



# An Approach for the Co-existence of Service and Opportunistic Grids: The EELA-2 Case

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- **Outline**

- Motivation
- Service grids vs. opportunistic grids
  - gLite
  - OurGrid
- Our approach for the co-existence of such grids in the same architecture
  - Using service grid resources opportunistically
  - Exposing opportunistic grid resources to service grids
- Current status and future work



- **Motivation**

- Grids have become a reality with many infrastructures currently in place
  - EGEE, TeraGrid, SETI@home, Grid 5000, Condor pools, OurGrid communities and many others
- These infrastructures can be broadly divided into two classes
  - Service grids
    - *High performance dedicated machines and large data storage elements*
    - *Spread over a relatively small number of sites*
    - *High and well defined level of QoS*
  - Opportunistic grids
    - *“lightweight” grid infrastructures based on the scavenging of idle computing cycles from non-dedicated resources*
    - *Able to assemble large amounts of resources*
    - *Best-effort grids, appropriate to run BoT applications*



- **Motivation**

- A natural step forward is to allow these infrastructures to interoperate somehow
  - GIN working group at OGF
  - Several gateways between grid infrastructures have been proposed and implemented
- We advocate that co-existence (instead of interoperation) is a better strategy to explore synergy between grids of different kinds
  - In particular, the co-existence of a service and an opportunistic grid allow:
    - *Idle resources from the service grid to be used in an opportunistic way*
    - *Increase the size and reach of the grid infrastructure*
    - *More suitable platform to run BoT applications, possibly liberating service grid resources to run essentially the tightly-coupled applications*

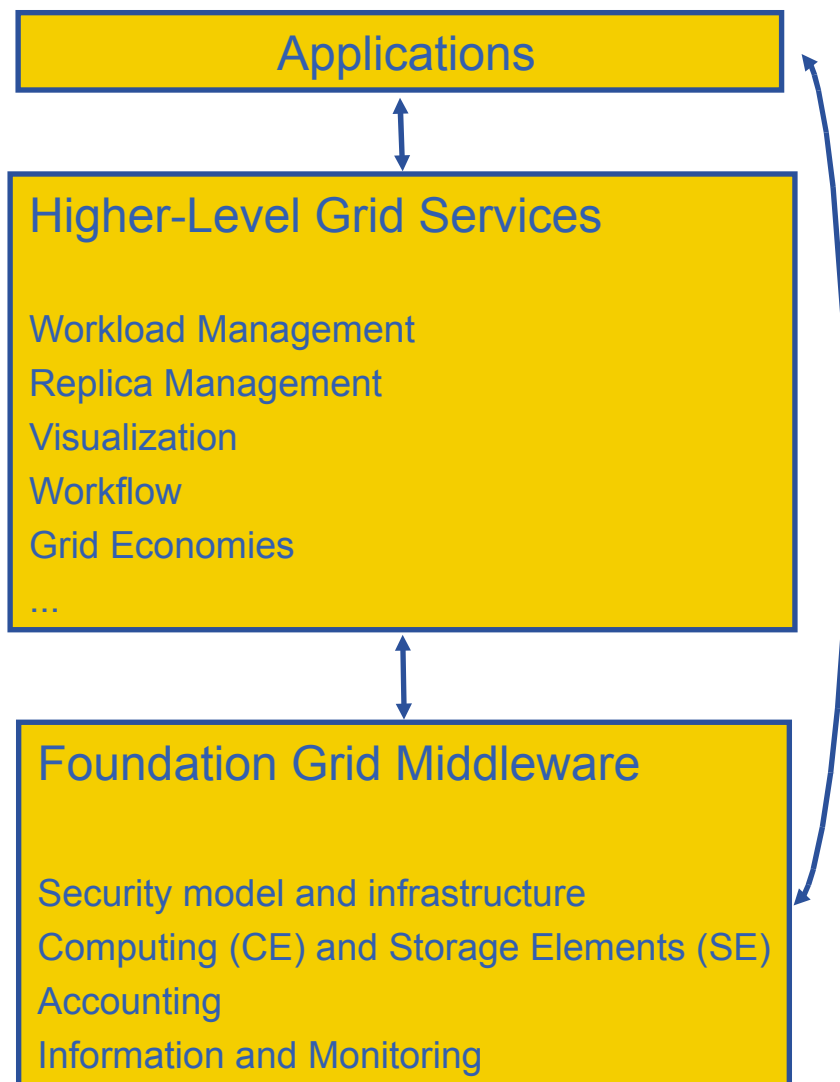


- **The gLite Middleware**
  - Created in the context of the EGEE Project
  - Exploit **experience and existing components** from Condor, Globus, EDG/LCG, AliEn, and others
  - Develop a **stack of generic middleware** useful to EGEE applications (HEP and Biomedics are pilot applications)
  - Pluggable components – cater for different implementations



- **gLite follows a Service Oriented Architecture**
  - Facilitate interoperability among Grid services
  - The services work together in a concerted way but can also be deployed and used independently, allowing their exploitation in different contexts
- **Services communicate through the exchange of messages**
  - Slowly moving to WS-\* interfaces
  - Activity inside OGF-GIN



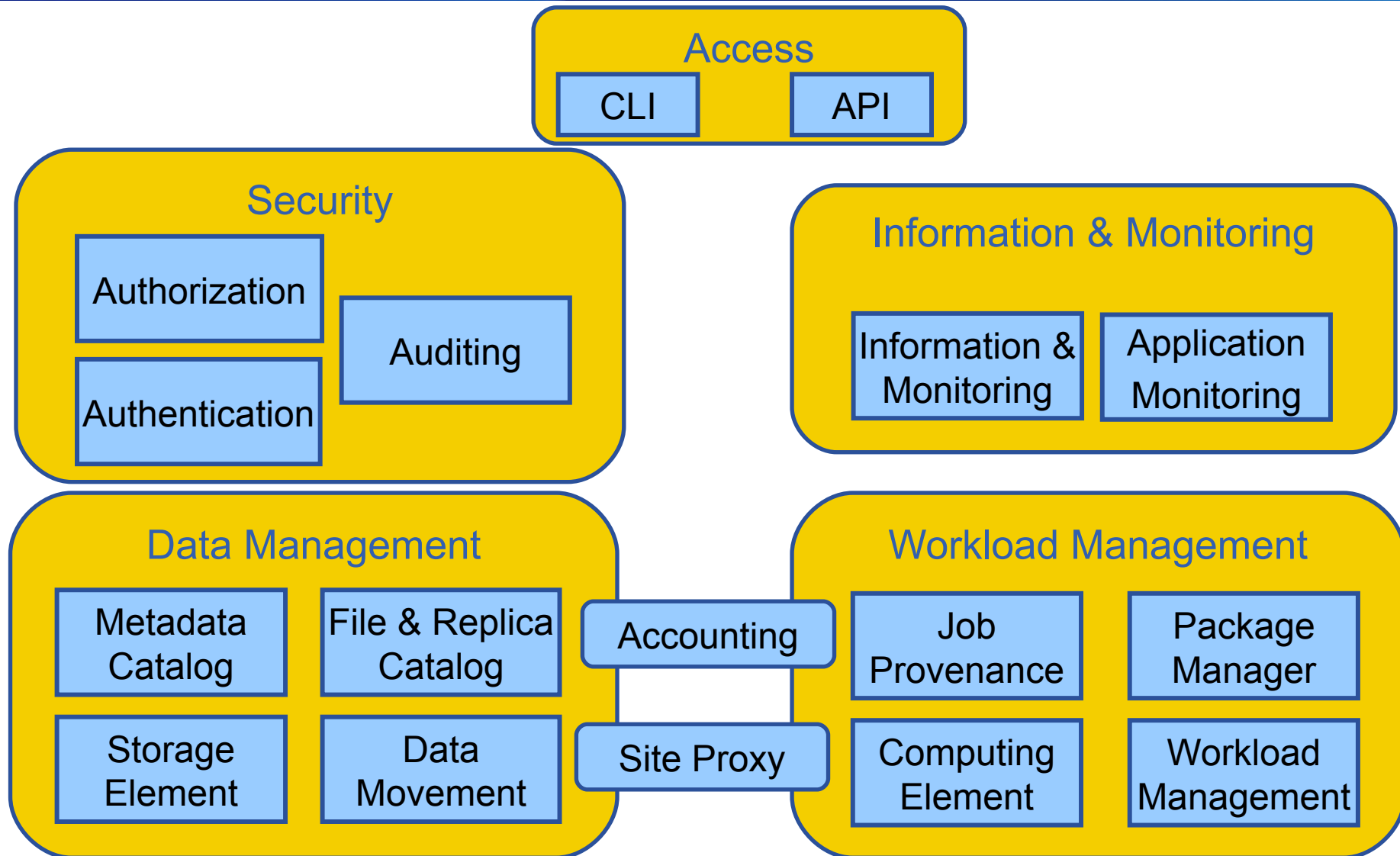


## • Middleware Structure

- Applications have access both to **Higher-level Grid Services** and to **Foundation Grid Middleware**
- Higher-Level Grid Services are supposed to help the users building their computing infrastructure but should not be mandatory
- Foundation Grid Middleware will be deployed on the EGEE infrastructure

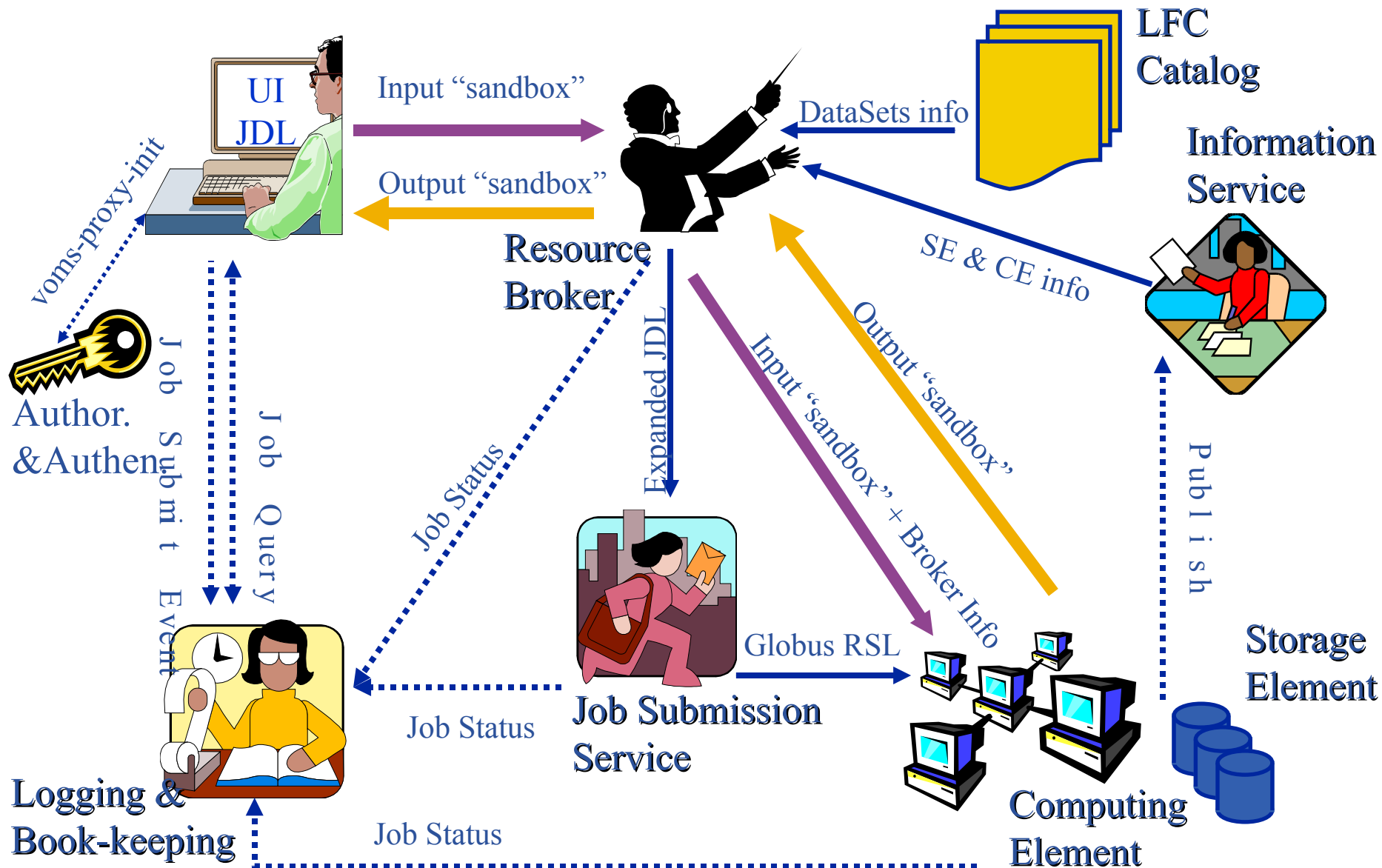


# E-science grid facility for Europe and Latin America

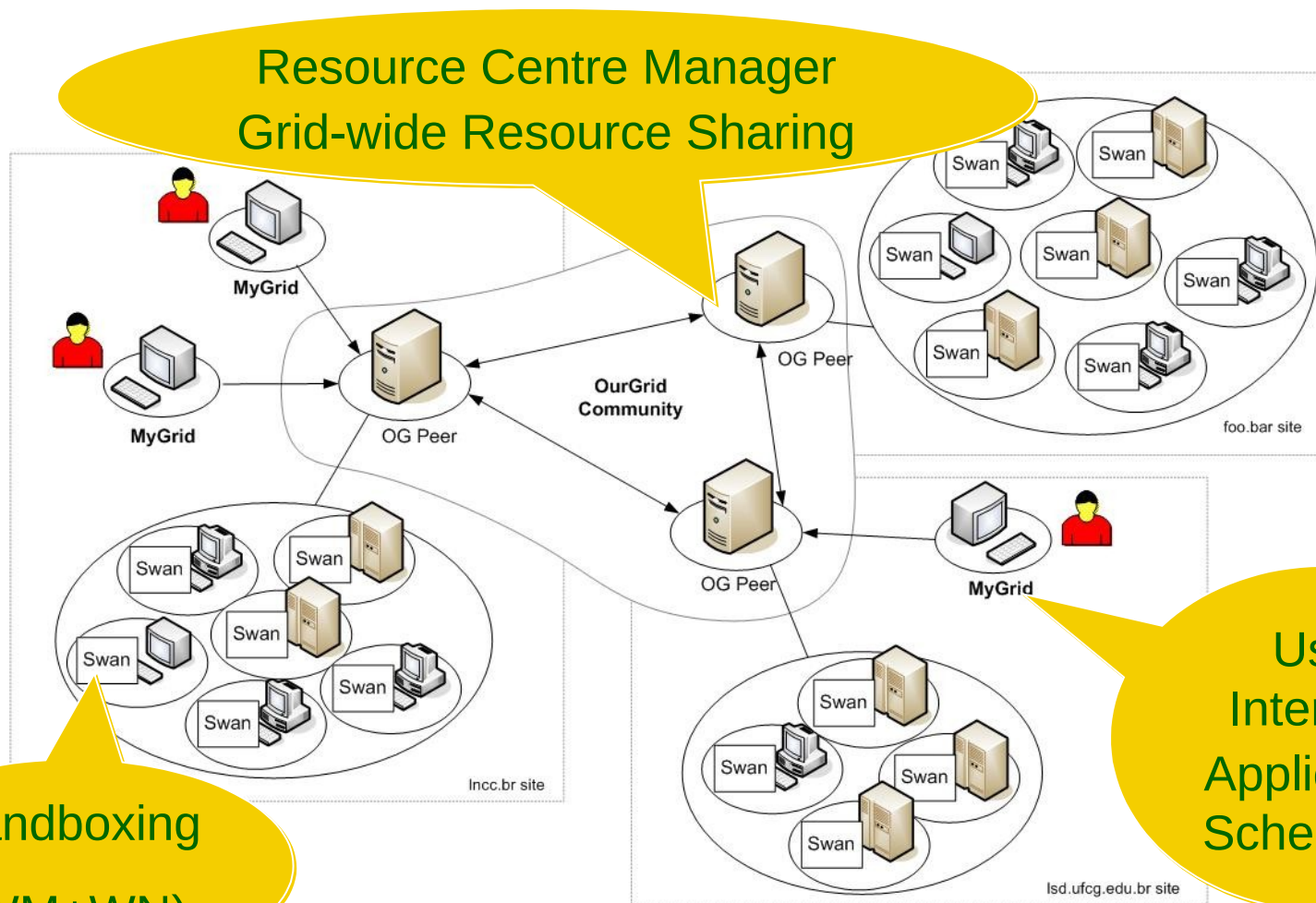




# E-science grid facility for Europe and Latin America



- What is an OurGrid grid?



Resource Centre Manager  
Grid-wide Resource Sharing

User Interface  
Application Scheduling

Sandboxing  
(WM+WN)



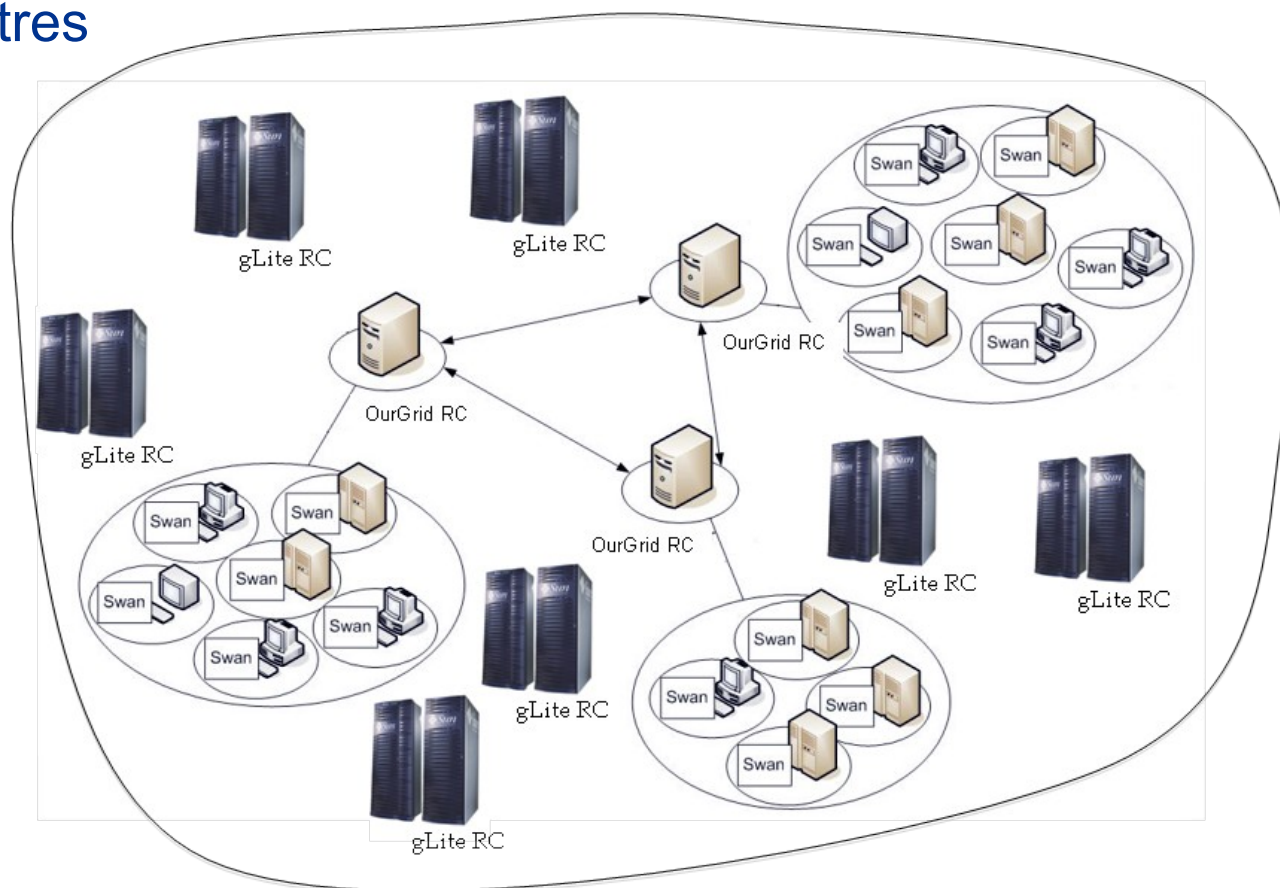
- **What kind of applications are supported by an OurGrid grid?**
  - It will depend on the virtual machines that will be made available by the managing agent of the worker nodes
  - Currently we have support for BoT applications that:
    - Have relatively short tasks
      - *Due to the best-effort nature of the worker nodes*
    - Have no inter-task communication
    - Are self-contained
      - *no need for special dynamically linked libraries*



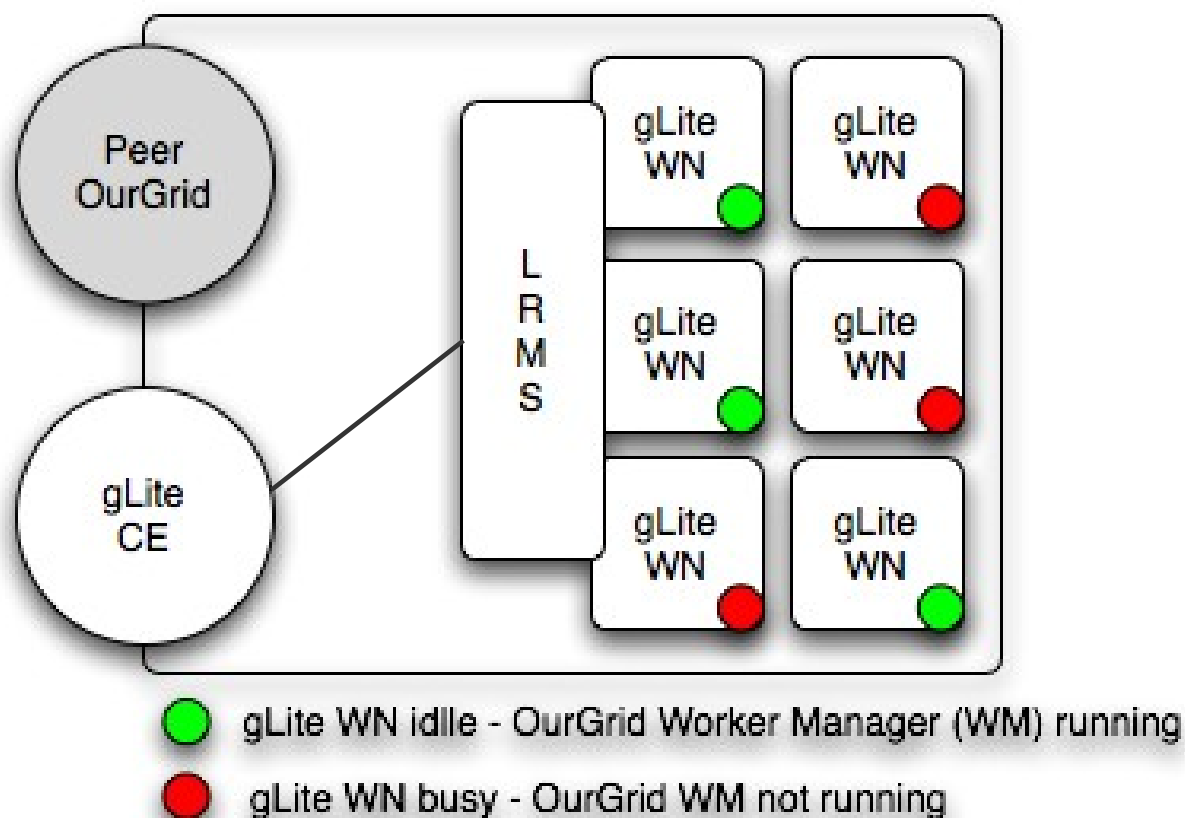
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# **Roadmap for allowing the co-existence of a service grid based on gLite and an opportunistic grid based on OurGrid**

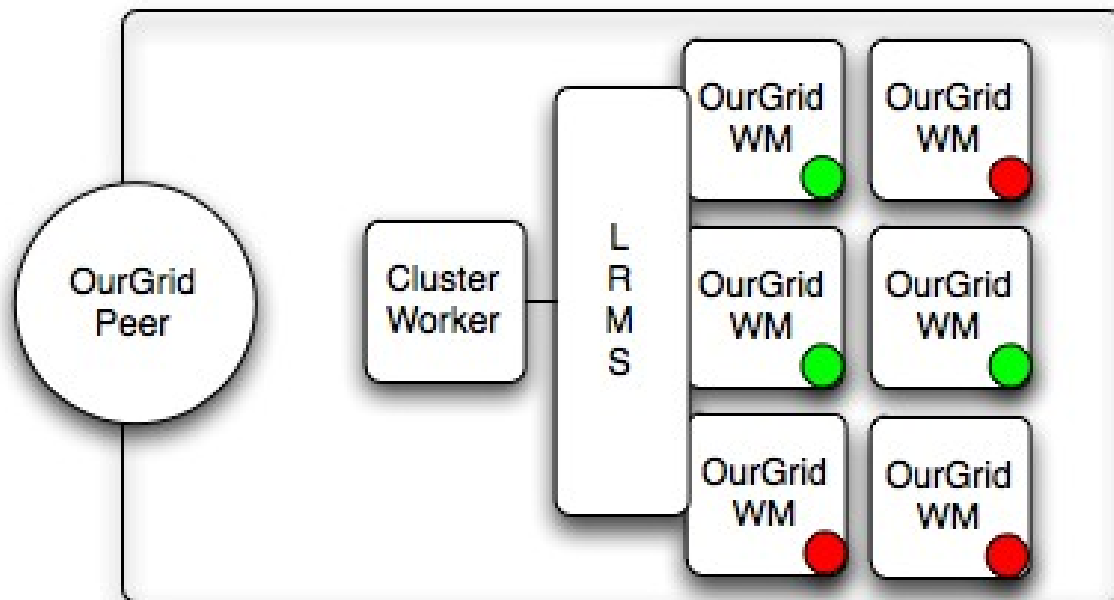
- **The first step is to allow EELA-2 OurGrid Resource Centres to be created**
  - Provide support for the use of the gLite PKI by OurGrid resource centres



- The second step is to allow idle resources in an EELA-2 gLite resource centre to be exposed as OurGrid resources

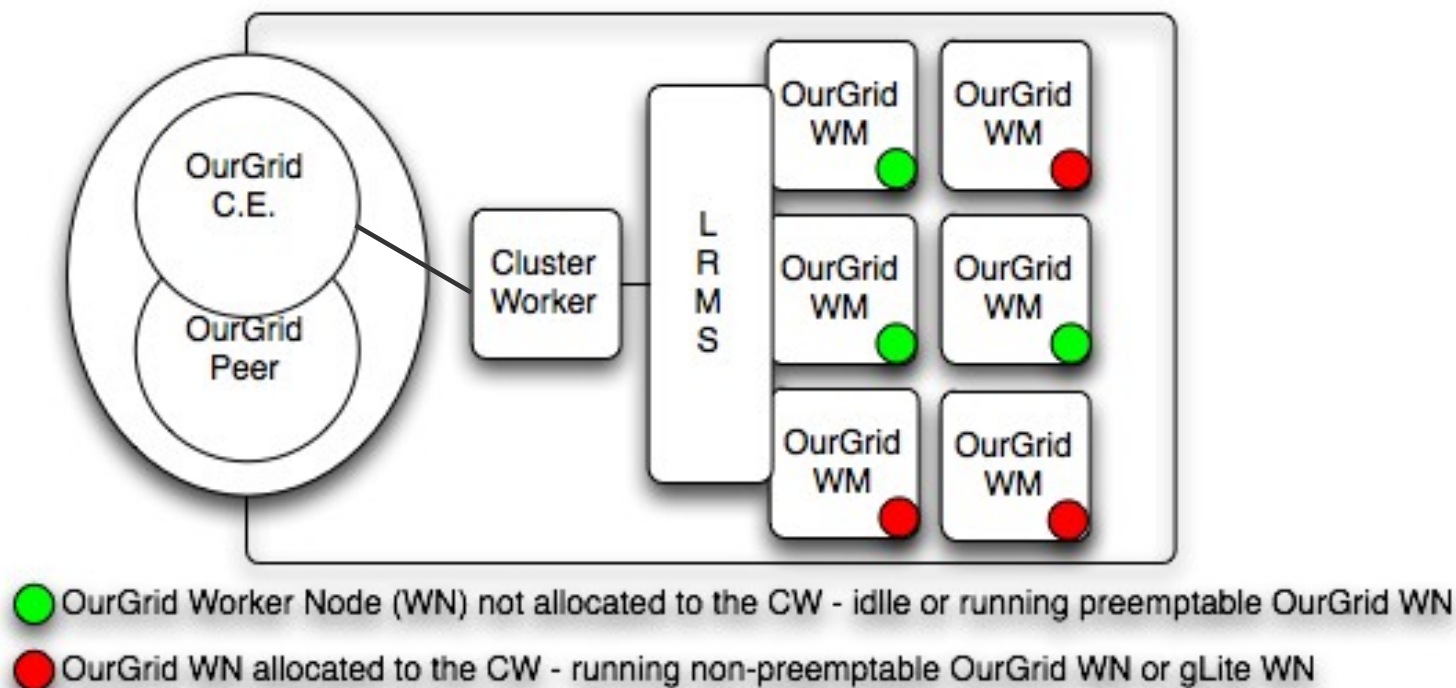


- The final step is to allow resources of an OurGrid resource centre to be exposed as gLite resources
  - This will be achieved in two sub-steps
    - Firstly, allow clusters to be exposed as a single resource in an OurGrid resource centre



- OurGrid Worker Node (WN) not allocated to the CW - idle or running preemptible OurGrid WN
- OurGrid WN allocated to the CW - running non-preemptible OurGrid WN

- The final step is to allow resources of an OurGrid resource centre to be exposed as gLite resources
  - This will be achieved in two sub-steps
    - Firstly, allow clusters to be exposed as a single resource in an OurGrid resource centre
    - Secondly, make these resources available at the gLite grid





- **Current status and future work**
  - Latest version of OurGrid just released with support to X.509 certificates
  - Support for the exploitation of idle cycles in service grids will be available soon and will be part of the production infrastructure in operation from November 2008
  - Cluster worker planned for early 2009
  - Evaluate the impact of the co-existence in a production environment