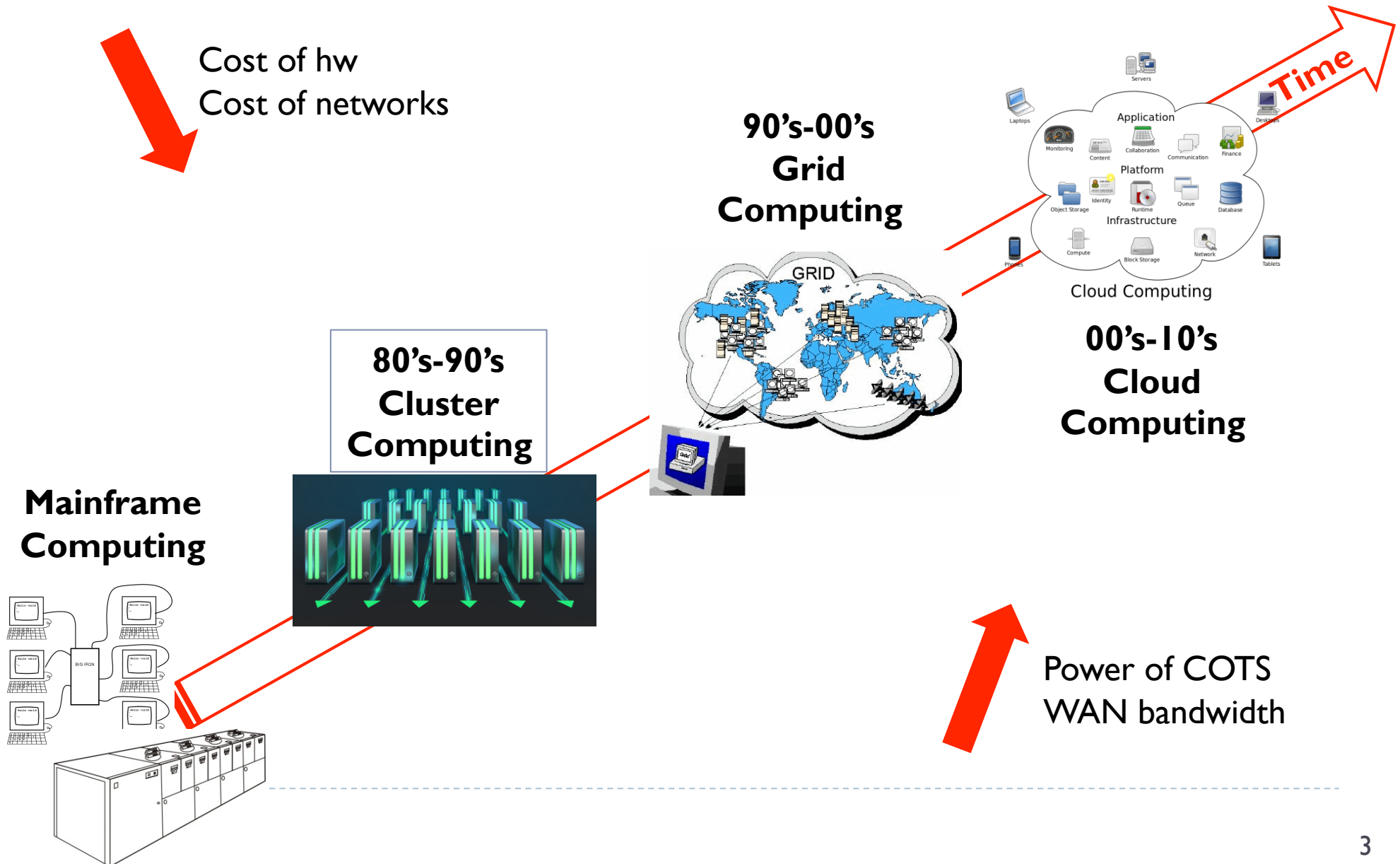
GARR Workshop – Rome, 29 November 2012

# Outline

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- ▶ Introductory considerations
- ▶ The Catania Science Gateway framework
- ▶ The CHAIN worldwide interoperability demo
- ▶ Summary and conclusions

# Evolution of distributed computing

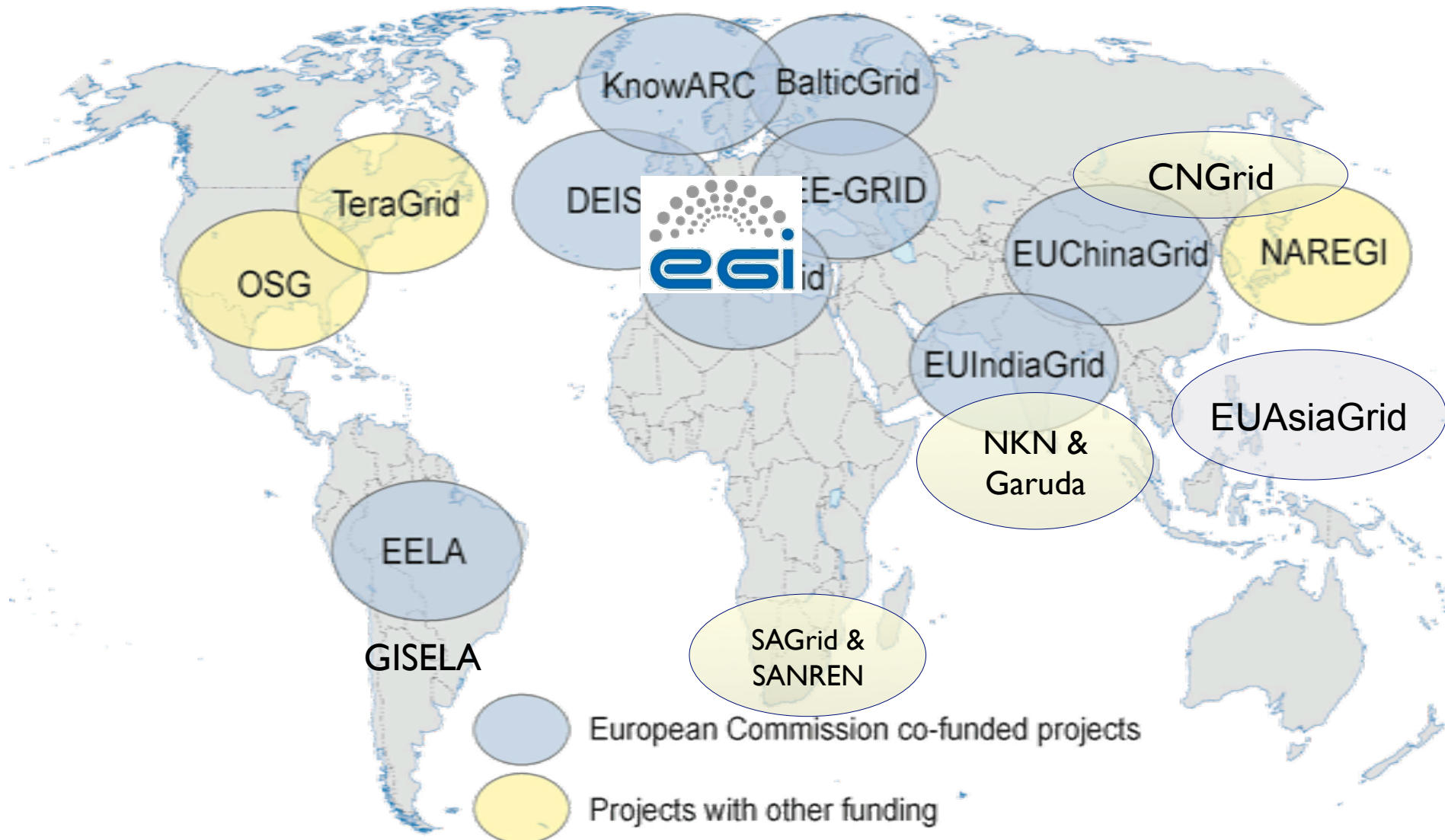


# One architecture... many local resource managers

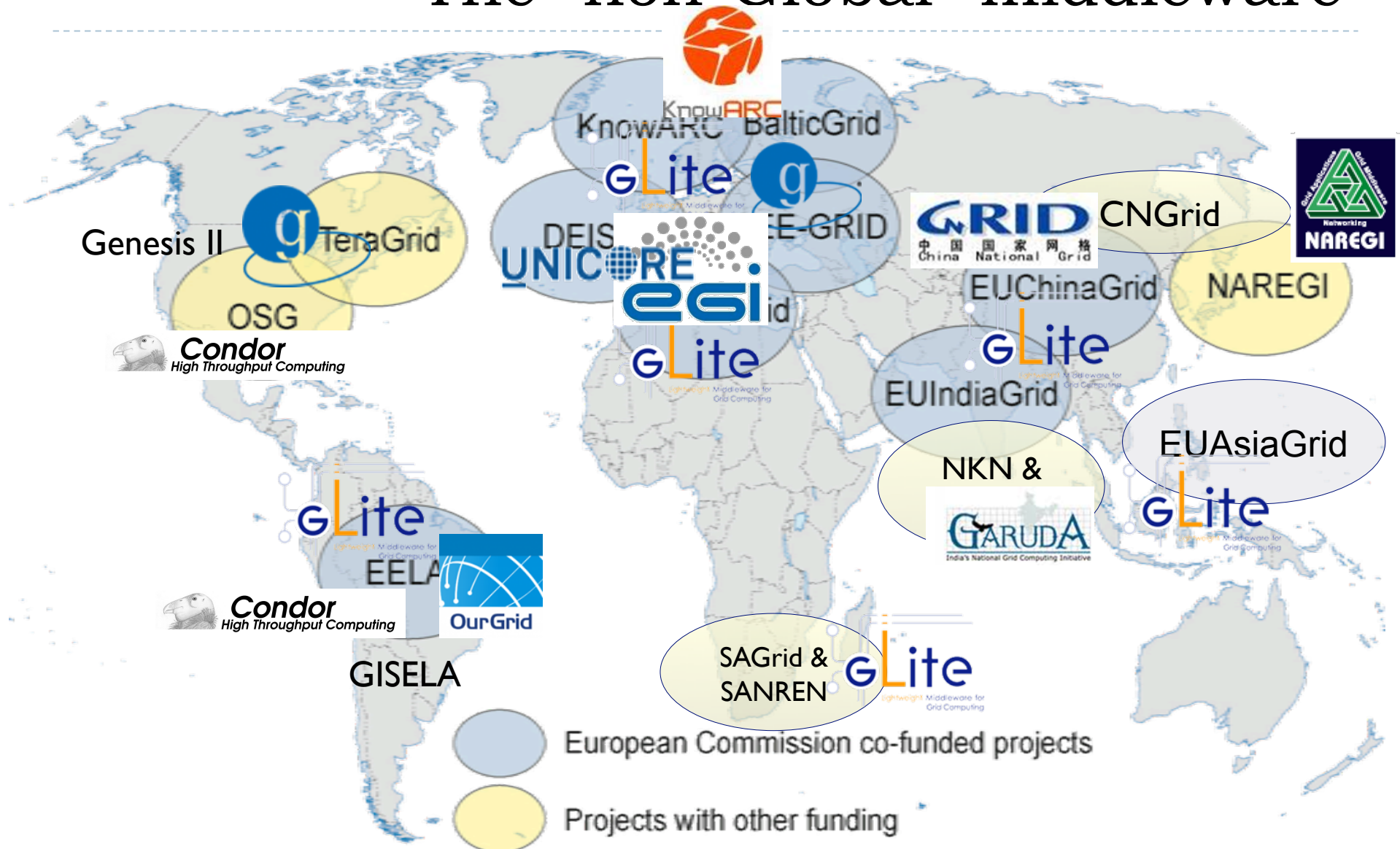
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# The “Global” Grid



# The “non-Global” middleware



# Using Grids is not straightforward ☹

```
Type = "Job";
JobType = "MPICH";
MPIType = "MVAPICH2_PGI706";
CpuNumber = 16;
MPIGranularity = 4;
Executable = "flash2";
StdOutput = "mpi.out";
StdError = "mpi.err";
InputSandbox =
{
  "watchdog"
};
OutputSandbox =
{
  "watchdog"
};
Requirements =
{
  "0"
};
RetryCount = 0;
```

**JDL**

```
echo Staging Input Data \ (Courtesy of European Space
Agency\);
#edg-rm --vo=gilda copyFile lfn:$1.N1 file://$PWD/$1.N1;
lcp-cp --vo=gilda lfn:$1.N1 file://$PWD/$1.N1;
echo Staging Application;
gunzip beam20.tar.gz;
tar xvf beam20.tar;
cd beam-2.0/bin;
echo Starting Application;
./pds2jpg-ASAR-run.sh $1;
mv $1-b*.jpg ../
cd ../
rm -fr beam-2.0;
rm -fr $PWD/beam-2.0;
```

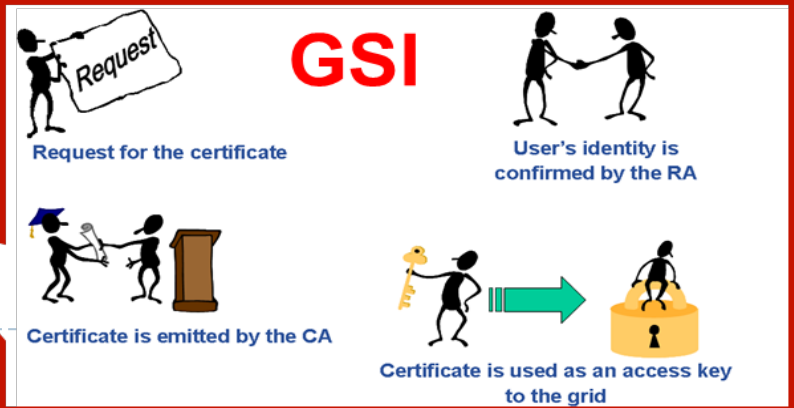
**Script**

**CLI**

**Users have to cope with complex security procedures, execution scripts, job description languages, command line based interfaces and lack of standards. This makes the learning curve very steep and keeps non IT-experts away.**



```
Job terminated successfully
Exit code: 0
Status Reason: Job terminated successfully
Destination: grid010.ct.infn.it:2119/jobmanager-lcgpbs-gilda
Submitted: Tue Jun 29 15:34:40 2010 CEST
```



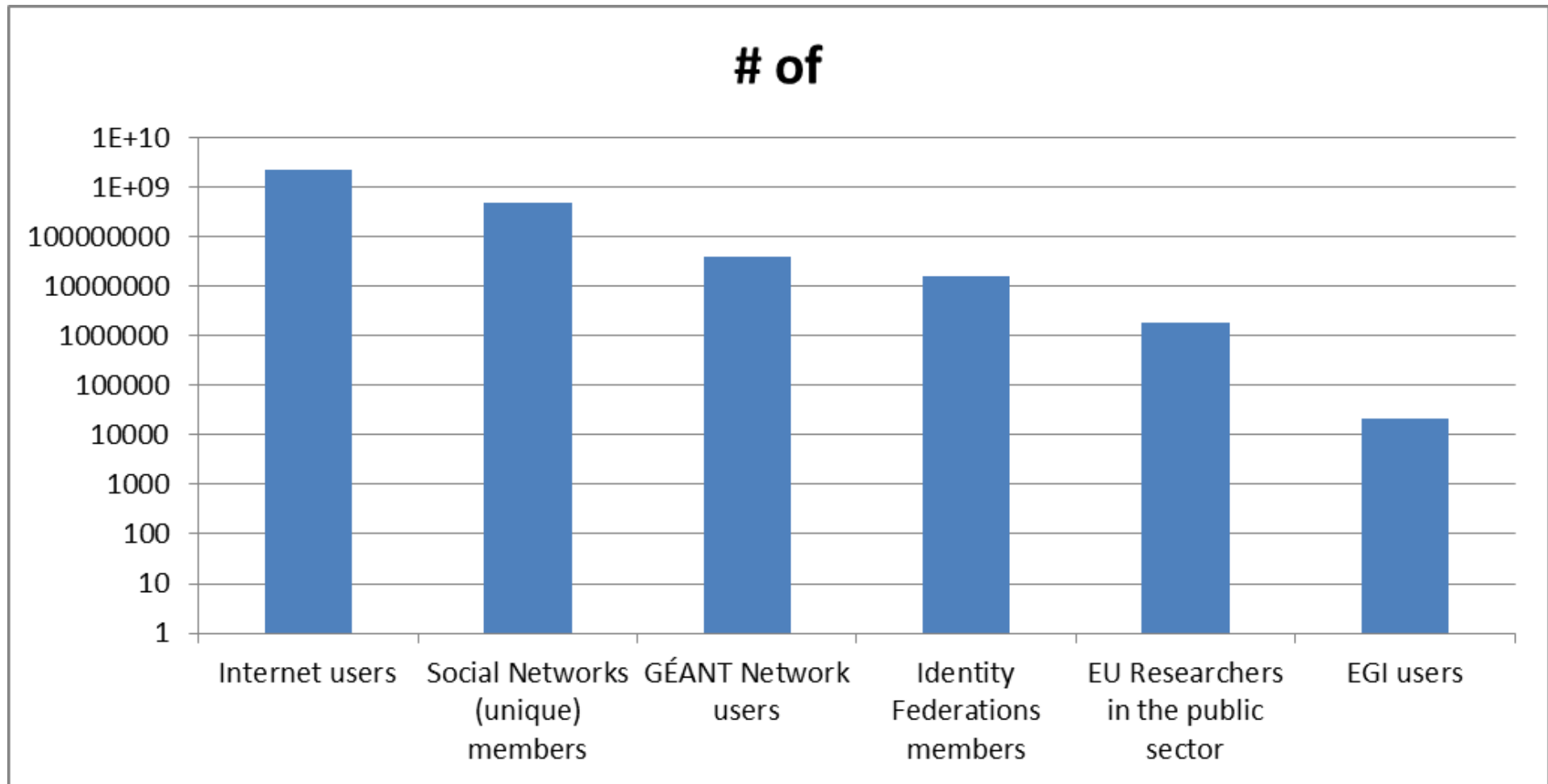
# The eResearch2020 report

(<http://www.eresearch2020.eu/eResearch%20Brochure%20EN.pdf>)

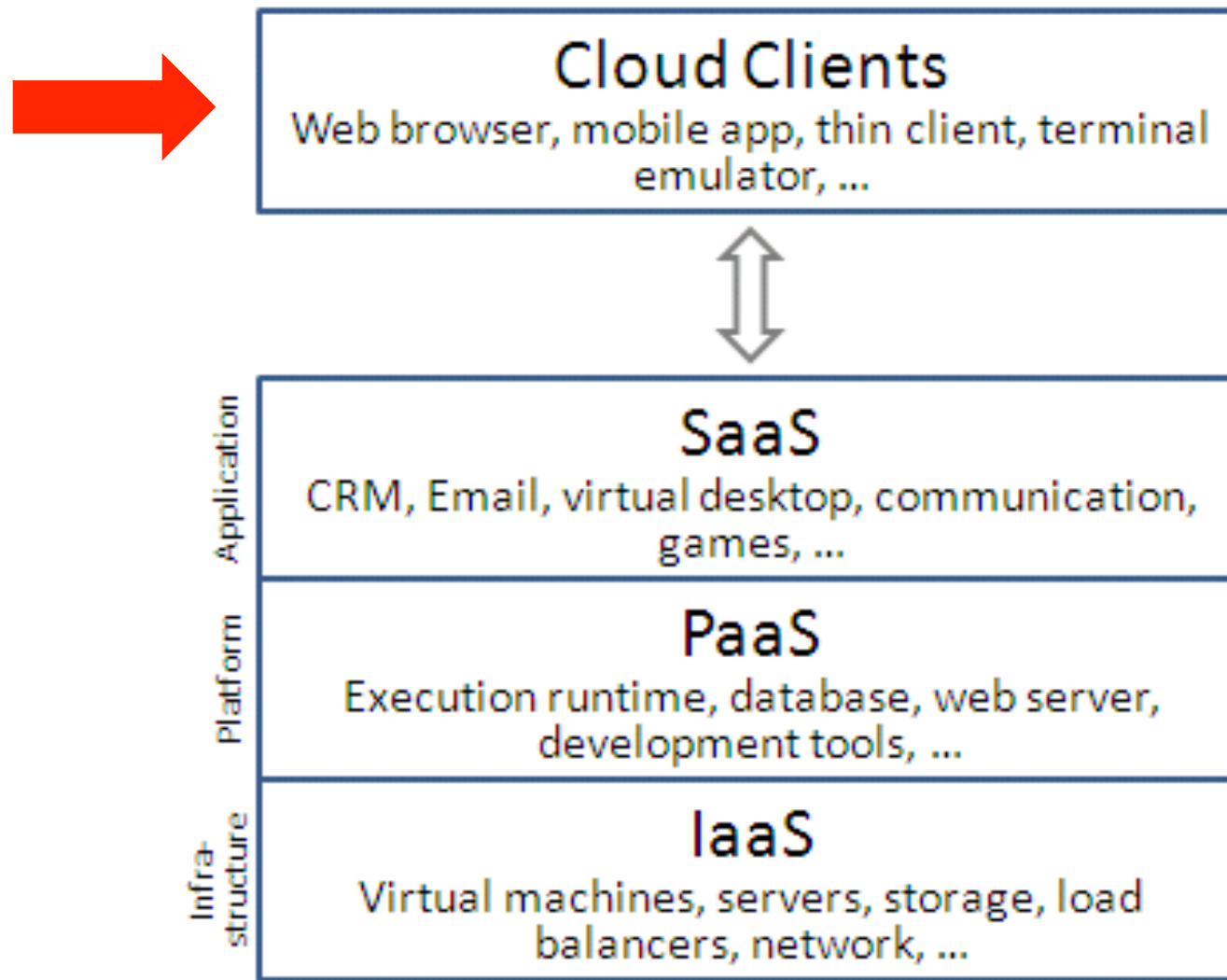
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- Some barriers in the adoption of Grids:
    - ▶ **Changes on Grids means changes on applications**
    - ▶ Time required to adapt usual workflows
    - ▶ Lack of structure to support anonymous access
    - ▶ Download and installation of applications
    - ▶ **Interface**
    - ▶ Slow to get to compared to other resources
    - ▶ **Difficult to use in the beginning**
    - ▶ **Time spent to get the application compiled and running**
-

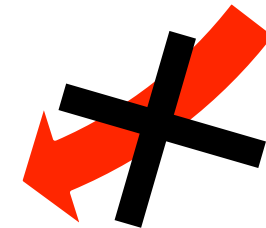
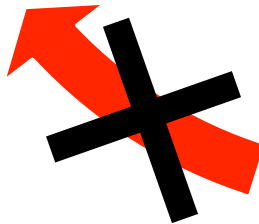
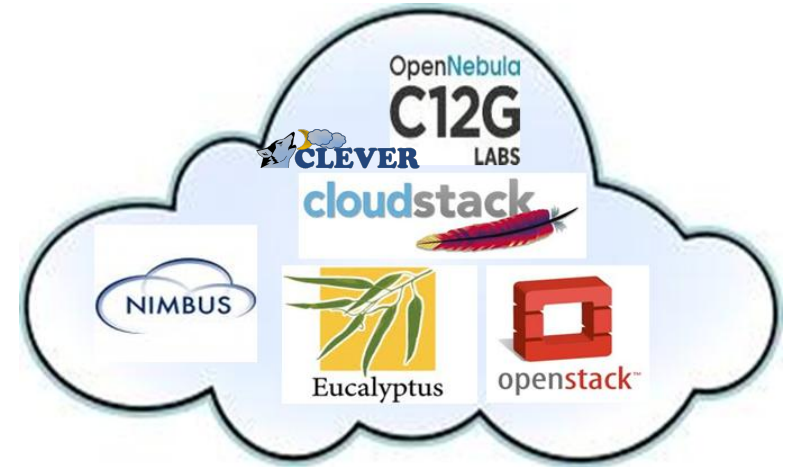
# Some figures...



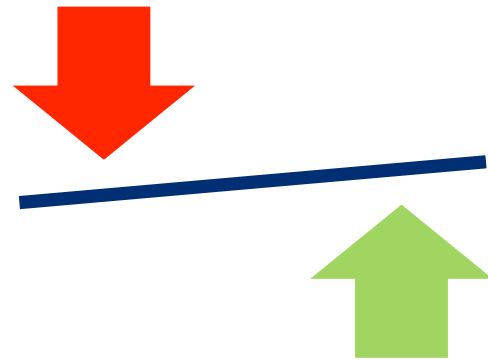
# The cloud stack



# A very «cloudy» sky...

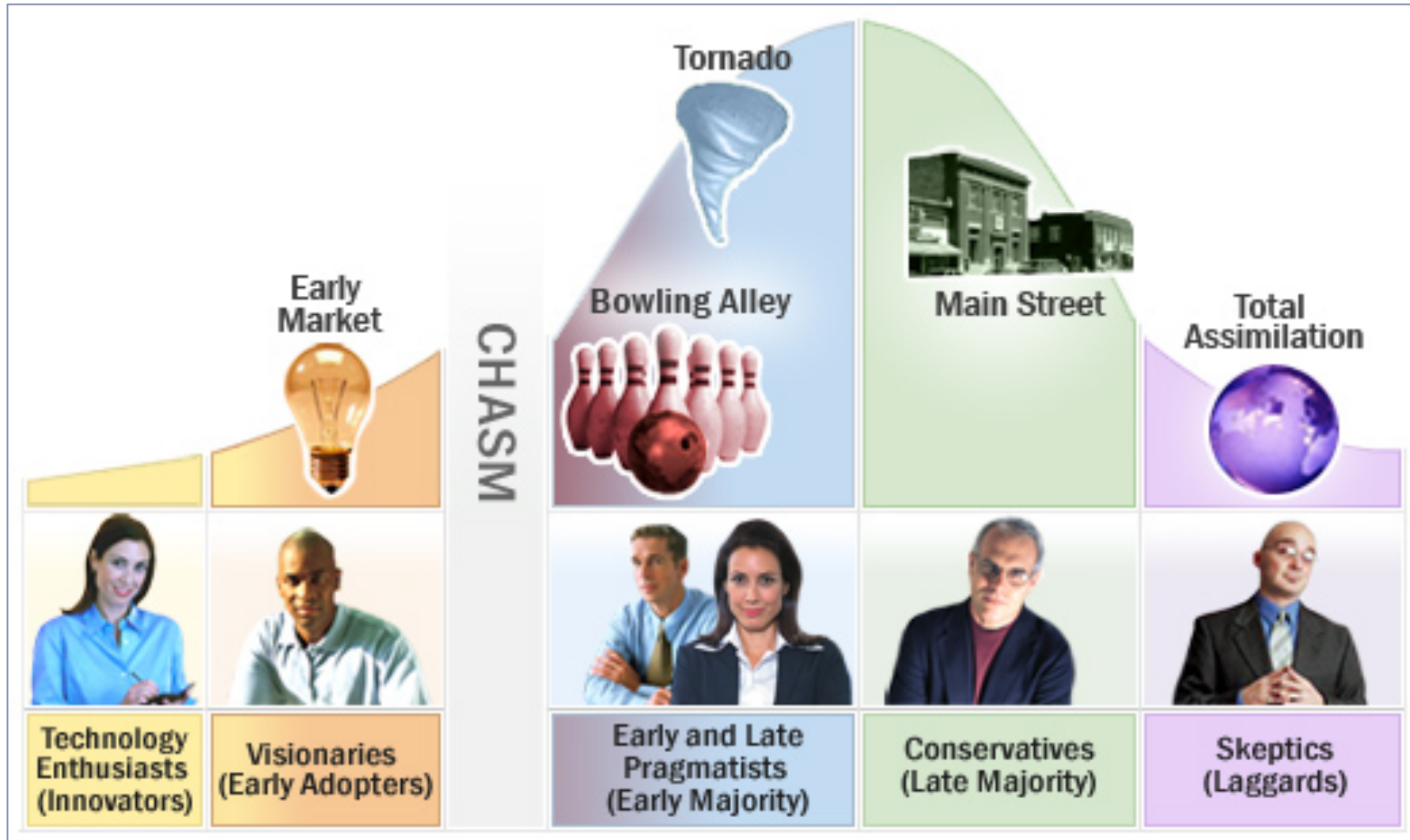


... and difficult choices to make



From <http://blogs.zdnet.com/Hinchcliffe>

# The path to technology uptake – Where are we with e-Infrastructures ?



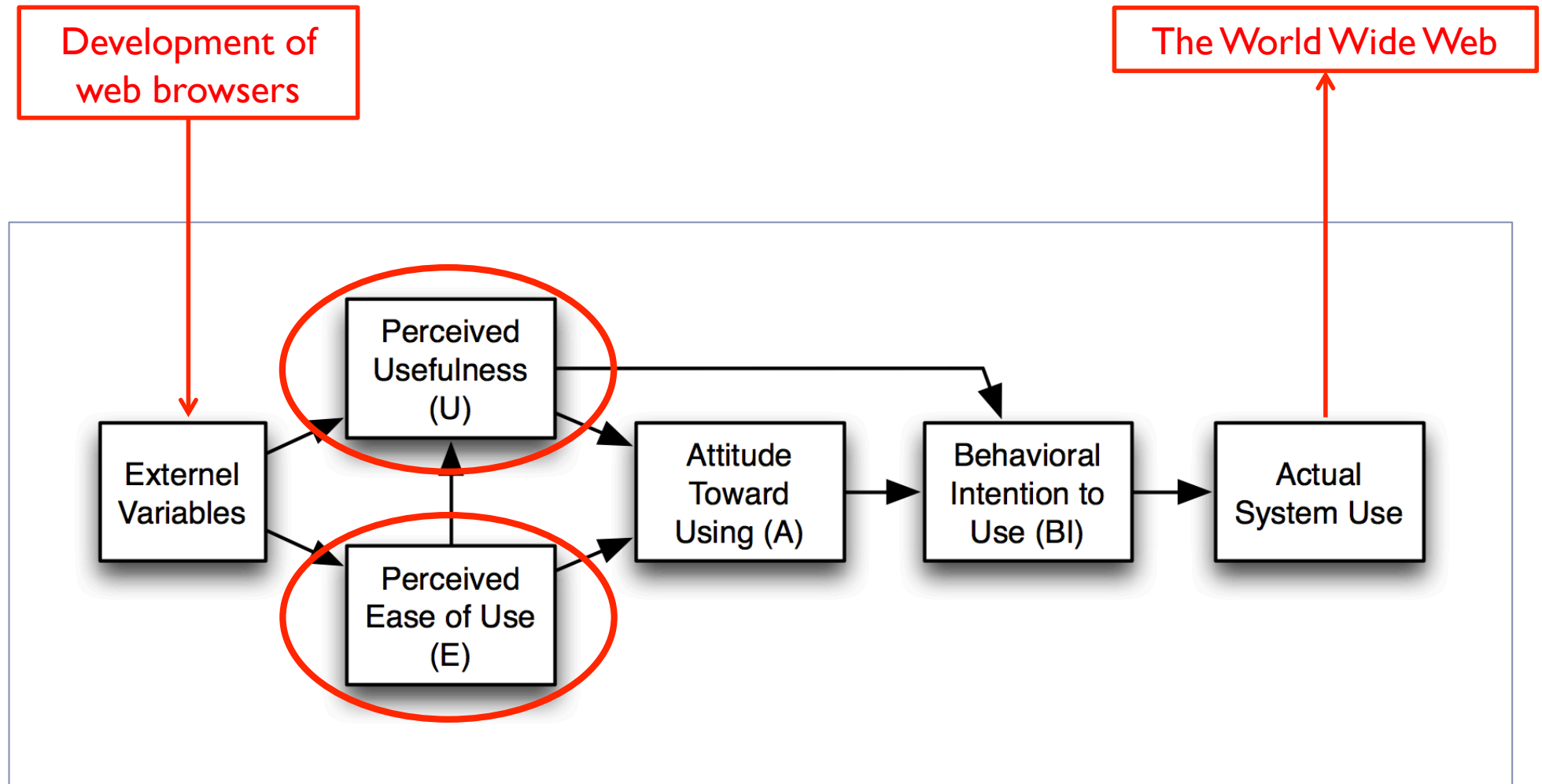
The Rogers "bell-shape" curve - Rogers, E. M. (1962), "Diffusion of Innovations", Glencoe: Free Press.

# Interoperability – Does this definition apply to e-Infrastructures ?

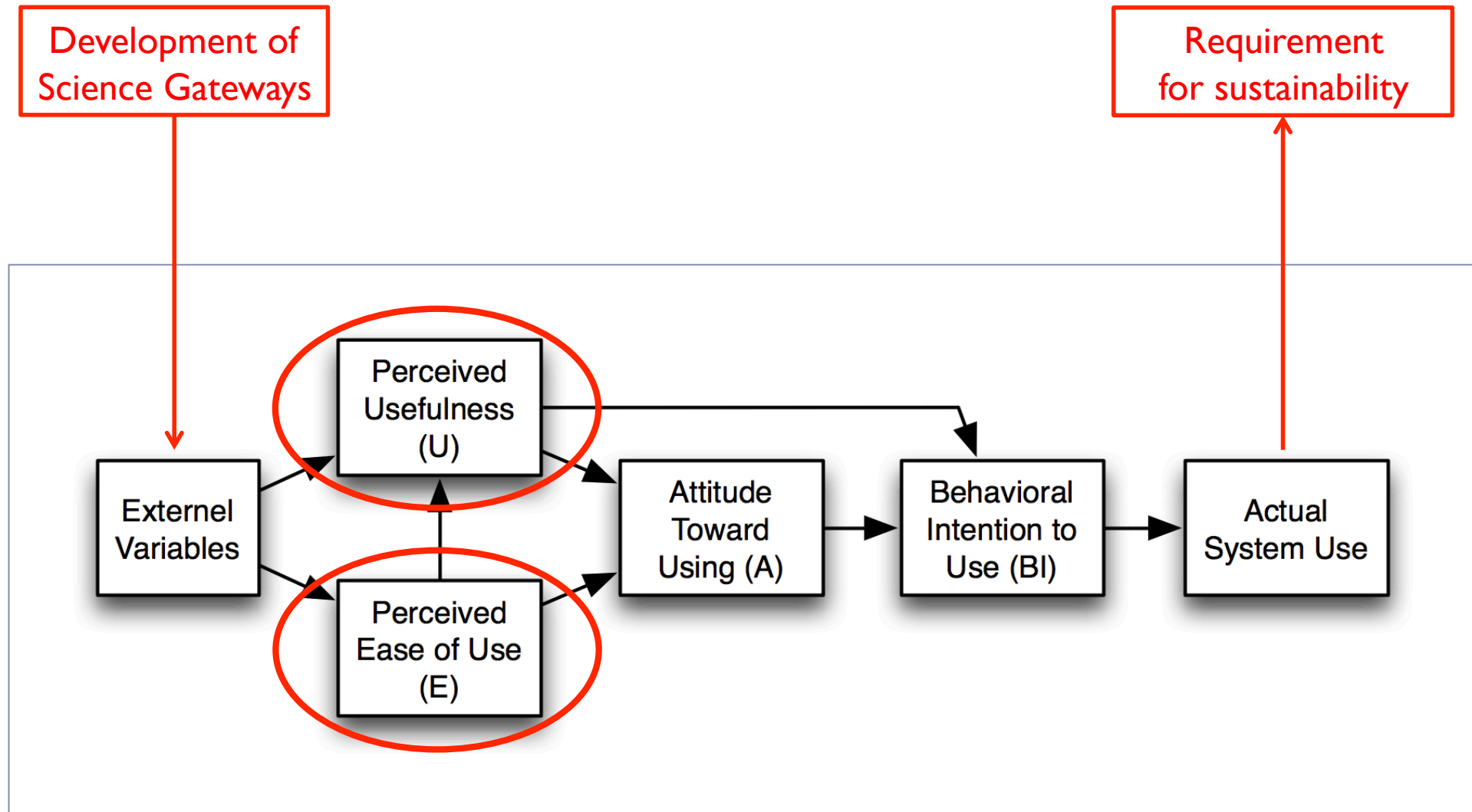
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- ▶ **Interoperability** is a property referring to *the ability of diverse systems and organizations to work together* (inter-operate). The term is often used in a technical systems engineering sense, or alternatively in a broad sense, taking into account social, political, and organizational factors that impact system to system performance;
  - ▶ According to ISO/IEC 2382-01 (*Information Technology Vocabulary, Fundamental Terms*), **interoperability** is "*The capability to communicate, execute programs, or transfer data among various functional units in a manner that requires the user to have little or no knowledge of the unique characteristics of those units*".
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# IT acceptance model – **the Web**



# IT acceptance model – **the Grid**

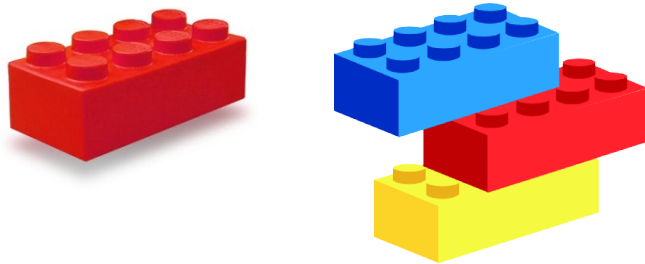


Davis, F. D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly* 13(3): 319–340

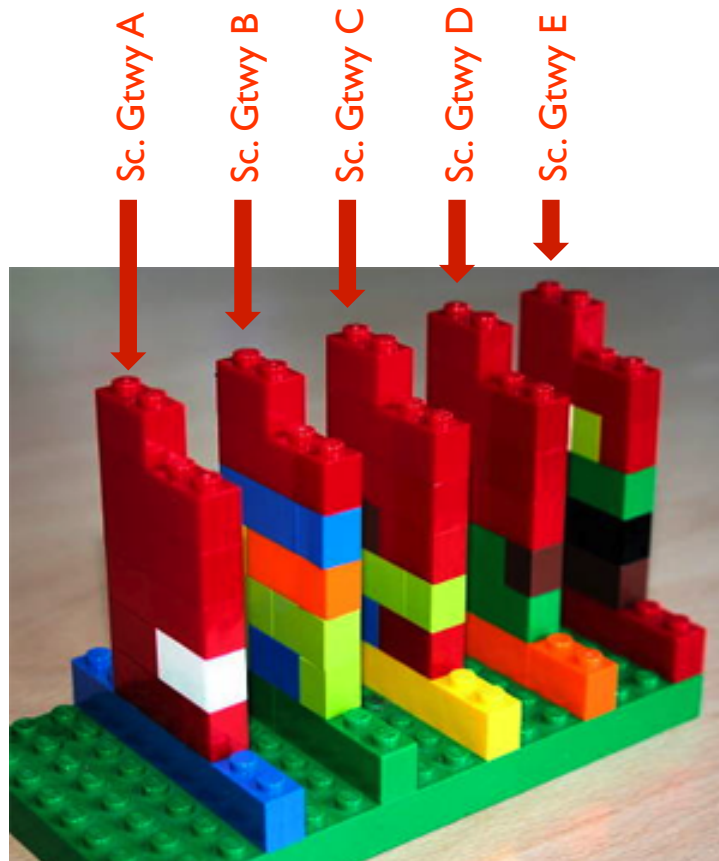
# Community-driven web portals have started to integrate Grid Tools and Applications



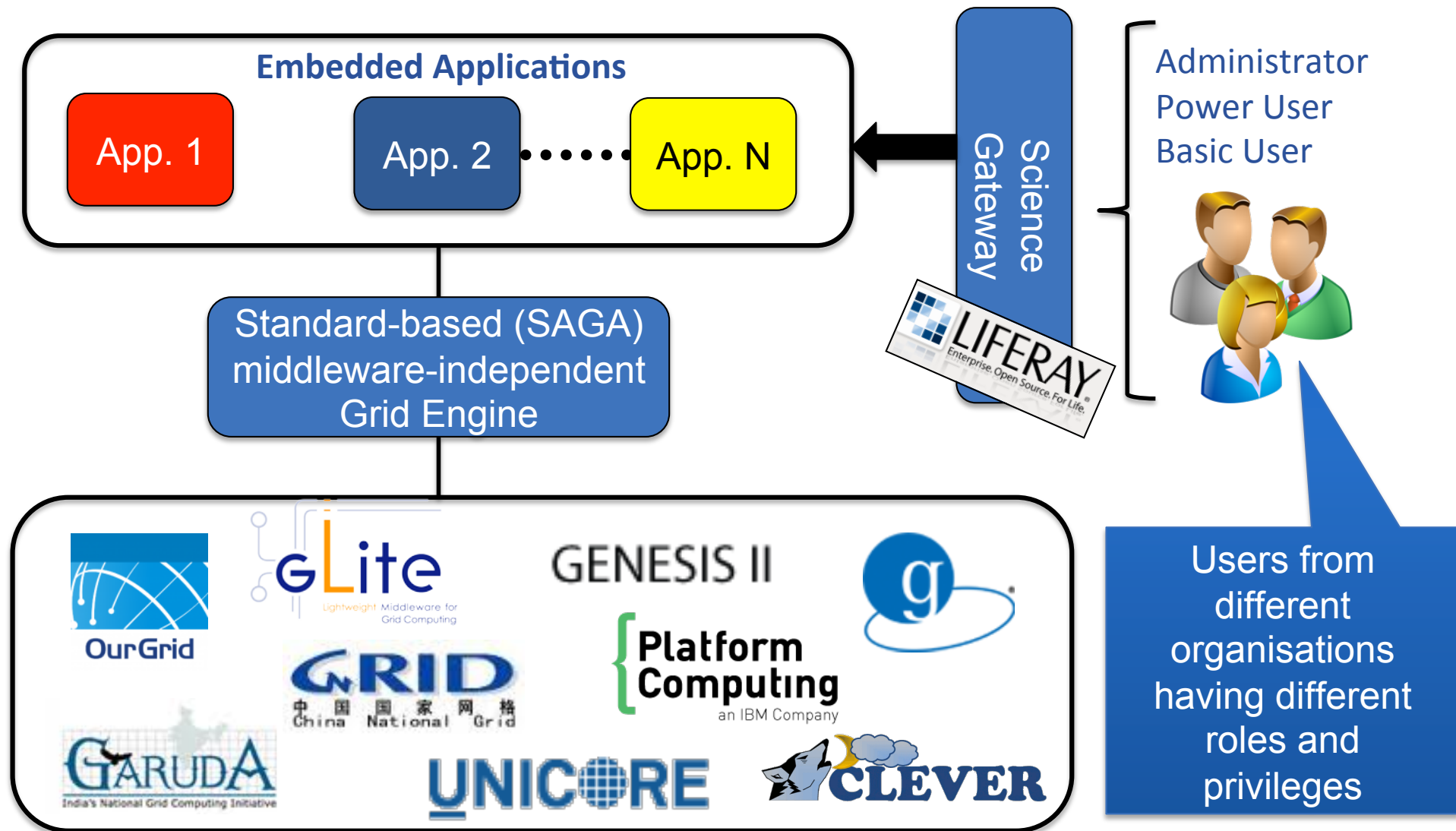
# Primary requirement: building Science Gateways should be like playing with



- **Standards**
- **Simplicity**
- **Easiness of use**
- **Re-usability**

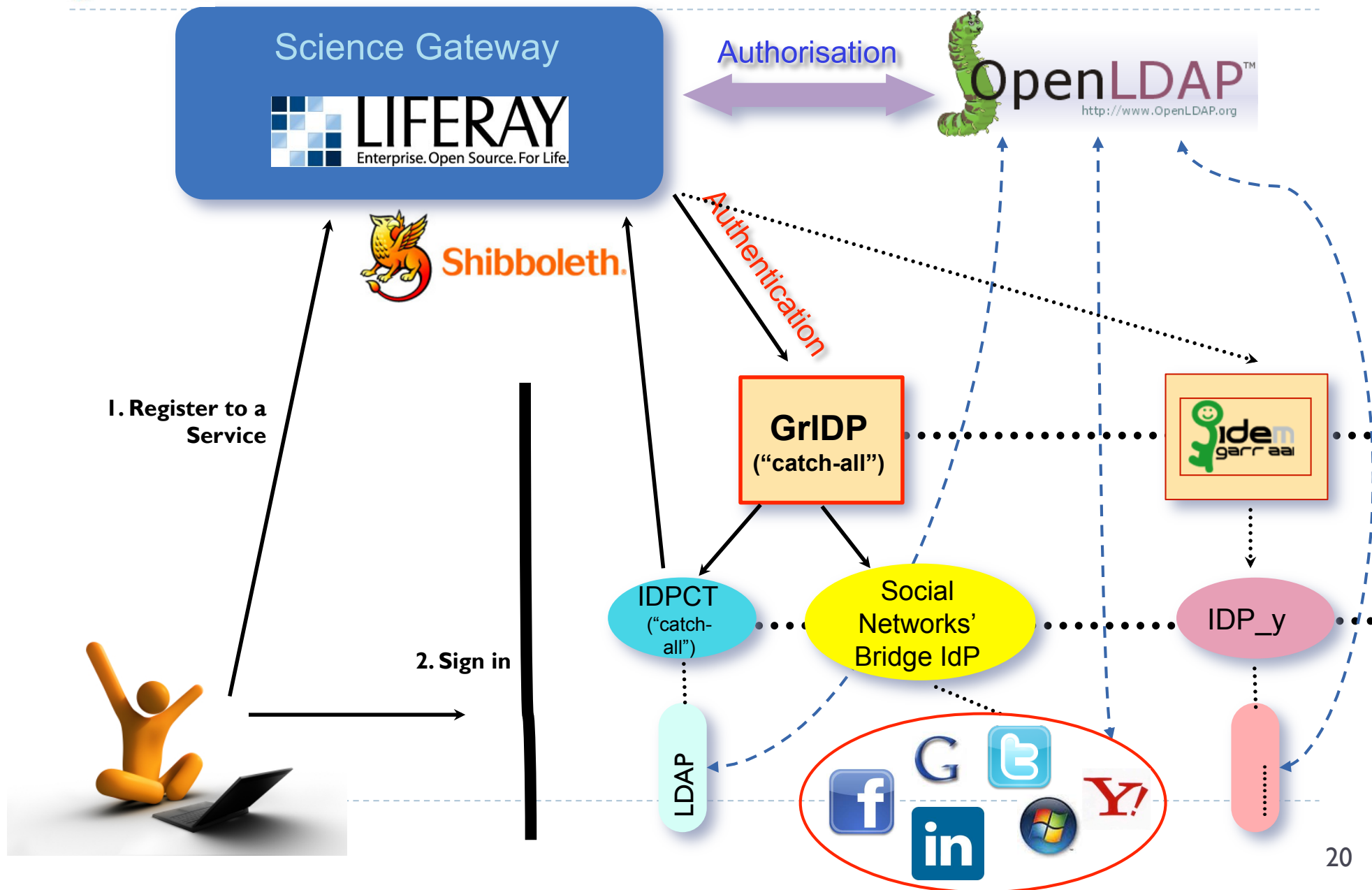


# The Catania Science Gateway framework



► **Middleware supported so far**

# AuthN & AuthZ Schema



# Official Identity Federations currently supported by Catania Science Gateways



**IdFMex**

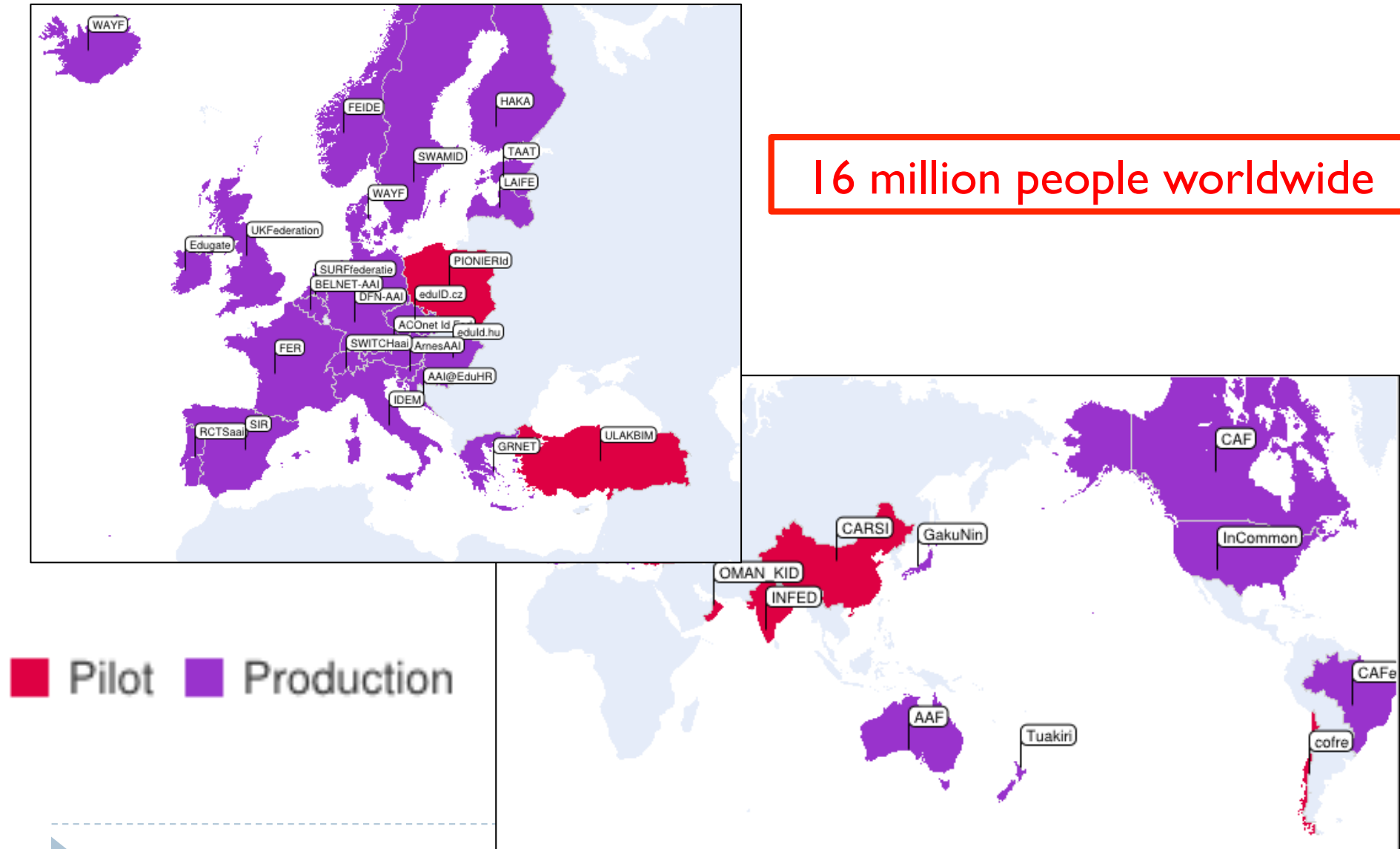


To be created  
26-30 Nov



# Identity Federations in the world

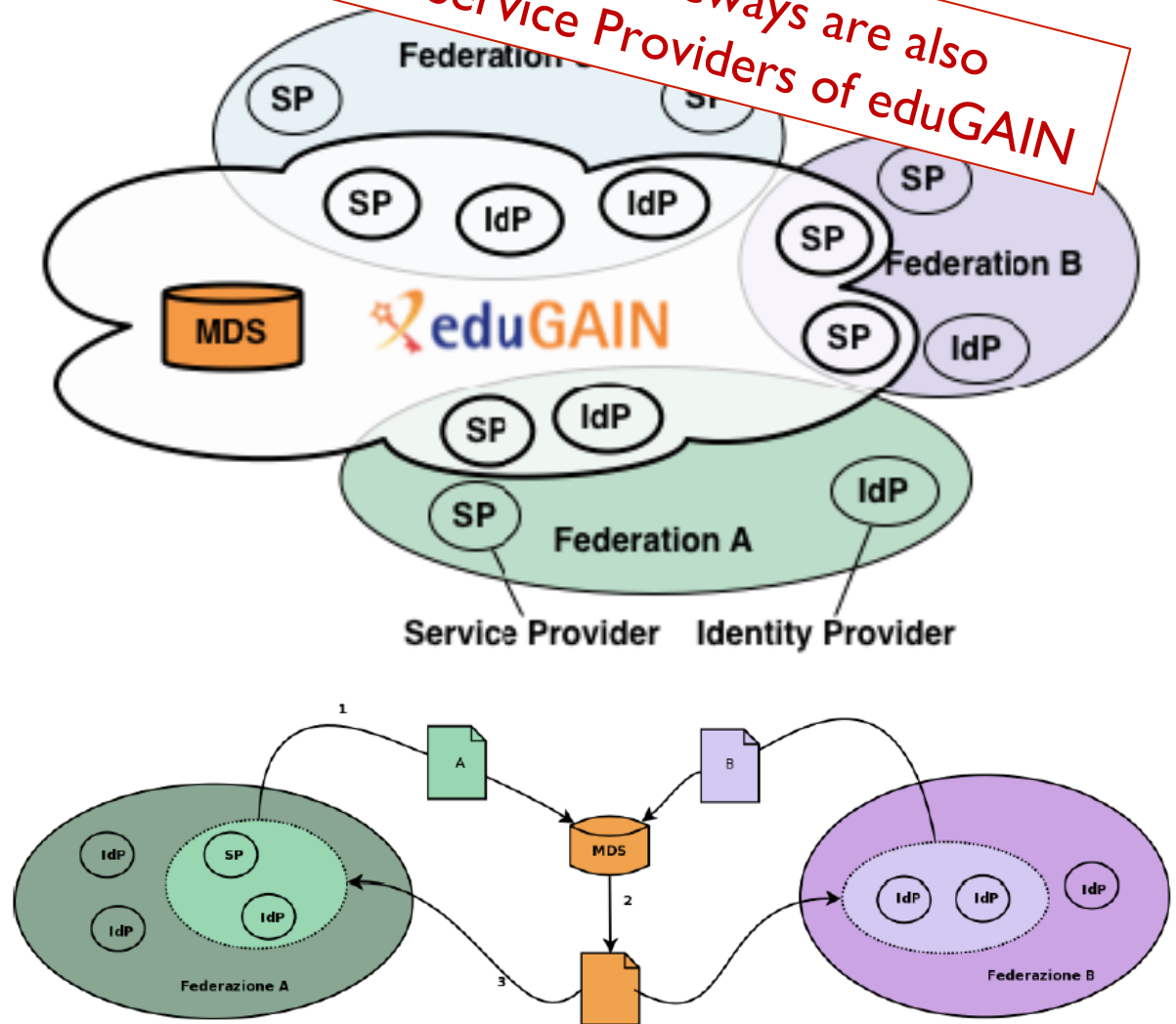
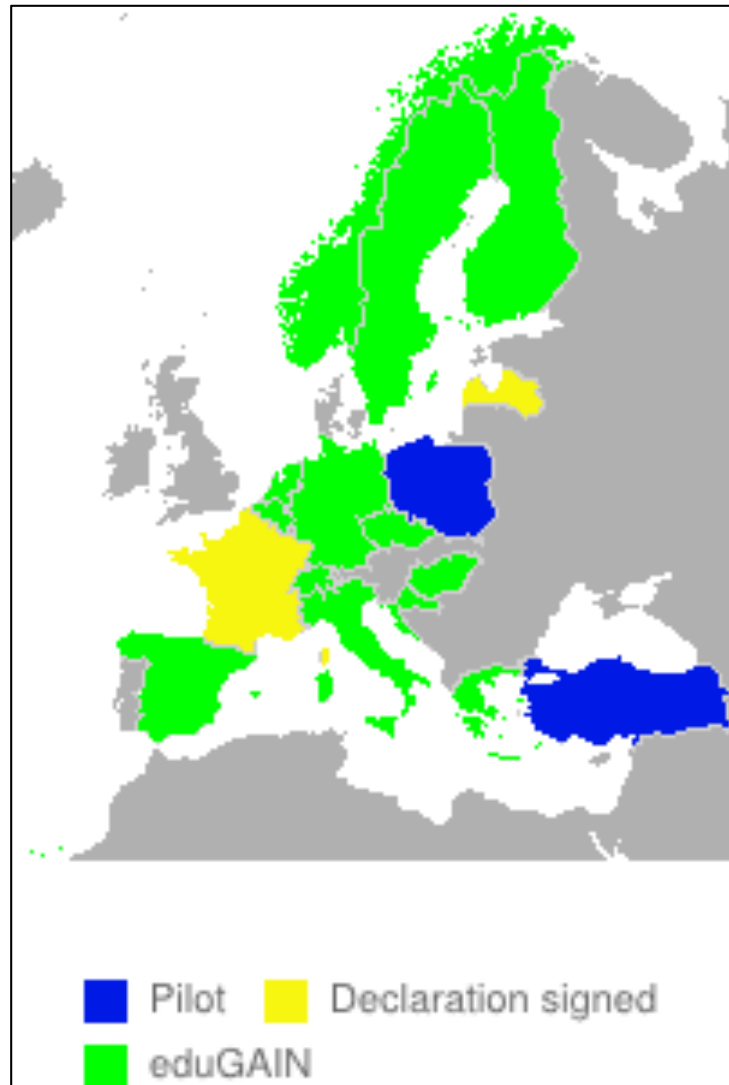
(<https://refeds.org>)



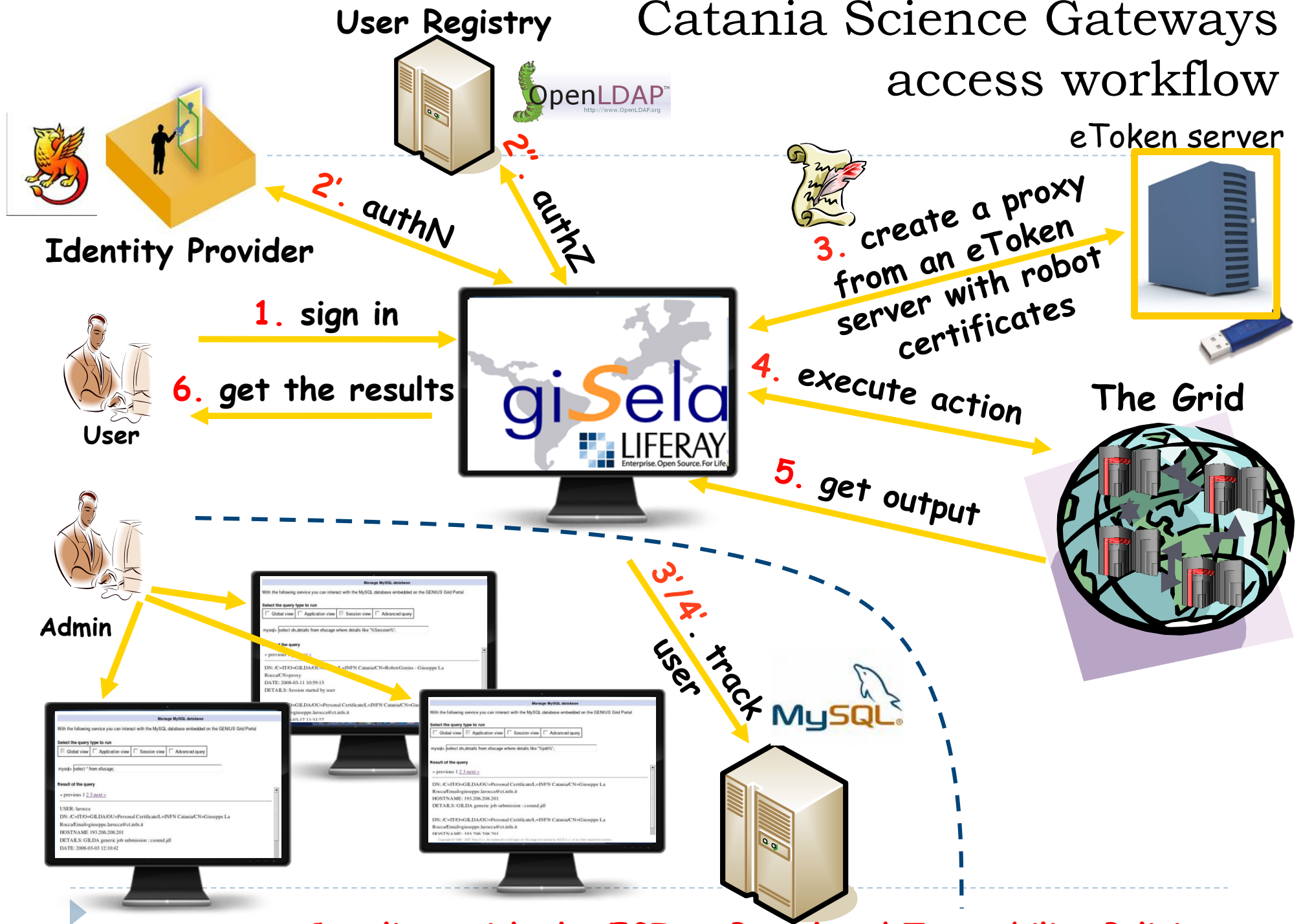
# eduGAIN

([www.edugain.org](http://www.edugain.org))

*Catania Science Gateways are also registered as Service Providers of eduGAIN*



# Catania Science Gateways access workflow



**Compliant with the EGI.eu Portal and Traceability Policies** 24

# The CHAIN Worldwide Interoperability Demo

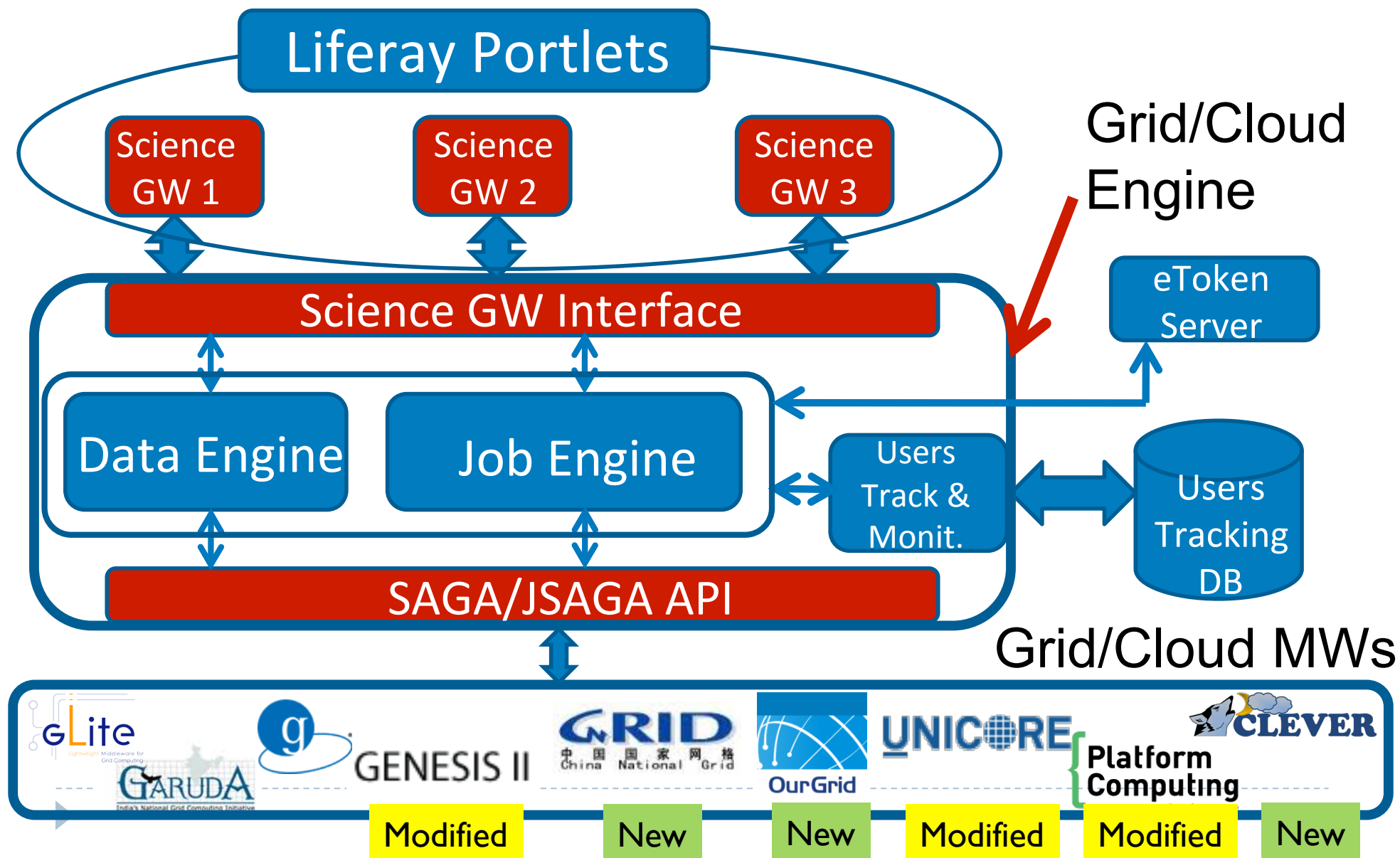
(<http://science-gateway.chain-project.eu>)

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- ▶ To demonstrate that:
  - ▶ e-Infrastructures can be made interoperable to each other at user application level using standards
    - ▶ with the meaning of interoperability given in slide 14;
  - ▶ VRC-specific applications can be submitted from anywhere and run everywhere



# The Catania Grid & Cloud Engine

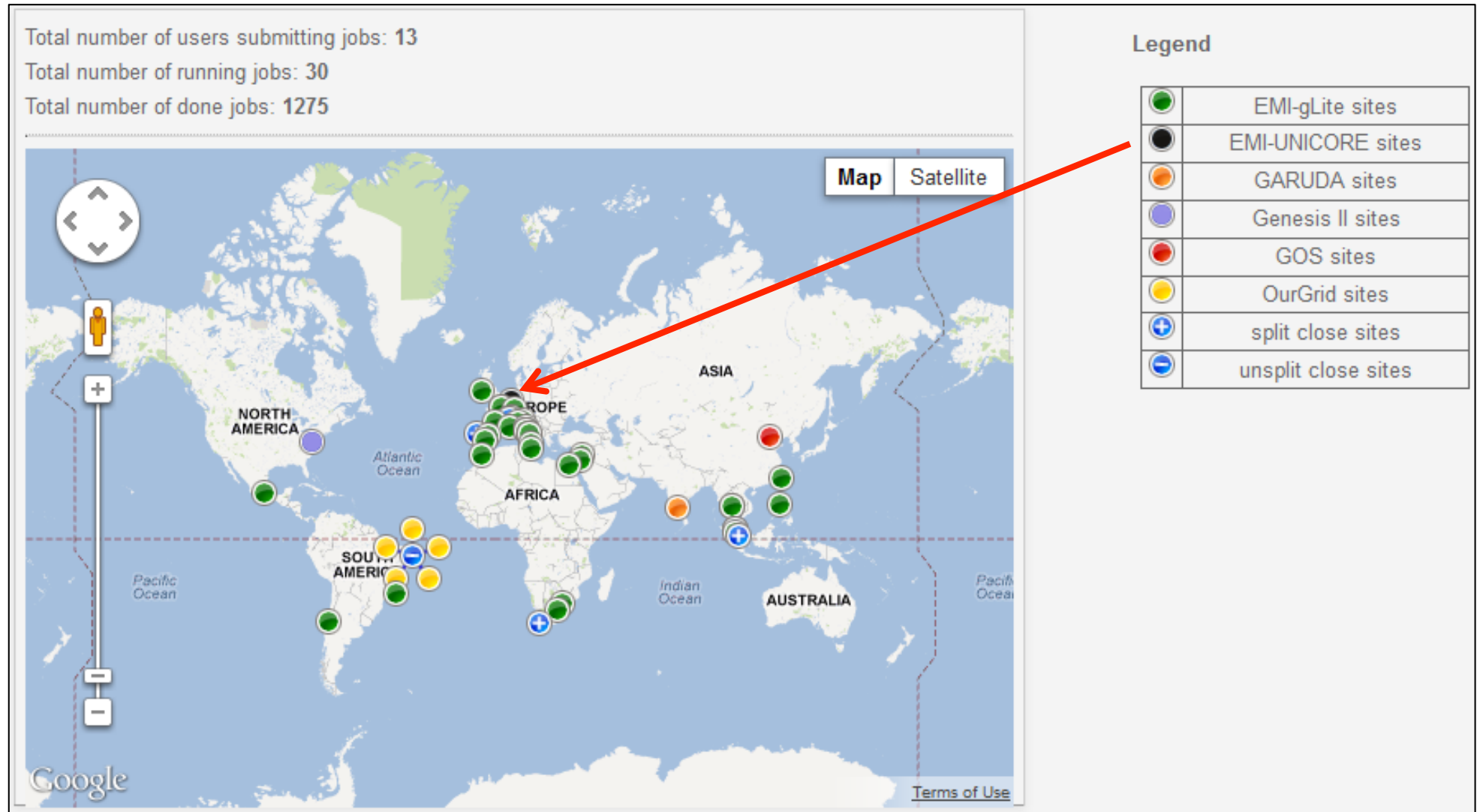


# CHAIN Demo Contributors



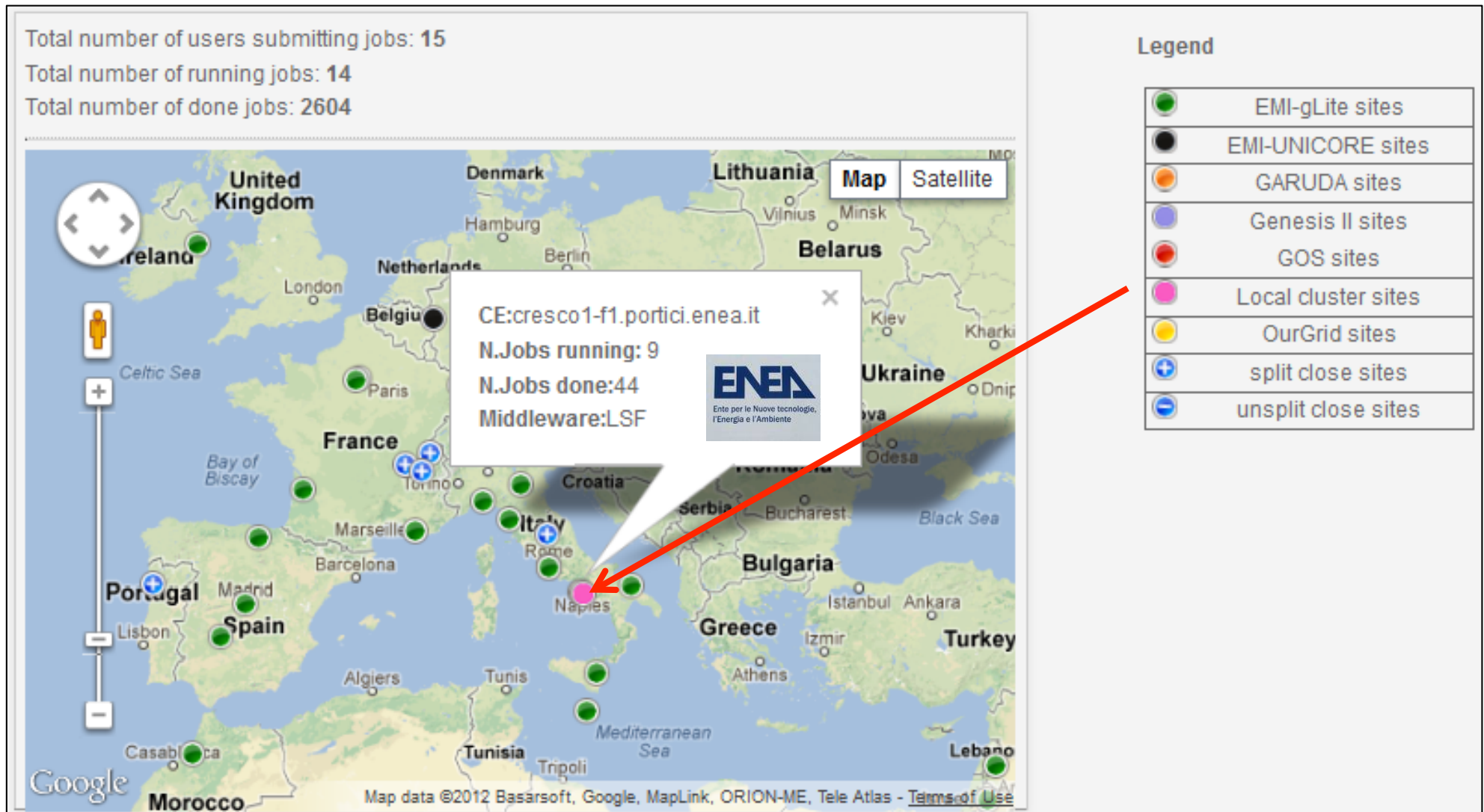
# CHAIN Demo Status

(<http://science-gateway.chain-project.eu/demo-status>)



# CHAIN Demo Status

(<http://science-gateway.chain-project.eu/demo-status>)



# Science Gateways and clouds – The MyCloud service

chain  
Co-ordination & Harmonisation of Advanced e-INFRASTRUCTURES  
Science Gateway

Welcome Help Demo Applications Demo Status My Workspace **My Cloud** Cloud Services Project Home

My Cloud

Cloud Node(s) ? ↻

infn-wn-25.ct.pi2s2.it ↻

- agInfraSrv3
- myCloudStation-8745

infn-wn-53.ct.pi2s2.it ↻

infn-wn-51.ct.pi2s2.it ↻

- AGLRTTool
- myCloudStation-8619

Cloud Service(s)

- AGLRTTool
- agInfraSrv2
- agInfraSrv3
- myCloudStation

Powered by:

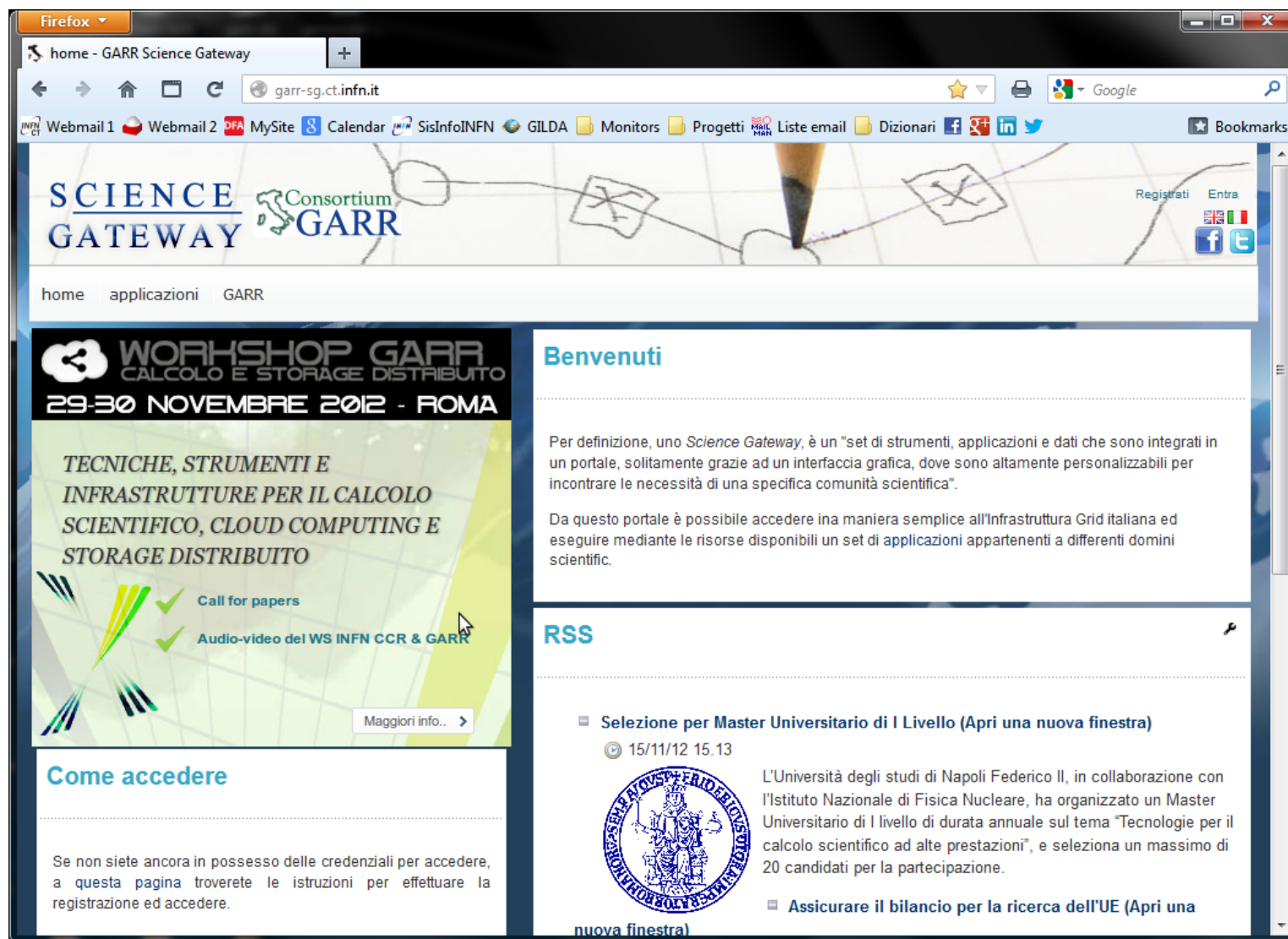


# Summary and conclusions

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- ▶ e-Infrastructures can be very beneficial platforms for many users, provided they are really «easy to use» and users are at their centre
  - ▶ The Catania Science Gateway framework, with support for Identity Federations changes the way Grid infrastructures are used, hugely widening their potential user base across continents and organisations, especially non-IT experts and the “citizen scientist”
  - ▶ The adoption of standards (JSR 286, SAGA, SAML, etc.) represents a concrete investment towards sustainability
  - ▶ The CHAIN worldwide interoperability program demonstrates that, through Science Gateways based on standards, users can really access global e-Infrastructures in a seamless and ubiquitous way independently of the underlying middleware (local, volunteering, grid, cloud)
  - ▶ **We propose the use the same approach to gather distributed resources from all over Italy and build a truly Italian e-Infrastructure, yet respecting local specificities and exploiting competences of all organisations interested in participating in this endeavour**
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# The GARR Science Gateway



The screenshot shows the GARR Science Gateway website in a Firefox browser window. The address bar displays `garr-sg.ct.infn.it`. The browser's toolbar includes various icons for navigation and search. The website's header features the "SCIENCE GATEWAY Consortium GARR" logo and navigation links for "home", "applicazioni", and "GARR". A banner for the "WORKSHOP GARR CALCOLO E STORAGE DISTRIBUITO" is prominently displayed, dated "29-30 NOVEMBRE 2012 - ROMA". The banner includes the text "TECNICHE, STRUMENTI E INFRASTRUTTURE PER IL CALCOLO SCIENTIFICO, CLOUD COMPUTING E STORAGE DISTRIBUITO" and links for "Call for papers" and "Audio-video del WS INFN CCR & GARR". Below the banner, a section titled "Come accedere" provides instructions for users who do not have credentials. The main content area is divided into two columns. The left column contains a "Benvenuti" (Welcome) message and an "RSS" feed. The right column features a news item titled "Selezione per Master Universitario di I Livello (Apri una nuova finestra)" dated "15/11/12 15.13", which includes the logo of the University of Naples Federico II and a brief description of the master's program. Below the news item, there is a link to "Assicurare il bilancio per la ricerca dell'UE (Apri una nuova finestra)".

home - GARR Science Gateway

garr-sg.ct.infn.it

Webmail 1 Webmail 2 DFA MySite Calendar SisInfoINFN GILDA Monitors Progetti Liste email Dizionari f g+ in t

SCIENCE GATEWAY Consortium GARR

home applicazioni GARR

WORKSHOP GARR  
CALCOLO E STORAGE DISTRIBUITO  
29-30 NOVEMBRE 2012 - ROMA

TECNICHE, STRUMENTI E  
INFRASTRUTTURE PER IL CALCOLO  
SCIENTIFICO, CLOUD COMPUTING E  
STORAGE DISTRIBUITO

Call for papers  
Audio-video del WS INFN CCR & GARR

Maggiori info...

Come accedere

Se non siete ancora in possesso delle credenziali per accedere, a questa pagina troverete le istruzioni per effettuare la registrazione ed accedere.

Benvenuti

Per definizione, uno Science Gateway, è un "set di strumenti, applicazioni e dati che sono integrati in un portale, solitamente grazie ad un interfaccia grafica, dove sono altamente personalizzabili per incontrare le necessità di una specifica comunità scientifica".

Da questo portale è possibile accedere in maniera semplice all'infrastruttura Grid italiana ed eseguire mediante le risorse disponibili un set di applicazioni appartenenti a differenti domini scientifici.

RSS

Selezione per Master Universitario di I Livello (Apri una nuova finestra)

15/11/12 15.13

L'Università degli studi di Napoli Federico II, in collaborazione con l'Istituto Nazionale di Fisica Nucleare, ha organizzato un Master Universitario di I livello di durata annuale sul tema "Tecnologie per il calcolo scientifico ad alte prestazioni", e seleziona un massimo di 20 candidati per la partecipazione.

Assicurare il bilancio per la ricerca dell'UE (Apri una nuova finestra)

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**Thank you !**