

# Introduction to EGEE and application development concepts on gLite

*Gergely Sipos [sipos@sztaki.hu](mailto:sipos@sztaki.hu)*

*Training and induction*

*Application Porting Support*

*MTA SZTAKI (Hungarian Academy of Sciences)  
Budapest*

*[www.lpds.sztaki.hu](http://www.lpds.sztaki.hu)*

## Laboratory of Parallel and Distributed Systems

Research Division of Academy of Sciences from 1998

Head: Prof. Péter Kacsuk

21 members: 12 full-time/9 part-time

[www.lpds.sztaki.hu](http://www.lpds.sztaki.hu)

Funding member of the Hungarian Grid Competence Centre

Co-ordination of Grid activities in Hungary

[www.mgkk.hu](http://www.mgkk.hu)

**EGEE Training and user support centre since 2004**



- **What is EGEE, how to get access**
  - The project
  - The grid
  - The middleware
  - The community
  - The future: European Grid Infrastructure
- **Application development on the EGEE Grid**
  - Command line
  - P-GRADE Portal
- **Demo**
- **Next steps**

- **Aim of EGEE:**  
*“to establish a seamless European Grid infrastructure for the support of the European Research Area (ERA)”*

- **EGEE**

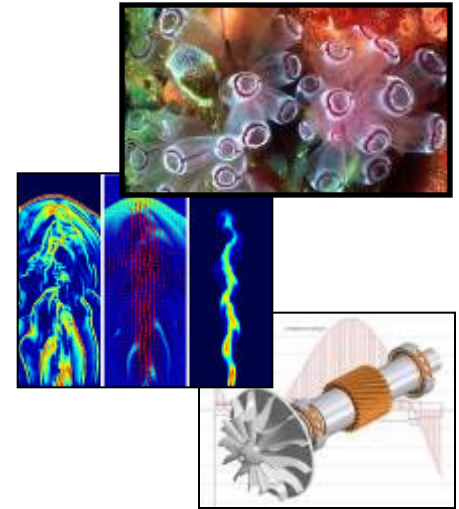
- 1 April 2004 – 31 March 2006
- 71 partners in 27 countries, federated in regional Grids

- **EGEE-II**

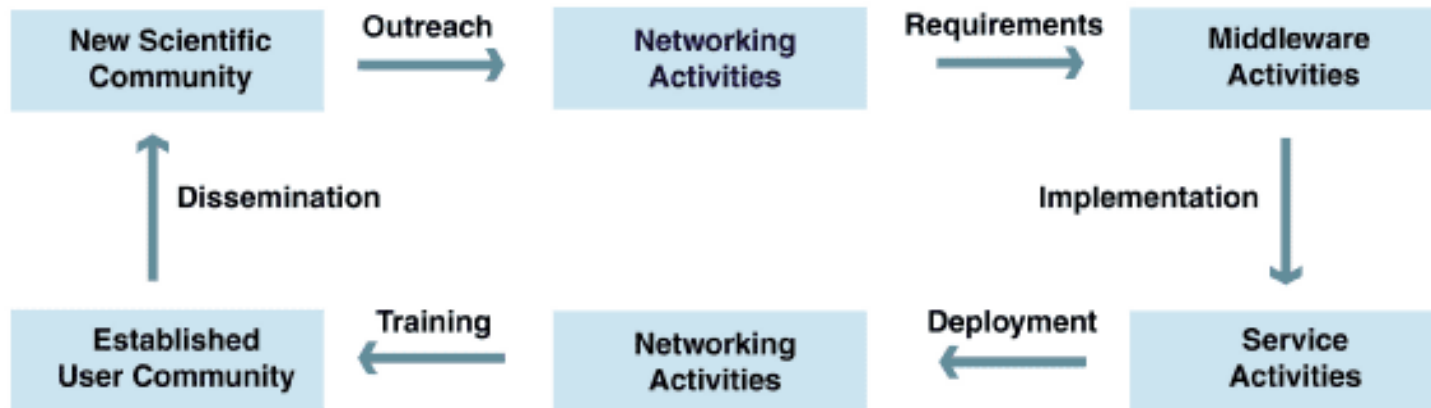
- 1 April 2006 – 30 April 2008
- Expanded consortium

- **EGEE-III**

- 1 May 2008 – 30 April 2010
- Transition to sustainable model:  
 European Grid Infrastructure (EGI)



Duration: 2 years  
 EC co-funding: 32 Million €  
 Total budget: ~47 Million € + ~50 Million € computing equipment  
 Total effort: 9132 person months (~382 FTE)



17,000 users

139,000 CPUs (cores)

25Pb disk

39Pb tape

12 million jobs/month

+45% in a year

268 sites

+5% in a year

48 countries

+10% in a year

162 VOs

+29% in a year

**Real Time Monitor:**

<http://gridportal.hep.ph.ic.ac.uk/rtm>

Imperial College  
London

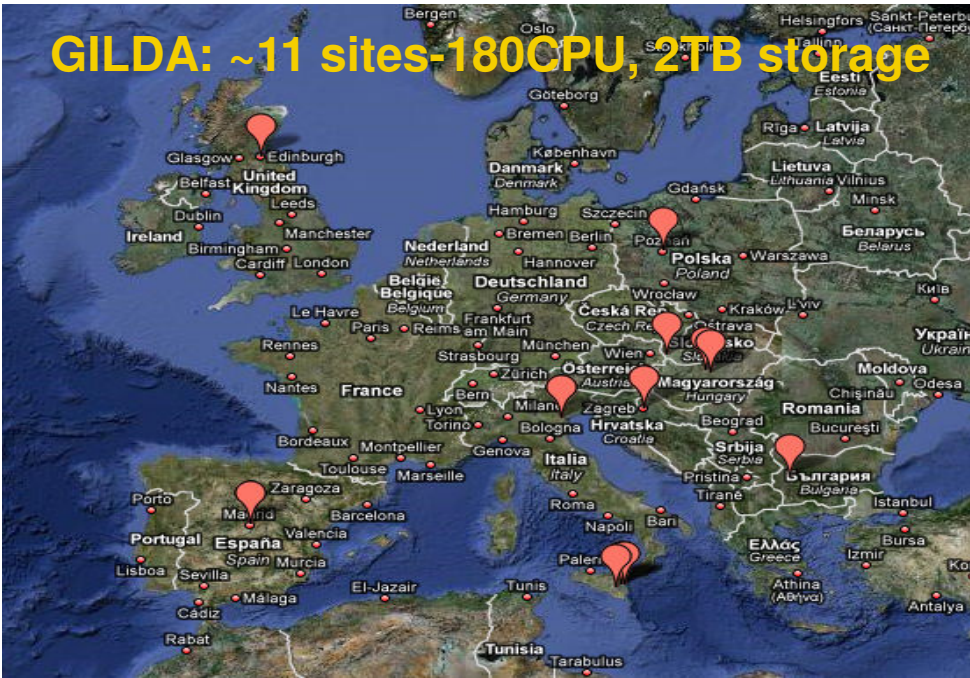


**GridPP**  
UK Computing for Particle Physics

- **Production service**
  - Scaling up the infrastructure with resource centres around the globe
  - Running only well-tested and reliable middleware
  - 268 sites, 48 countries, ~139.000 CPUs (cores), ~25 PB disk
  - Separated into ~160 Virtual Organizations
  - Operations Portal: <http://cic.gridops.org/>

- **Pre-production service**
  - Run in parallel with the production service (restricted number of sites)
  - First deployment of new versions of the *gLite middleware*

- **Training-Infrastructure - GILDA**
  - Complete suite of Grid elements
  - Everyone can register and use GILDA for training and testing
  - <https://gilda.ct.infn.it/>



## Collaborative projects empower e-science in Asia

- **EUChinaGrid project**

- 01/01/2006 – 31/03/2008



- **EUIndiaGrid project**

- 01/10/2006 – 30/09/2008



- **EUAsiaGrid project**

- 01/04/2008 – 31/03/2010

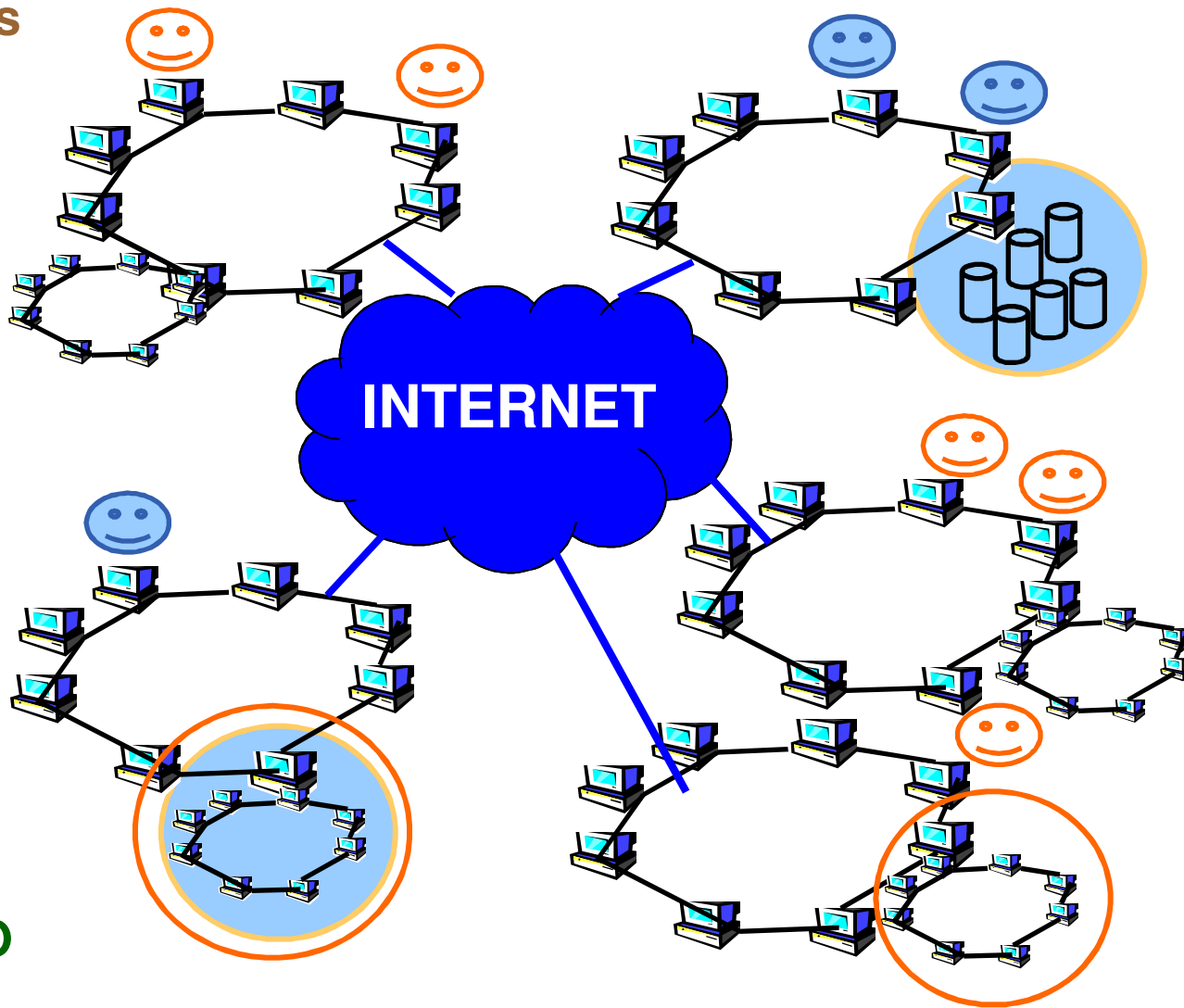
- Main goals:

- To promote the gLite middleware across Asian countries
    - Dissemination, training, and direct user support activities
    - To prepare new trainers in a “training the trainers” action
    - To help setup concrete scientific communities

- Asian partners: AdMU (PH), ANU (AU), ASGC (TW), ASTI (PH), HAIL (TH), IDA (SG), IAMI (VN), ITB (ID), NECTEC (TH), UPM (MY), MIMOS (MY)

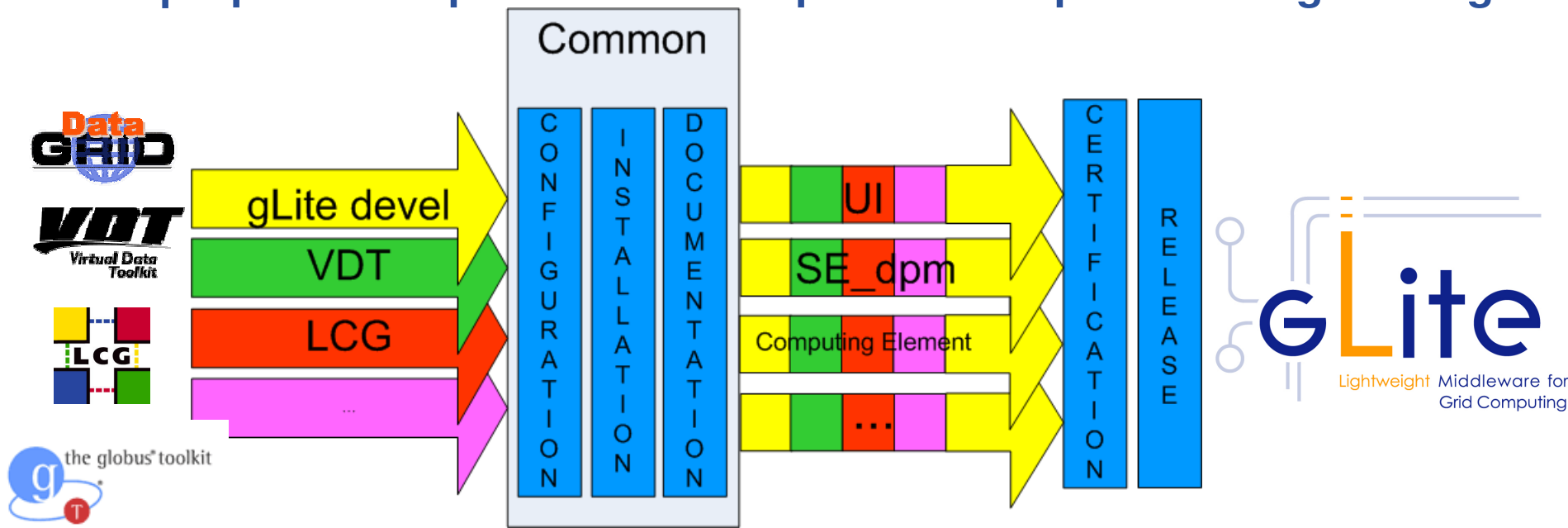


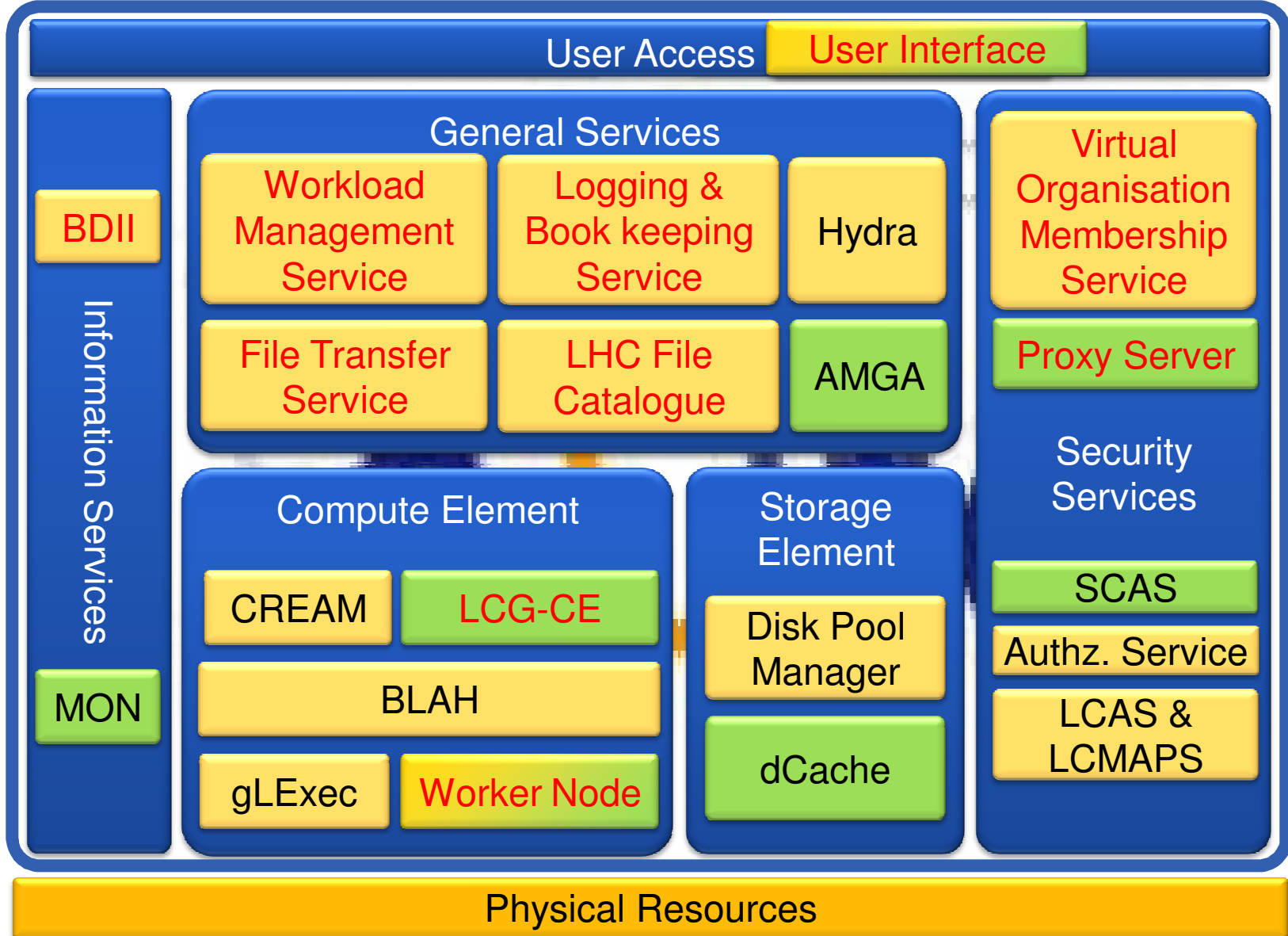
- **gLite middleware runs on each EGEE site to provide**
  - Data services
  - Computation services
  - Security service
- **EGEE resources and users form Virtual organisations (VO): basis for collaboration**
- **Distributed services (both people and software) enable a VO**





- The current release is gLite 3.1
- Compatible with Scientific Linux v4, v5, under porting to Debian
- gLite is...
  - A distribution
  - With its own large development effort
- It is updated almost every week
- Its purpose is to provide a stable platform for production grid usage







The screenshot shows the website for the Hungrid Virtual Organization. The browser title is "Hungrid VO - Windows Internet Explorer" and the address bar shows "http://grid.kfki.hu/hungrid/index.html". The website header features the text "A Hungrid Virtuális Szervezet" and the EGEE logo "Enabling Grids for E-science". A navigation menu includes links for "Főoldal", "Szolgáltatások", "Regisztráció", "Egyéni felhasználók", "Intézményeknek", "GyIK", "Linkek", and "Kapcsolat". The main content area has a sub-header "A Hungrid Virtuális Szervezet" followed by several paragraphs of text describing the organization's mission and services. An image of a particle detector is also visible. The footer of the page mentions the European Union's 6th framework program.

## Sites:

- Technical University (BME)
- Science University (ELTE)
- Physics Research Institute (KFKI-RMKI)

## Resources:

- ~ 110 CPU
- ~ 6 TByte storage

## + Portal service:

- SZTAKI

## Members:

- **Any Hungarian researcher**

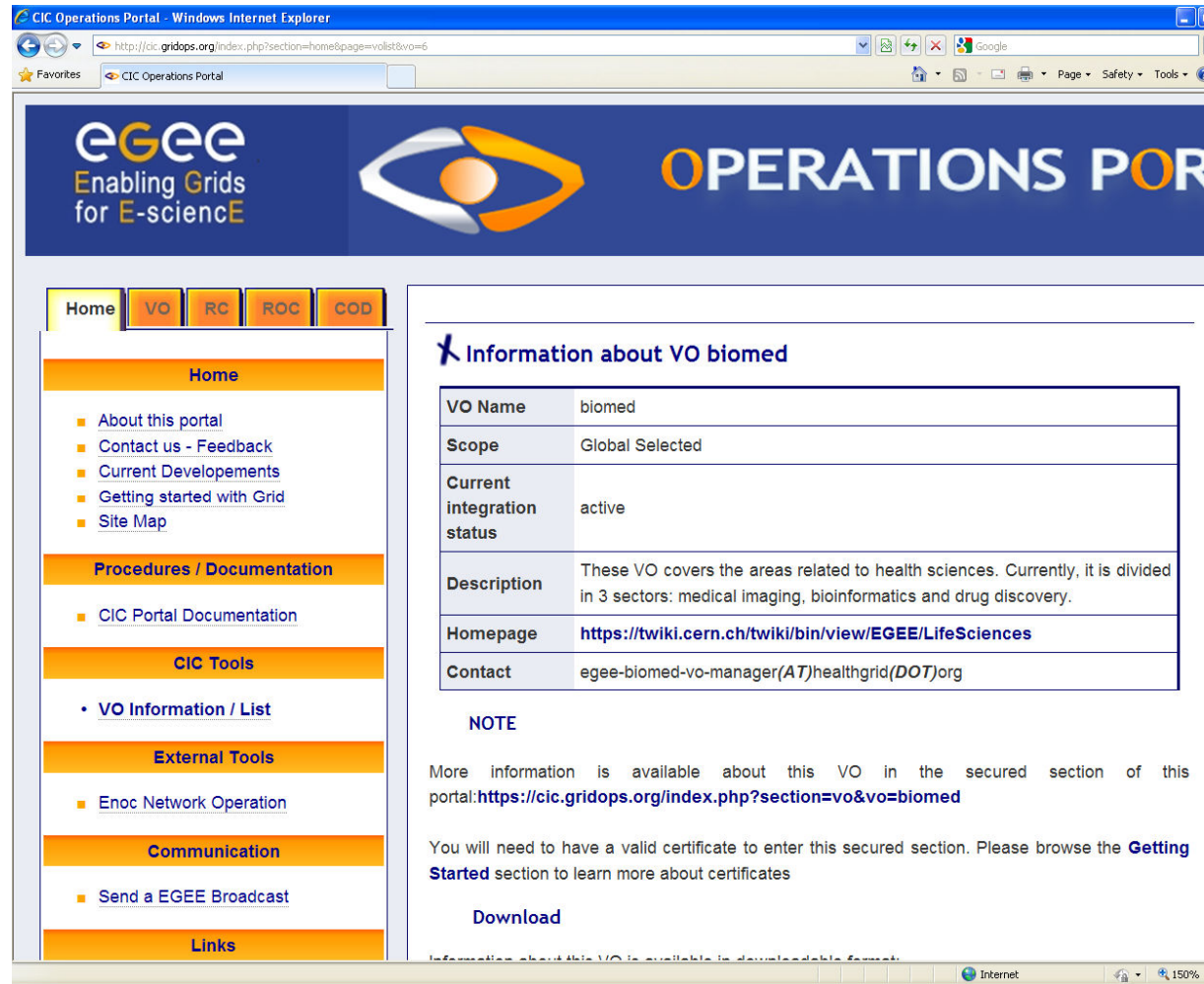
## Sites:

- 36, mostly from Europe and Asia
- 65,584 CPUs
- ~741 TB storage

Portal services are also available

## Members:

- **Anybody working with biomedical applications**
- **No geographical restriction!**
- **Currently 216 members**



CIC Operations Portal - Windows Internet Explorer

<http://cic.gridops.org/index.php?section=home&page=vo1st&vo=6>

Home VO RC ROC COD

**Home**

- About this portal
- Contact us - Feedback
- Current Developements
- Getting started with Grid
- Site Map

**Procedures / Documentation**

- [CIC Portal Documentation](#)

**CIC Tools**

- [VO Information / List](#)

**External Tools**

- [Enoc Network Operation](#)

**Communication**

- [Send a EGEE Broadcast](#)

**Links**

---

### Information about VO biomed

VO Name	biomed
Scope	Global Selected
Current integration status	active
Description	These VO covers the areas related to health sciences. Currently, it is divided in 3 sectors: medical imaging, bioinformatics and drug discovery.
Homepage	<a href="https://twiki.cern.ch/twiki/bin/view/EGEE/LifeSciences">https://twiki.cern.ch/twiki/bin/view/EGEE/LifeSciences</a>
Contact	egee-biomed-vo-manager(AT)healthgrid(DOT)org

**NOTE**

More information is available about this VO in the secured section of this portal: <https://cic.gridops.org/index.php?section=vo&vo=biomed>

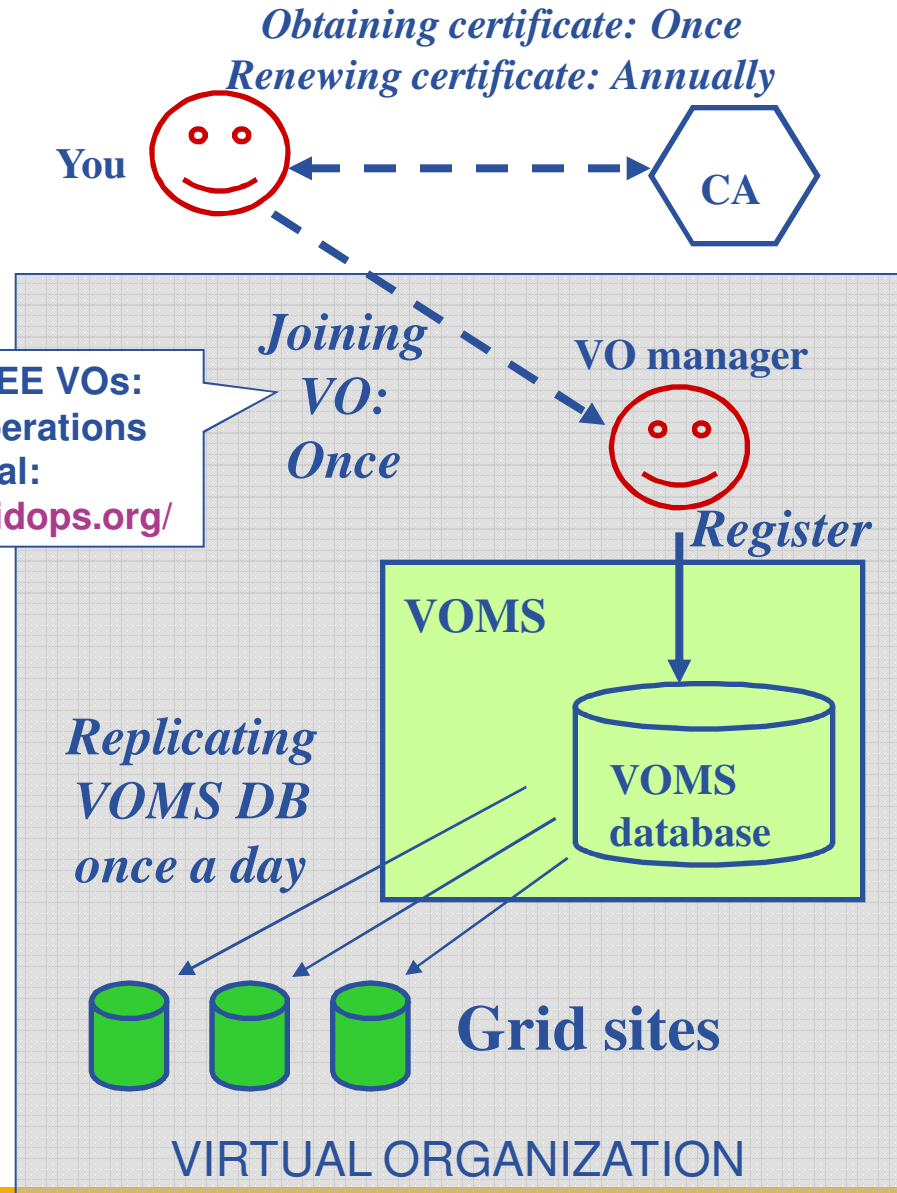
You will need to have a valid certificate to enter this secured section. Please browse the **Getting Started** section to learn more about certificates

**Download**

Information about this VO is available in downloadable format:

- Users (and machines) are identified by **grid certificates**. Certificates issued by **national Certification Authorities (CA)**
- VO Membership Service (VOMS) keeps list of people who are registered to a VO
- **Users' steplist**
  - User obtains certificate from Certification Authority  
<http://www.igtf.net>
  - User registers at the VO
    - usually via a web form
  - VO manager authorizes the user
    - VOMS DB updated
  - The user's identity is replicated onto resources within 24 hours
  - Use the grid through command line or graphical interfaces

List of EGEE VOs:  
On CIC Operations Portal:  
<http://cic.gridops.org/>



<http://igtf.net>

## About the IGTF

[IGTF Charter](#)  
[Tokyo Accord \(2003\)](#)

## Member PMAs and Registries

[APGridPMA](#)  
[EUGridPMA](#)  
[TAGPMA](#)  
[TACAR](#)

## Authentication Profiles

[Classic X.509 CAs](#)  
[Short-Lived Credential Services \(SLCS\)](#)  
[Member Integrated Credential Services](#)

[Download the Distribution](#)  
[Download the Utilities](#)

## Open Grid Forum Relationships

[CA Operations WG](#)  
[OGF Documents](#)

## Links

[Open Grid Forum](#)  
[TERENA TF-EMC2](#)

## The International Grid Trust Federation

The international community is deploying large scale distributed computing grids on a production scale, across organisations, across countries, and across continents, for the advancement of science and engineering. In shaping this common grid infrastructure, many of these grids are relying on common practices, policies and procedures to reliably identify grid subscribers and resources.

The International Grid Trust Federation (IGTF) is a body to establish common policies and guidelines between its Policy Management Authorities (PMAs) members and to ensure compliance to this Federation Document amongst the participating PMAs. The IGTF does not provide identity assertions but instead ensures that within the scope of the [IGTF charter](#) the assertions issued by accredited authorities of any of its member PMAs meet or exceed an authentication profile relevant to the accredited authority.

### Functions and the Trust Anchor Distribution

The IGTF maintains a list of trust anchors, root certificates and related meta-information for all the accredited authorities, i.e., those that meet or exceed the criteria mentioned in the *Authentication Profiles*. The Distribution contains Certificate Revocation List (CRL) locations, contact information, and signing policies.

- [Download the latest update of the Com](#)
- [Download the Distribution Tools and the](#)

### Constituency

The IGTF constituency consists of our three member PMAs: the [APGridPMA](#) covering Asia and the Pacific, the [EUGridPMA](#) covering Europe, the Middle East and Africa, and [The Americas Grid PMA](#) covering Latin America, the Caribbean and North America. All registered members in each regional PMA are also members of the IGTF. These include identity providers, CAs, and their major Relying Parties, such as the international Grid Deployment and Infrastructure projects.

### News

The latest IGTF trust anchor distribution is always available from the PMA web sites: [EUGridPMA](#) and [APGridPMA](#). Please refer to the README and CHANGES files for information about the distribution and its use.

CAs in Asia-Pacific region

The IGTF constituency consists of our three member PMAs: the [APGridPMA](#) covering Asia and the Pacific, the [EUGridPMA](#) covering Europe, the Middle East and Africa, and [The Americas Grid PMA](#) covering Latin America, the Caribbean and North America. All registered members in each regional PMA are also members of the IGTF. These include identity providers, CAs, and their major Relying Parties, such as the international Grid Deployment and Infrastructure

[APGrid PMA home](#)

[APGrid PMA Documents](#)

[Charter](#)

[CAs and Members](#)

[APGrid PMA Membership](#)

[CAs in Asia Pacific](#)

[Related Links](#)

[International Grid PMA](#)

[EU Grid PMA](#)

[DOE Grid PMA](#)

[The Americas Grid PMA](#)

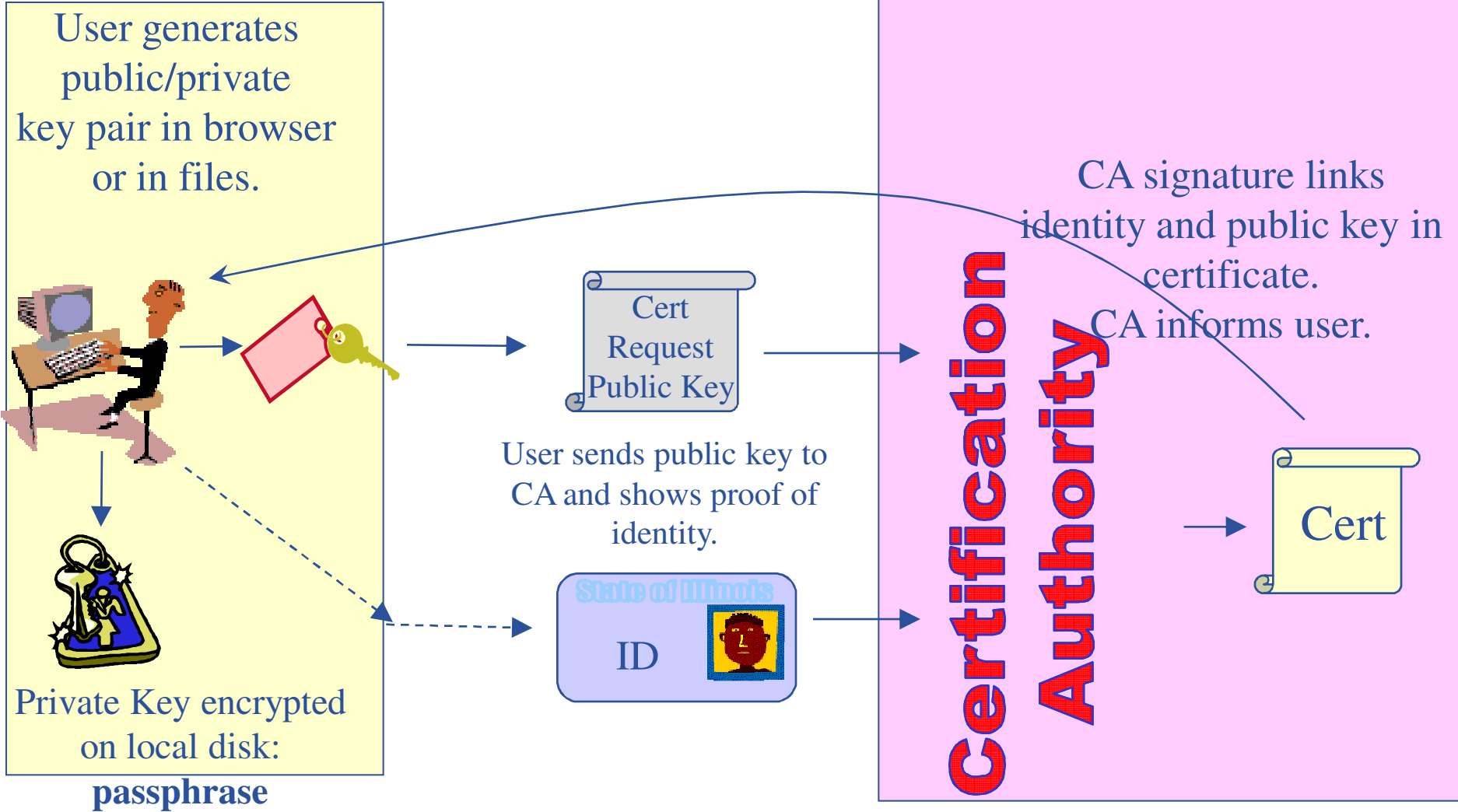
[ApGrid](#)

[PRAGMA](#)

## Certificate Authorities

### Production-Level CAs

CA	Contact	CA's Cert	Signing Policy	CRL	CP/CPS	Other Info
AIST GRID CA, Japan	<a href="#">Yoshio Tanaka</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>
APAC Grid CA, Australia	<a href="#">David Bannon</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>
ASGC CA, Taiwan	<a href="#">Eric Yen</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>
CNIC Grid CA	<a href="#">Kai Nan</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>
SDG CA	<a href="#">Kai Nan</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>
HKU Grid CA, Hong Kong	<a href="#">Cheung Frankie Fai Ting</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>
IGCA, India	<a href="#">Subrata Chattopodhyay</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>
IHEP CA, China	<a href="#">SUN, Gongxing</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>
KEK Grid CA, Japan	<a href="#">Takashi Sasaki</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>
KISTI Grid CA, Korea	<a href="#">Sangwan Kim</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>
NAREGI CA, Japan	<a href="#">Kento Aida</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>
NCHC Grid CA, Taiwan	<a href="#">Weicheng Huang</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>
NECTEC GOC CA, Thailand	<a href="#">Sornthep Vannarat</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>
NGO-Netrust CA, Singapore	<a href="#">Jon Lau</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>
PRAGMA-UCSD CA, USA	<a href="#">Cindy Zheng</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>	<a href="#">here</a>





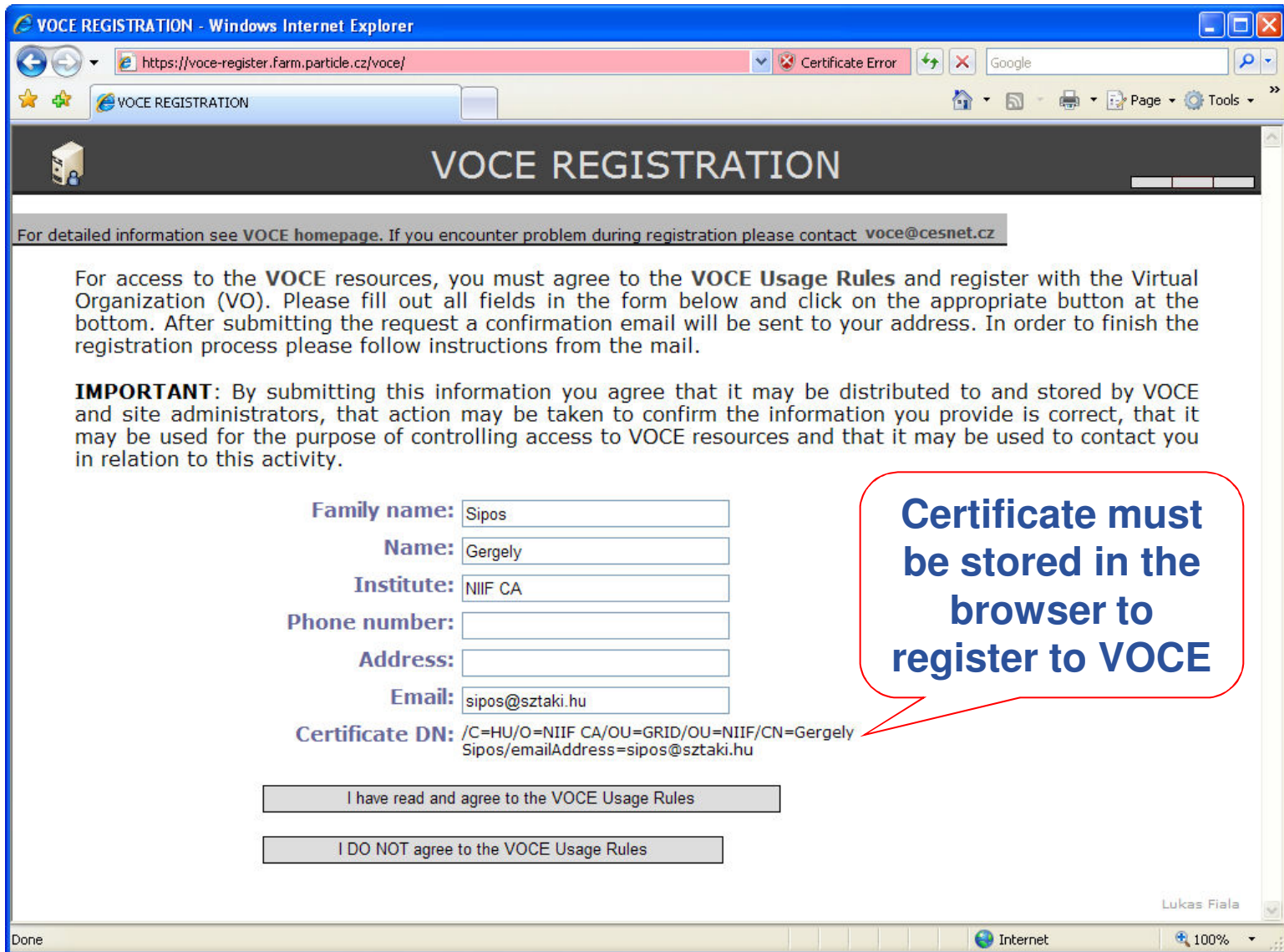
- **Keep your private key and certificate secure**
  - if possible *on a USB drive only*
  - *Typically kept*
    - *on the User Interface machine of your VO*
    - *in MyProxy server*
    - *in Web browser*
- ***Different formats exist – transformation may be required!!!***
- **Do not loan your certificate to anyone**
- **Report to your CA if your certificate has been compromised**

## Typical situation on User Interface machine:

```
[sipos@glite-tutor sipos]$ ls -l .globus/
total 8
-rw-r--r--    1 sipos    users    1761 Oct 25  2006 usercert.pem
-r-----    1 sipos    users    951  Oct 24  2006 userkey.pem
```

## Someone's identity in EGEE = Subject of certificate:

```
[sipos@glite-tutor sipos]$ grid-cert-info -subject
/C=HU/O=NIIF CA/OU=GRID/OU=NIIF/CN=Gergely Sipos/Email=sipos@sztaki.hu
```



VOCE REGISTRATION - Windows Internet Explorer

https://voce-register.farm.particle.cz/voce/ Certificate Error Google

### VOCE REGISTRATION

For detailed information see [VOCE homepage](#). If you encounter problem during registration please contact [voce@cesnet.cz](mailto:voce@cesnet.cz)

For access to the **VOCE** resources, you must agree to the **VOCE Usage Rules** and register with the Virtual Organization (VO). Please fill out all fields in the form below and click on the appropriate button at the bottom. After submitting the request a confirmation email will be sent to your address. In order to finish the registration process please follow instructions from the mail.

**IMPORTANT:** By submitting this information you agree that it may be distributed to and stored by VOCE and site administrators, that action may be taken to confirm the information you provide is correct, that it may be used for the purpose of controlling access to VOCE resources and that it may be used to contact you in relation to this activity.

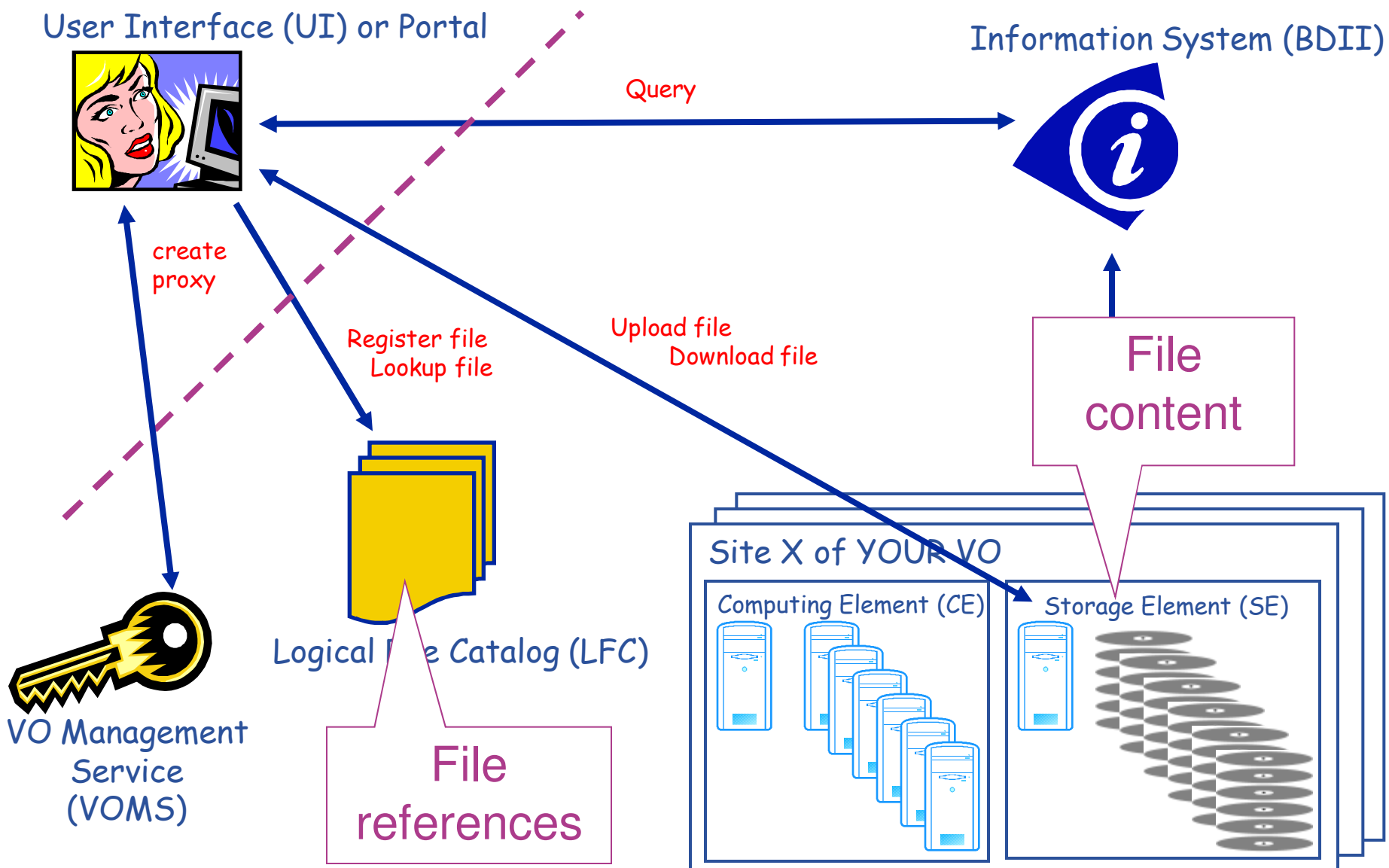
**Family name:**   
**Name:**   
**Institute:**   
**Phone number:**   
**Address:**   
**Email:**   
**Certificate DN:** /C=HU/O=NIIF CA/OU=GRID/OU=NIIF/CN=Gergely Sipos/emailAddress=sipos@sztaki.hu

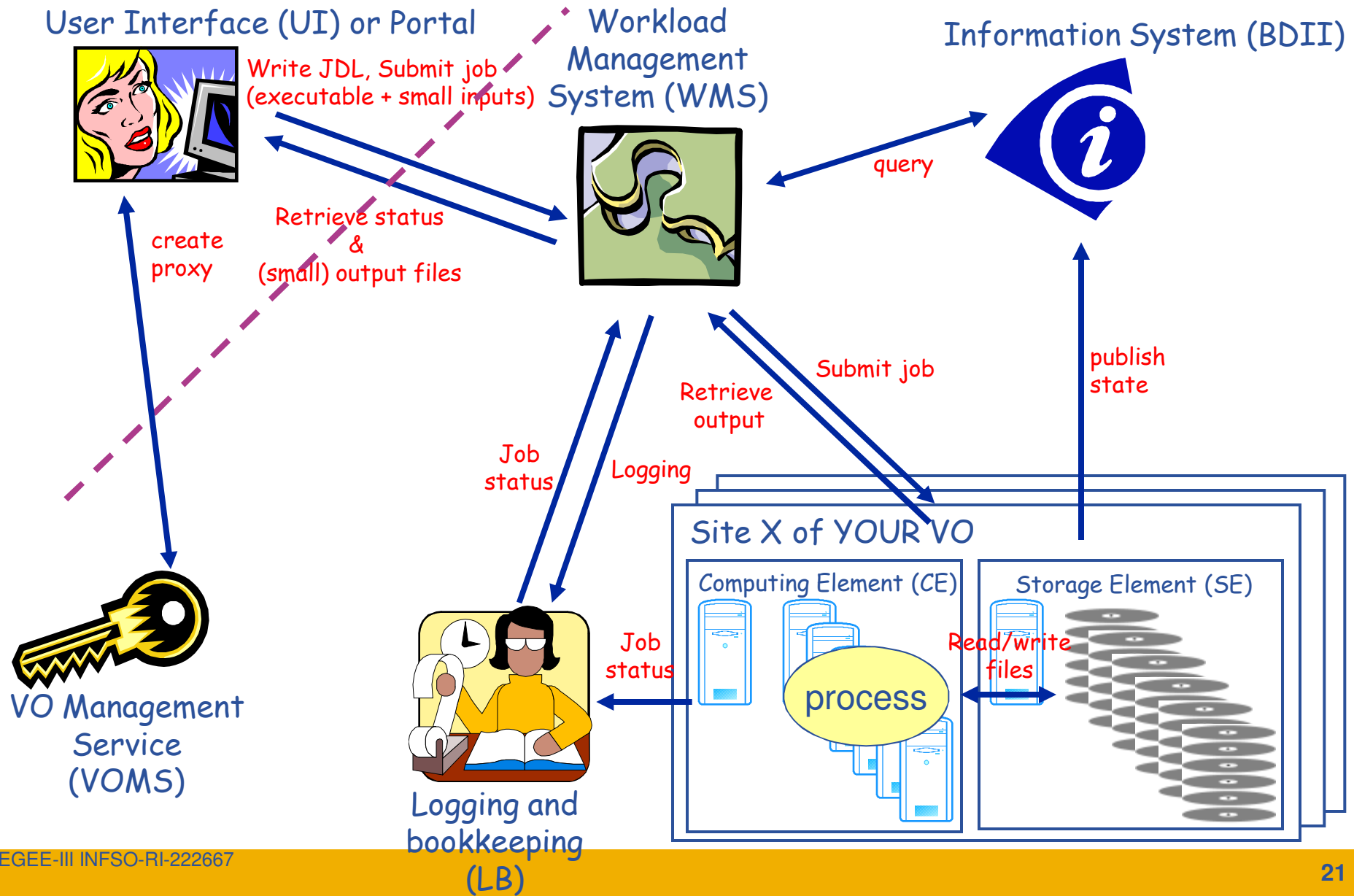
Lukas Fiala

Done Internet 100%

**Certificate must be stored in the browser to register to VOCE**

- **GILDA training Certification Authority is special**
  - Lightweight authentication - No need for personal visit!
    - Apply for a certificate on the Web!
  - GILDA renewable certificates are valid for 2 weeks (normal certificates for 1 year, also renewable)
  - GILDA renewable certificates are valid in GILDA training VO (normal certificates in any VO)
- **Resources:**
  - Apply for certificate: <https://gilda.ct.infn.it>
    - Choose “Instruction for Users” menu
  - Training exercises:  
<https://grid.ct.infn.it/twiki/bin/view/GILDA/WebHome>
  - Ticketing system: <http://gilda-support.ct.infn.it/>







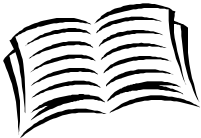
**User Interface (UI)**: The place where users logon to the Grid



**Resource Broker (RB) (Workload Management System (WMS))**:  
Matches the user requirements with the available resources on the Grid



**All built upon  
authorisation,  
authentication,  
security**



**File**



**Lo**

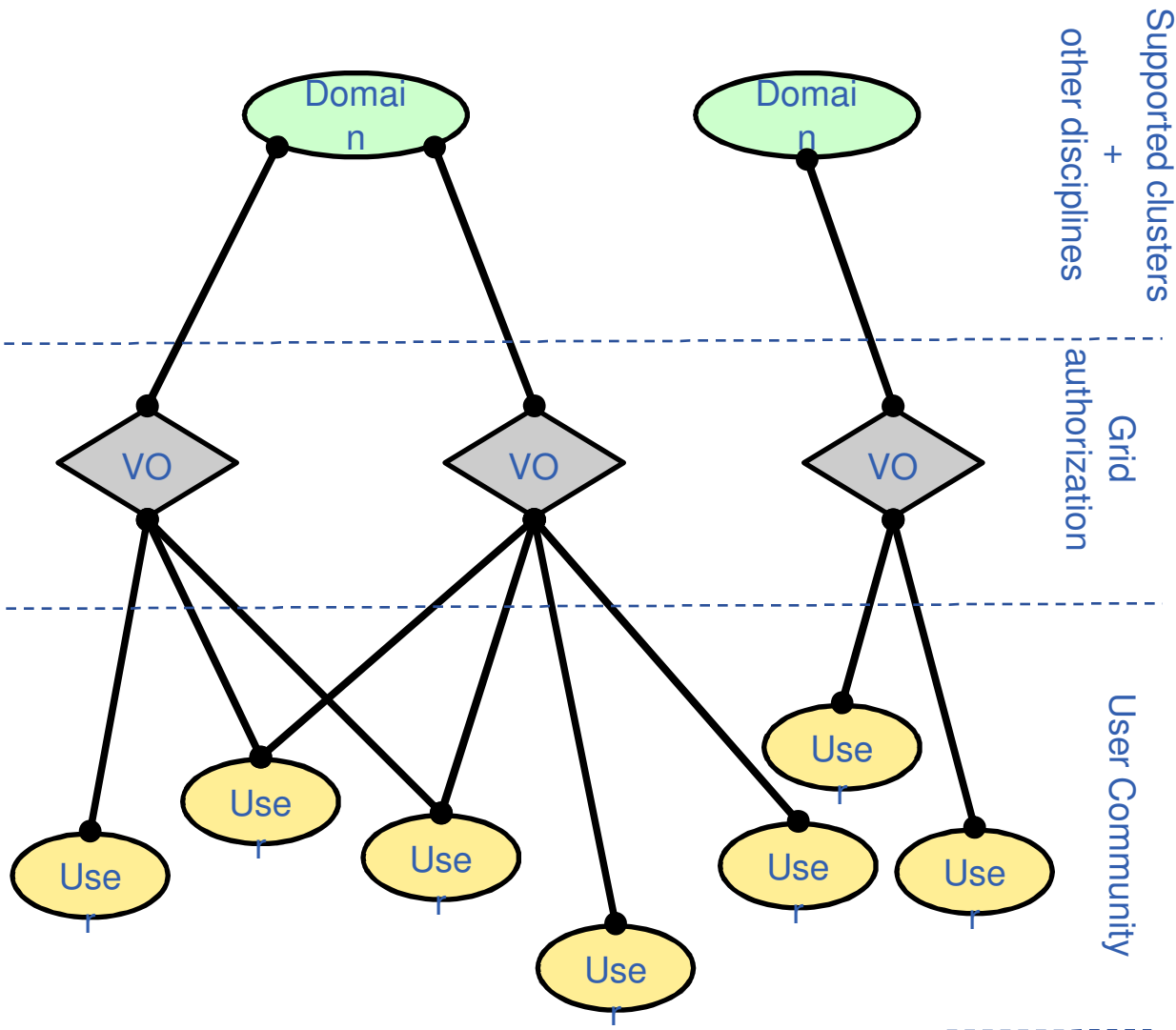


**Computing Element (CE)**: A batch queue on  
the user's job is executed



**Storage Element (SE)**: provides (large-scale) storage for files

ere



**Supported domains:**

- High Energy Physics (HEP)
- Life Sciences (LS)
- Earth Sciences (ES)
- Grid Observatory (GO)
- Computational Chemistry (CC)
- Astronomy & Astrophysics (AA)
- Fusion (F)

**23 “Core” VOs:**

CPU Utilization > 10% in the domain

**112 total Registered VOs**

**4167 users in “Core” VOs**

**13,381 users in Registered VOs**

**Application domains and contacts:** <https://twiki.cern.ch/twiki/bin/view/EGEE/NA4>

- 3 Terabyte of disk space

- TIFF Files:

- one per page, 600 dpi,
    - ~100MB
    - A3 size, high resolution
    - with embedded metadata added with Photoshop

- PDF files:

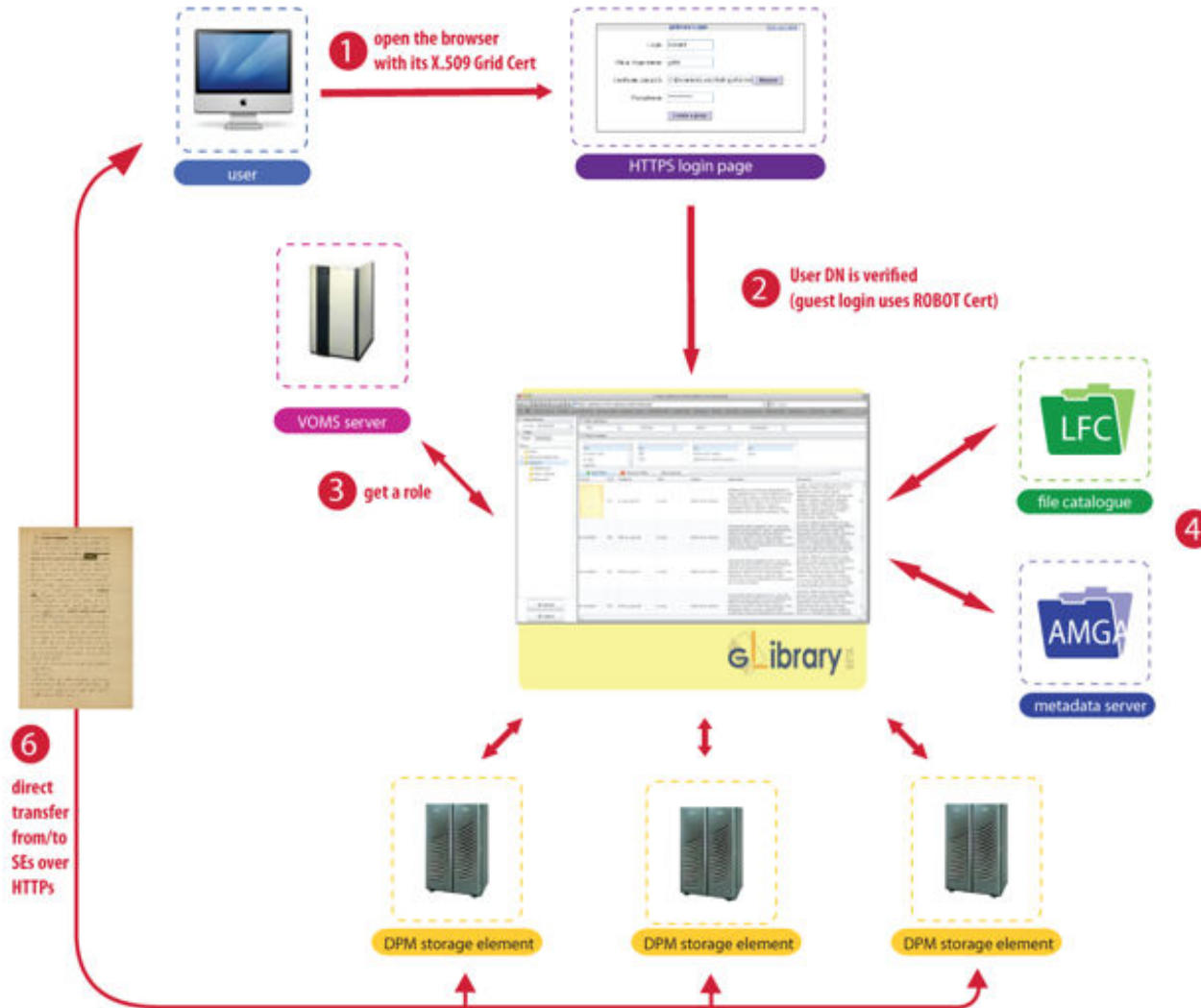
- one per work, 300 dpi,
    - 40-400MB
    - Overall examination of works

- Long-term preservation

- Multiple copies (replicas) spread in different Storage Elements
  - Reliability of storage systems and replica redundancy to achieve secure preservation

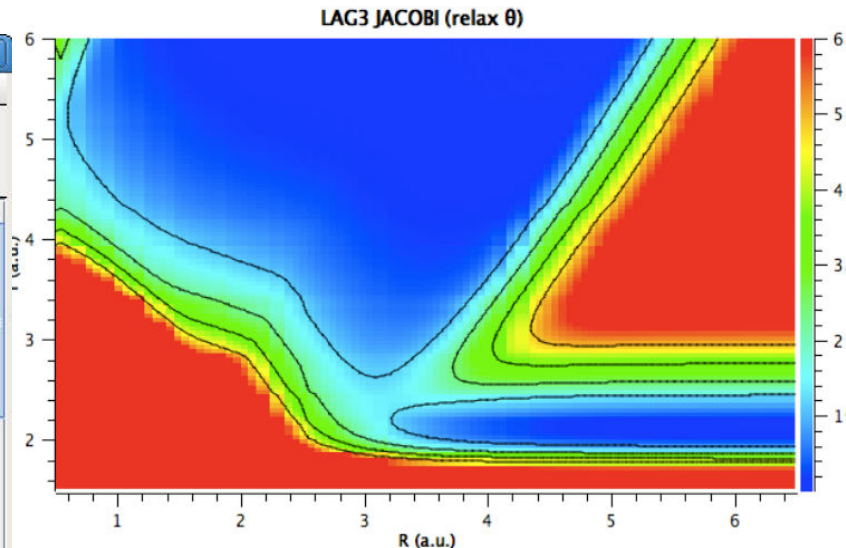
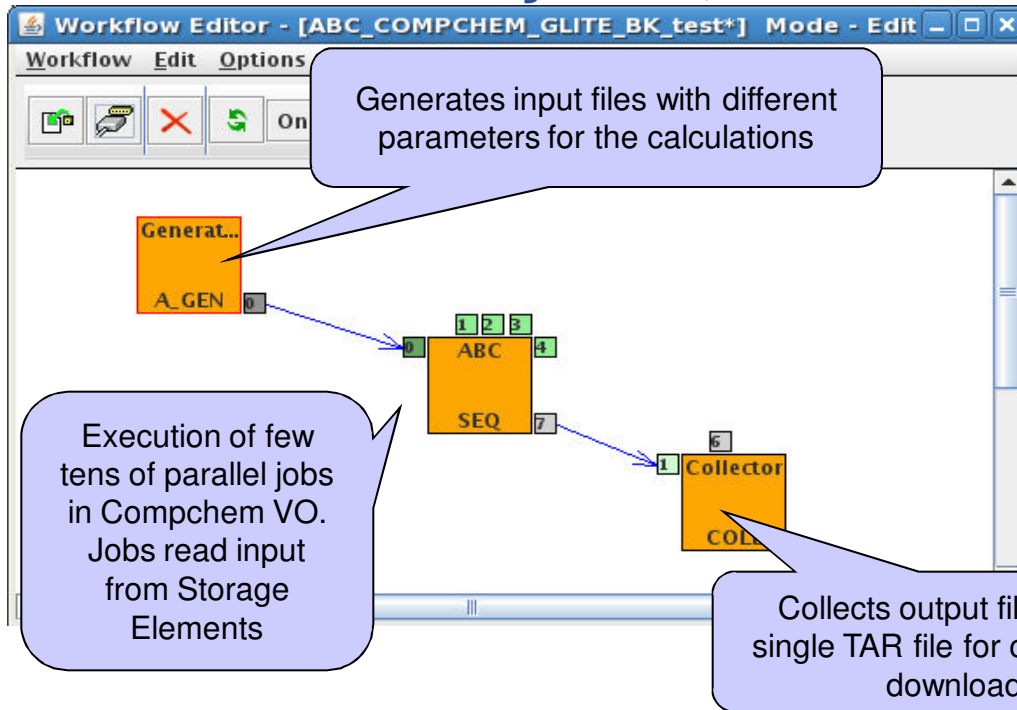
- Easy to use:

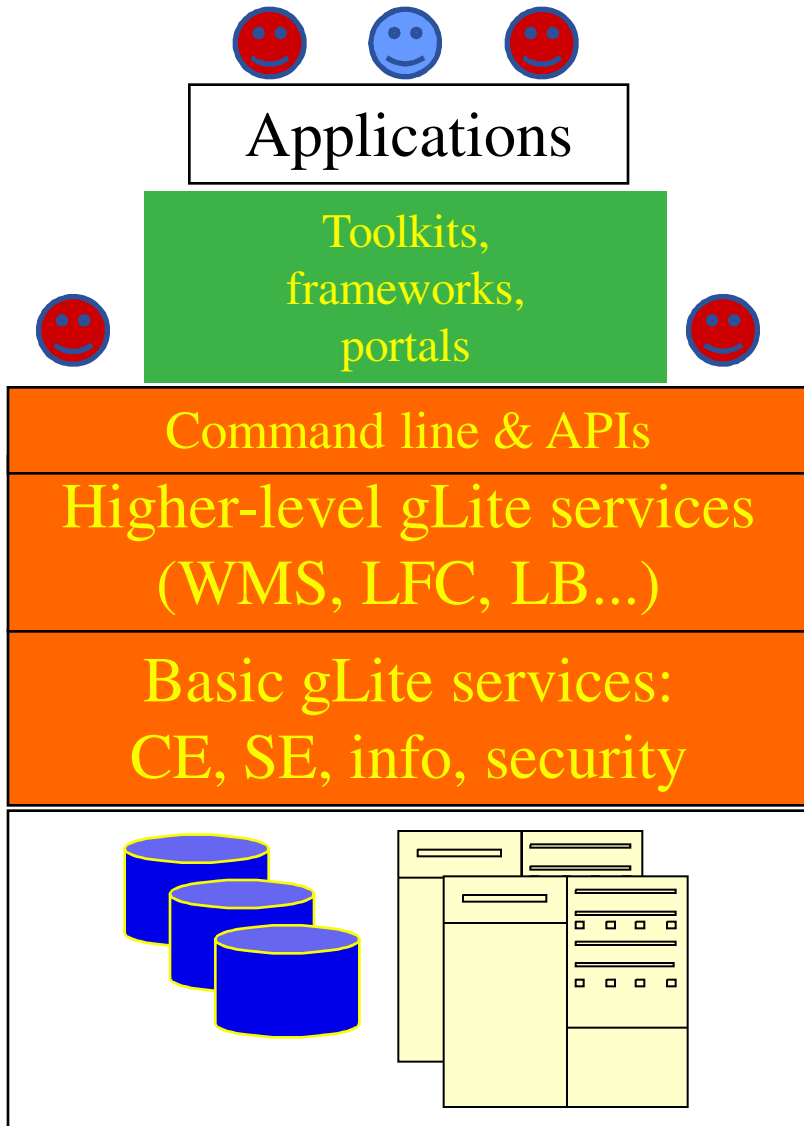
- Look-and-feel inspired by iTunes
  - Transfers are handled from the browser over HTTP/HTTPS
  - Certificate based or Guest access
  - Searching based on Metadata: AMGA metadata catalog





- Solving the Schrodinger equation for triatomic systems
- Workflow of jobs
- Ported to EGEE with P-GRADE Portal
- Uses gLite: broker, Computing, Storage, File catalog, Information system, VOMS





- Most VOs include software on top of gLite
- Some domain specific, some not
- **EGEE RESPECT Programme:**
  - Recommended External Software Packages for Egee CommuniTies
  - Identify third-party software that works well with gLite
    - Expand the functionality of the grid infrastructure,
    - Reduce duplicated development
    - Speed the porting of new applications to the grid
  - <http://technical.eu-egee.org/index.php?id=290>
- **P-GRADE Portal is one of the RESPECT tools!**

- **Training**

For users, for system administrators

- Training events: <http://www.egee.nesc.ac.uk/>
- Repository of talks, exercises: <http://egee.lib.ed.ac.uk>

- **Application Porting Support**

To get your application running on a gLite VO

- Consultancy: [www.lpds.sztaki.hu/lpds](http://www.lpds.sztaki.hu/lpds)
- Application database: [http://grid.ct.infn.it/egee\\_applications/](http://grid.ct.infn.it/egee_applications/)

- **Virtual Organization Support**

To setup a new VO

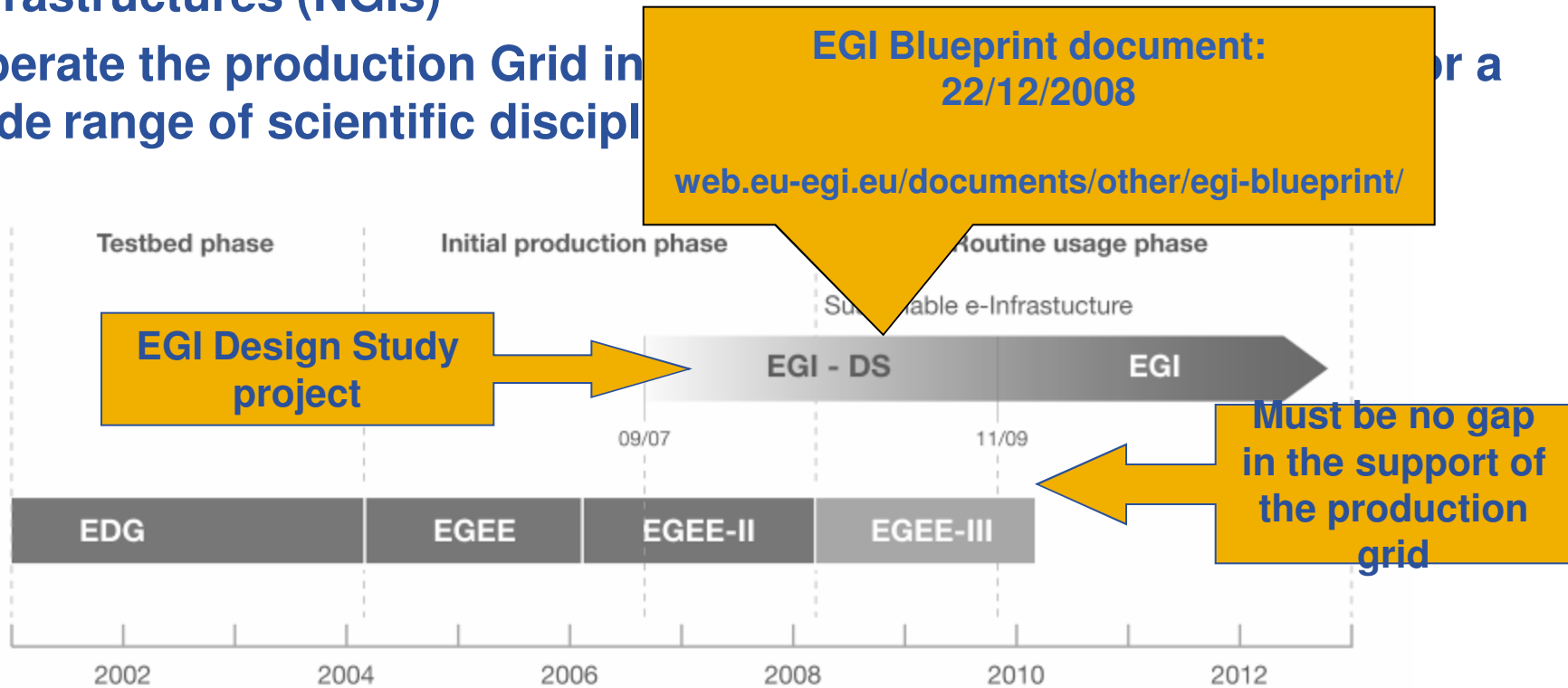
- VO Operations portal: <http://cic.gridops.org/>

- **Direct User Support**

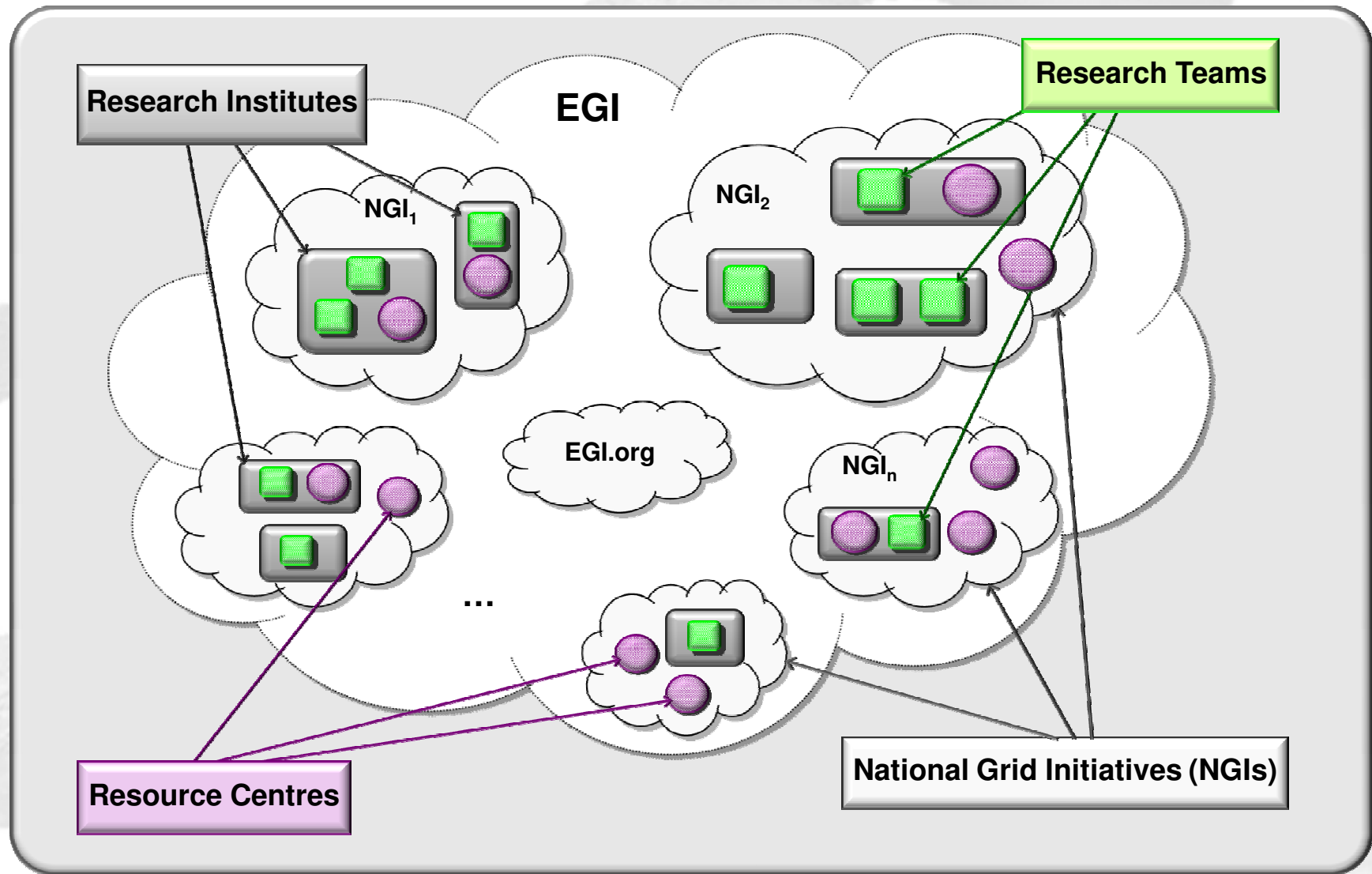
To solve infrastructure problems

- Global Grid User Support: [www.ggus.org](http://www.ggus.org)

- Need to prepare permanent, common **Grid infrastructure**
- Ensure the long-term sustainability of the European e-Infrastructure independent of short project funding cycles
- Coordinate the integration and interaction between National Grid Infrastructures (NGIs)
- Operate the production Grid in a wide range of scientific disciplines



# The EGI Actors





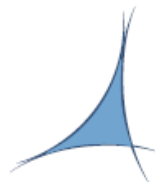
## EGEE '09 CONFERENCE

21-25 September 2009

Hotel Barceló Sants - Barcelona, Spain

[www.egee09.eu-egee.org](http://www.egee09.eu-egee.org)

EGEE-III is a project co-funded by the European Commission, INFSO-RI 222667



PIC  
port d'informació  
científica

Registration and Information

**Mondial**

**Mondial & Cititravel Congresos, S.L.**

Rosselló, 303 ático 1 - 08037 Barcelona, Spain  
T. +34 932 212 955 - Fax +34 934 592 059  
[egee09@mondial-congress.com](mailto:egee09@mondial-congress.com)

## EGEE offers ...

- ... a mechanism for **linking together people, resources and data** of many scientific community
- ... a basic set of middleware for *gridfying* applications with documentation, training and support
- ... services and forums for linking with grid experts, other communities and industry

**Not only for large communities!**

**Not only for European communities!**

**You can also use this technology!**

- **EGEE**
  - <http://www.eu-egee.org/>
- **gLite middleware**
  - <http://www.glite.org>
- **gLite manuals, documentation**
  - <http://glite.web.cern.ch/glite/documentation/>  
**(gLite user guide)**
- **Recommended External Software Packages for Egee CommuniTies**
  - <http://technical.eu-egee.org/index.php?id=290>
- **Grids and clouds – An EGEE comparative study**
  - [http://www.eu-egee.org/index.php?id=193&tx\\_ttnews%5Btt\\_news%5D=5&tx\\_ttnews%5BbackPid%5D=65&cHash=fe95cdbfb2](http://www.eu-egee.org/index.php?id=193&tx_ttnews%5Btt_news%5D=5&tx_ttnews%5BbackPid%5D=65&cHash=fe95cdbfb2)



**Thank you**