Edinburgh e-Science TOE

Training Outreach and Education

http://www.nesc.ac.uk/training

NGS National Grid Service

http://www.ngs.ac.uk

NGS in the future: emerging middleware

PPARC

http://www.pparc.ac.uk/

egee

http://www.eu-egee.org/

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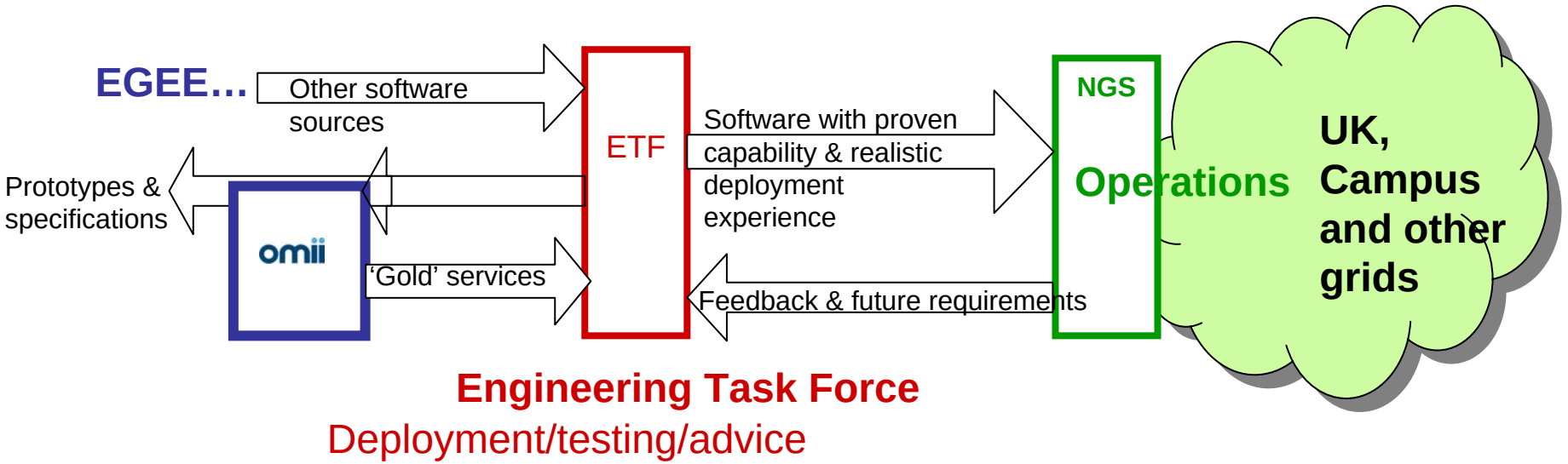
NGS
National Grid Service

Goal of talk

- The NGS is running a production service
- Different middleware may be deployed in the future.
- The talk seeks to outline some of the possibilities and contexts for that future

NGS middleware evolution



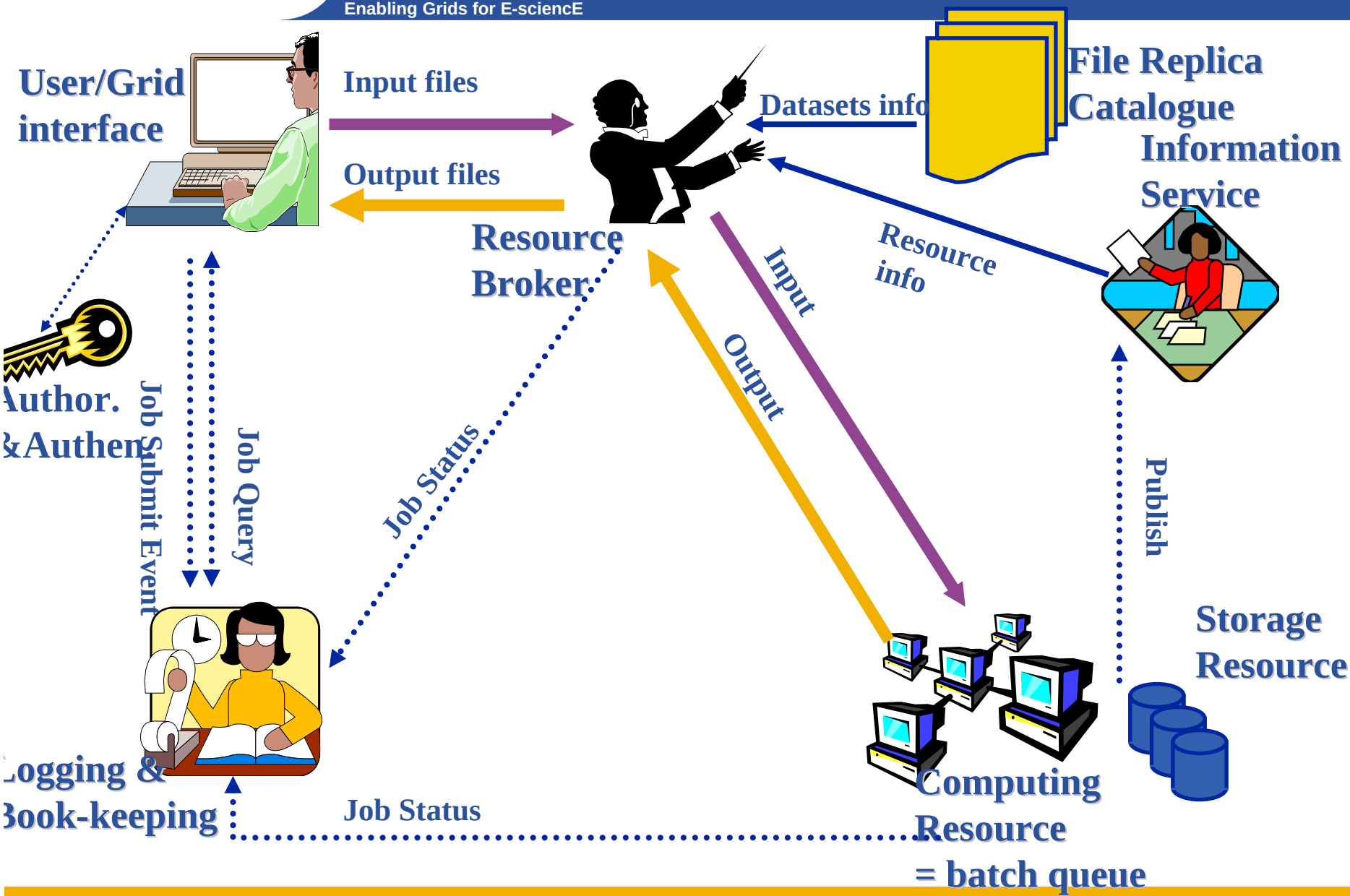
Outline of Current Status

- Middleware recently deployed
  - Portal v2
  - INCA monitoring: http://inca.grid-support.ac.uk/
  - Windows access - gsissh
- Being prepared for possible deployment
  - Resource broker
  - VOMS
- Under assessment / observation
  - middleware from EGEE
  - OMII-UK middleware
  - GT4
- Under development
  - Shibboleth integration – AuthN, AuthZ for UK
  - Portal

EGEE Resource broker

- (This is NOT the SRB!!!)
- Current NGS middleware comprises toolkits inviting development of higher level services
- On the current NGS we have
  - GRAM to submit jobs
  - Information service – resources available, state of queues…
- The RB will take the work out of deciding where to run a job
  - Submit job to the grid, not a specified “compute element”
- Challenge delaying RB deployment:
  - RB is tightly coupled to rest of EGEE middleware

Current EGEE grid



EGEE is …

- **EU-funded project that has established the largest multi-VO production grid in the world!**
- **What's happening now?**
  http://gridportal.hep.ph.ic.ac.uk/rtm/
- **What resources are connected?**
  http://goc.grid-support.ac.uk/gridsite/monitoring/

EGEE Resource broker

- Job Description Language file: describes resources needed by a job

- Commands analogous to GT2:
  - glite-job-submit <jdl filename>
  - glite-job-status <job-id>
  - glite-job-get-output <job-id>

NGS National Grid Service

Example

- glite-job-submit myjob.jdl
  - Myjob.jdl
    - JobType = “Normal”;
    - Executable = "$(CMS)/exe/sum.exe";
    - InputSandbox = {"/home/user/WP1testC","/home/file*”, "/home/user/DATA/*"};
    - OutputSandbox = {“sim.err”, “test.out”, “sim.log"};
    - Requirements = other. GlueHostOperatingSystemName == “linux" && other.GlueCEPolicyMaxCPUTime > 10000;
    - Rank = other.GlueCEStateFreeCPUs;

More about the RB

- To try using EGEE middleware:
  - GILDA is a dissemination grid running the EGEE middleware
  - Go to the demo site: https://grid-demo.ct.infn.it/

Resource broker - summary

- The resource broker receives a job description in JDL
- It chooses a batch queue for job submission, using the information services

- Its an example of the higher services that can be deployed for the NGS, built upon the current toolkits

VOMS: 2nd generation of VO management

Before VOMS

- **User is authorised as a member of a single VO**
- **All VO members have same rights**
- **Gridmapfiles are updated by VO management software: map the user's DN to a local account**
- **grid-proxy-init**

VOMS

- **User can be in multiple VOs**
  - Aggregate rights
- **VO can have groups**
  - Different rights for each
    - Different groups of experimentalists
    - …
  - Nested groups
- **VO has roles**
  - Assigned to specific purposes
    - E,g. system admin
    - When assume this role
- **Proxy certificate carries the additional attributes**
- **voms-proxy-init**

EGEE- NGS interoperability

- EGEE - Creating international grid infrastructure
- Important to NGS to interoperate with EGEE – collaborations cross national boundaries!
- 3 potential levels of interoperability
  - Application (P-GRADE for example)
  - Grids – jobs submitted to one grid potentially run on another
  - Service – services from one stack deployable on another
- 1 level is possible today – application level

- **Natural continuation of EGEE**
  - Expanded consortium
  - Emphasis on providing an infrastructure
    - → increased support for applications
    - → interoperate with other infrastructures
    - → more involvement from Industry

SA: service activities

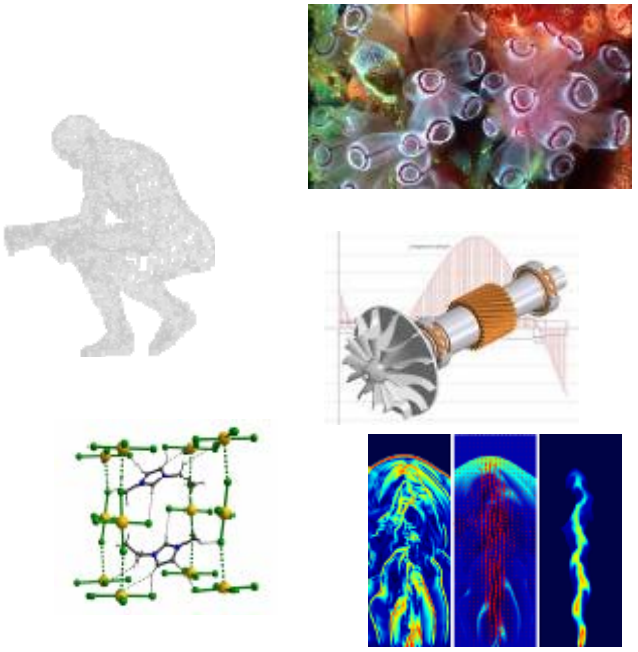
- establishing operations

NA: network activities

- supporting VOs

JRA: “joint research activities”

- e.g. hardening middleware

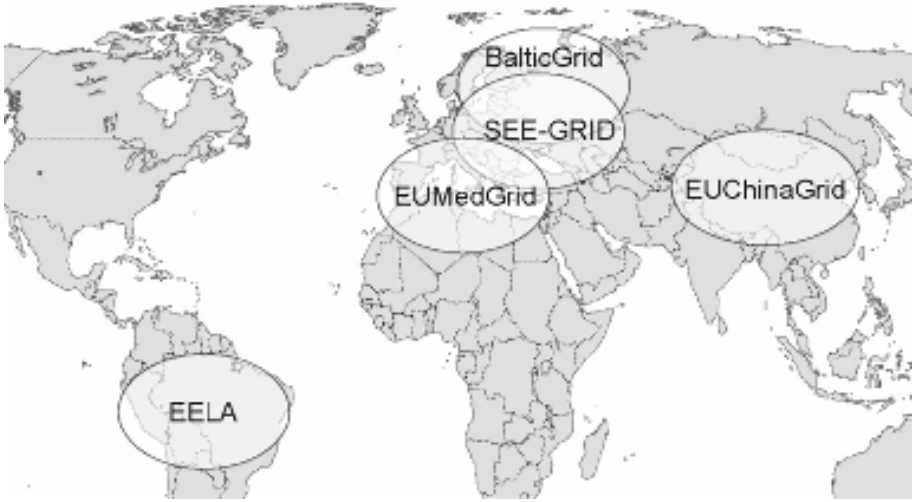


EGEE-II: Expertise & Resources

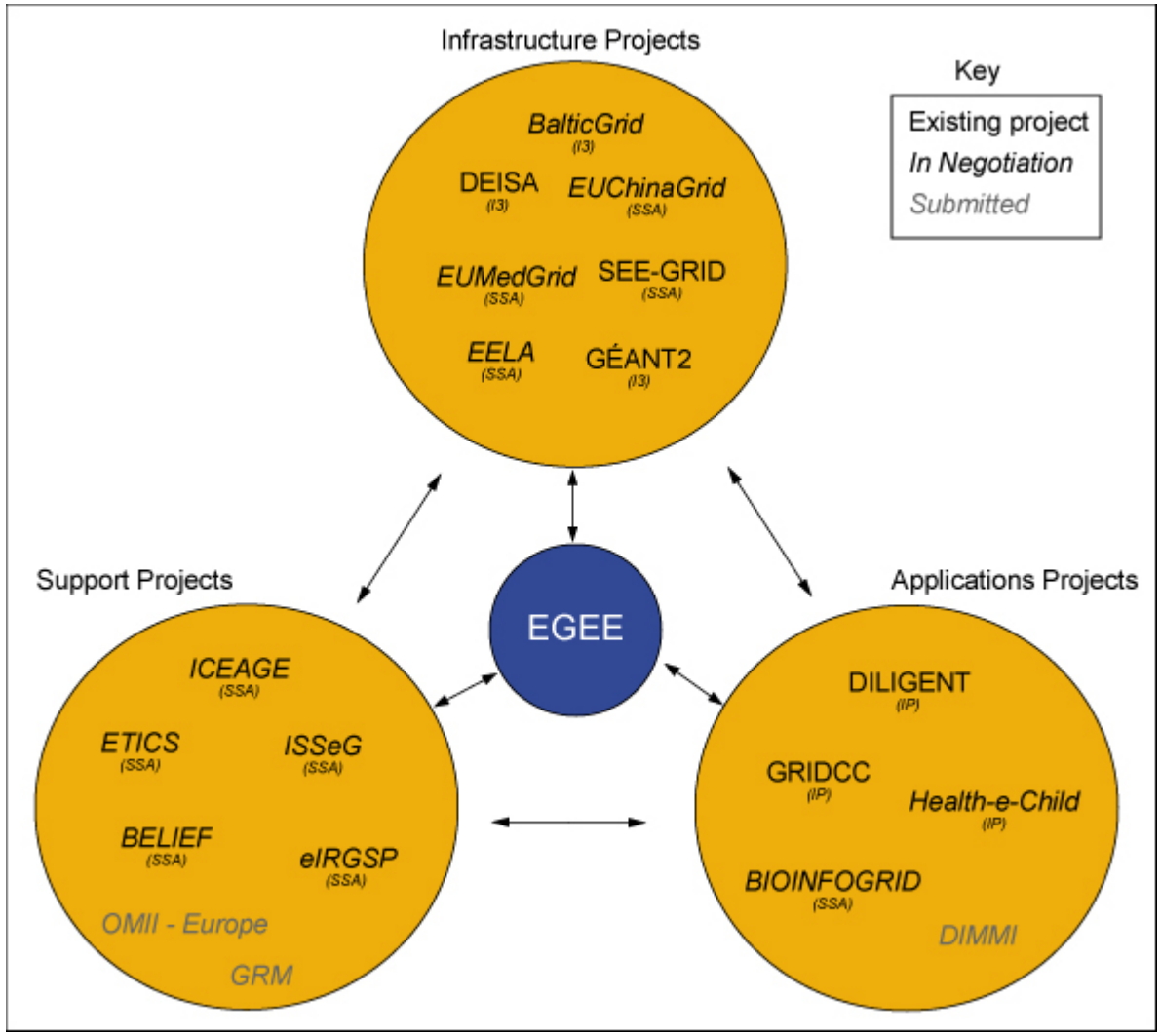
- More than 90 partners
- 32 countries
- 12 federations

→ Major and national Grid projects in Europe, USA, Asia

+ 27 countries through related projects:
  - BalticGrid
  - SEE-GRID
  - EUMedGrid
  - EUChinaGrid
  - EELA



Related Projects



Related projects: infrastructure, education, application

Name	Description
BalticGrid	EGEE extension to Estonia, Latvia, Lithuania
EELA	EGEE extension to Brazil, Chile, Cuba, Mexico, Argentina
EUChinaGRID	EGEE extension to China
EUMedGRID	EGEE extension to Malta, Algeria, Morocco, Egypt, Syria, Tunisia, Turkey
ISSeG	Site security
eIRGSP	Policies
ETICS	Repository, Testing
BELIEF	Digital Library of Grid documentation, organisation of workshops, conferences
BIOINFOGRID	Biomedical
Health-e-Child	Biomedical – Integration of heterogeneous biomedical information for improved healthcare
ICEAGE	International Collaboration to Extend and Advance Grid Education

EU initiatives

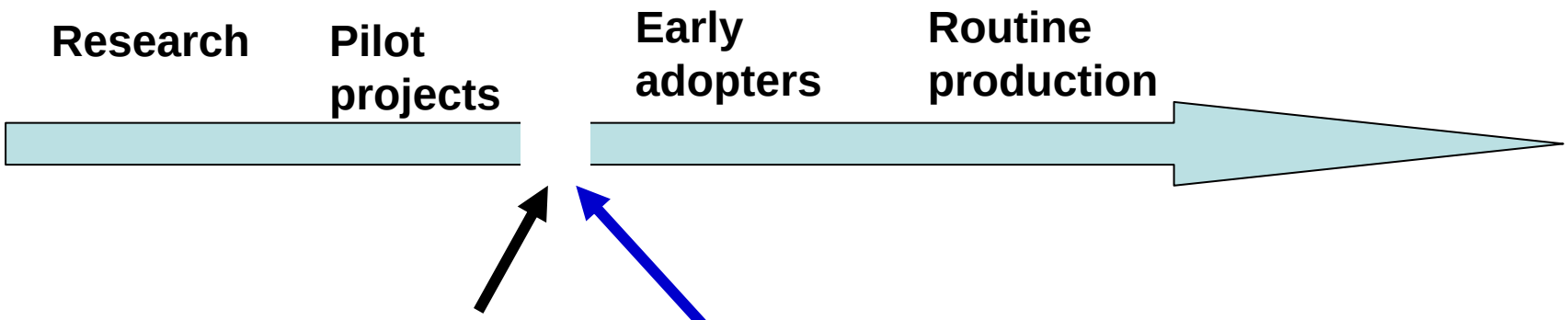
- **EGEE is cooperating with many projects…. Including:**

- **OMII-Europe http://www.omii-europe.com/**
  - Amongst goals: Applications can be deployed and run on multiple grid environments through adherence to common services
    - Not required to develop different solutions for different grids

- **ETICS – www.eu-etics.org**
  E-infrastructure for Testing, Integration and Configuration of Software
  - Mission: Provide a generic service that other projects can use to efficiently and easily build and test their grid and distributed software.
    Set up the foundations for a certification process to help increasing the quality and interoperability of such software

OMII-UK: Open Middleware Infrastructure Institute

Building e-Research



Researchers are not funded to provide production quality software for others to use

OMII-UK exists to help bridge this gap!

Open Middleware Infrastructure Institute

To be a leading provider of reliable interoperable and open-source Grid middleware components services and tools to support advanced Grid enabled solutions in academia and industry.

- Formed University of Southampton (2004)
  - Focus on an easy to install e-Infrastructure solution
  - Utilise existing software & standards
- Expanded with new partners in 2006
  - OGSA-DAI team at Edinburgh
  - myGrid team at Manchester

Activity

- By providing a software repository of Grid components and tools from e-science projects
- By re-engineering software, hardening it and providing support for components sourced from the community
- By a managed programme to contract the development of “missing” software components necessary in grid middleware
- By providing an integrated grid middleware release of the sourced software components

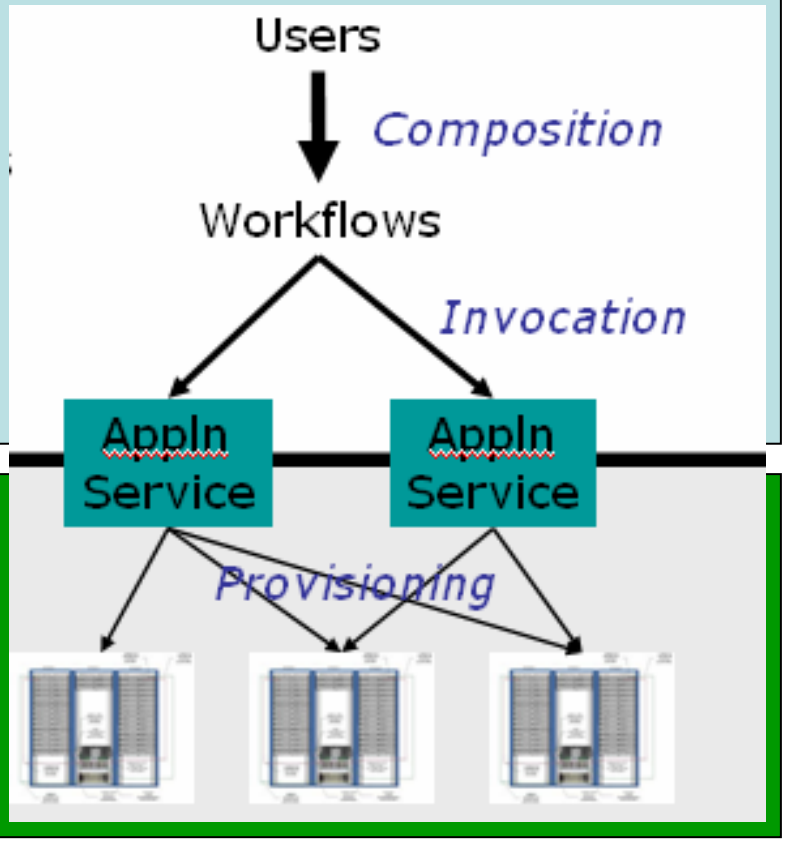
The Managed Programme:

- Integrated with the OMII Distribution
  - OGSA-DAI (Data Access service)
  - GridSAM (Job Submission & Monitoring service)
  - Grimoires (Registry service based on UDDI)
  - GeodiseLab (Matlab & Jython environments)
  - FINS (Notification services using WS-Eventing)
- Delivering into the repository
  - BPEL (Workflow service)
  - MANGO (Managing workflows with BPEL)
  - FIRMS (Reliable messaging)

OMII-UK and the NGS

Some **elements of OMII-UK managed programme and MyGrid are at this "VO-specific" level**

Potential for use of OMII-UK middleware to invoke NGS to provision services



NGS provides resources that can be invoked from WS-I and WS-RF services.

Longer-term future

- Interoperability with OMII-Europe
- NextGrid

EU initiatives

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NextGRID: Next Generation Grids

Stephen Davey, NeSC, UK

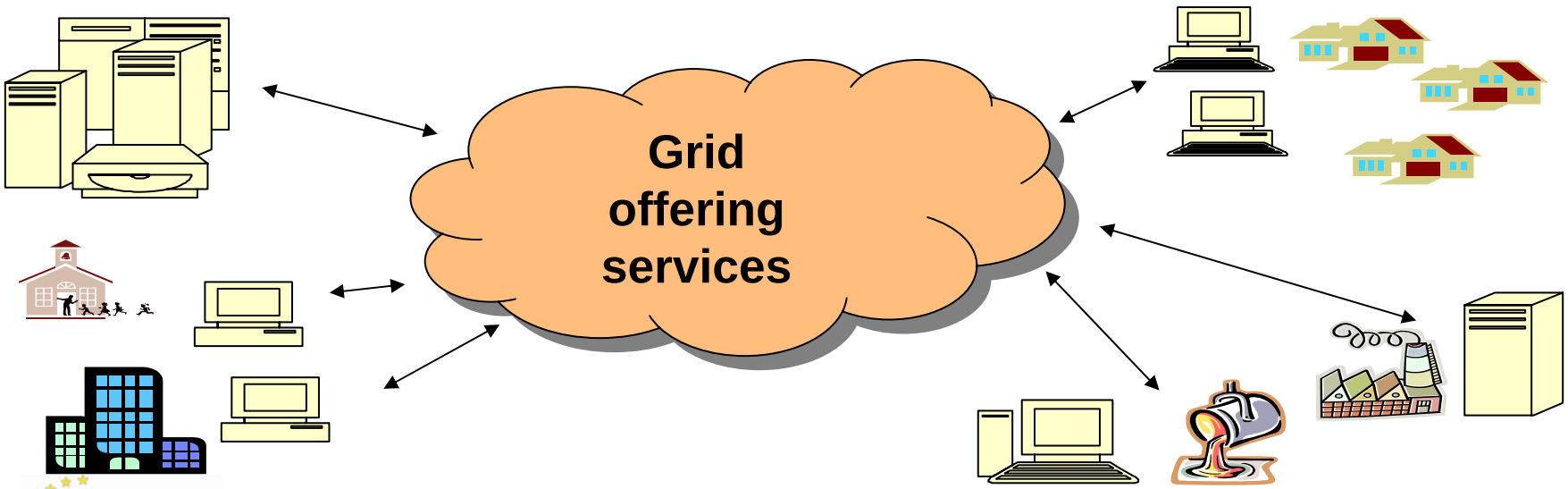
NextGRID Project

- 11M€ EU FP6 project; 3 years starting September 2004.
- 22 partners, some industrial, some academic.
- Developing Architecture for Next Generation Grids.
- Research and exploration project: A 5-10 year lookout.

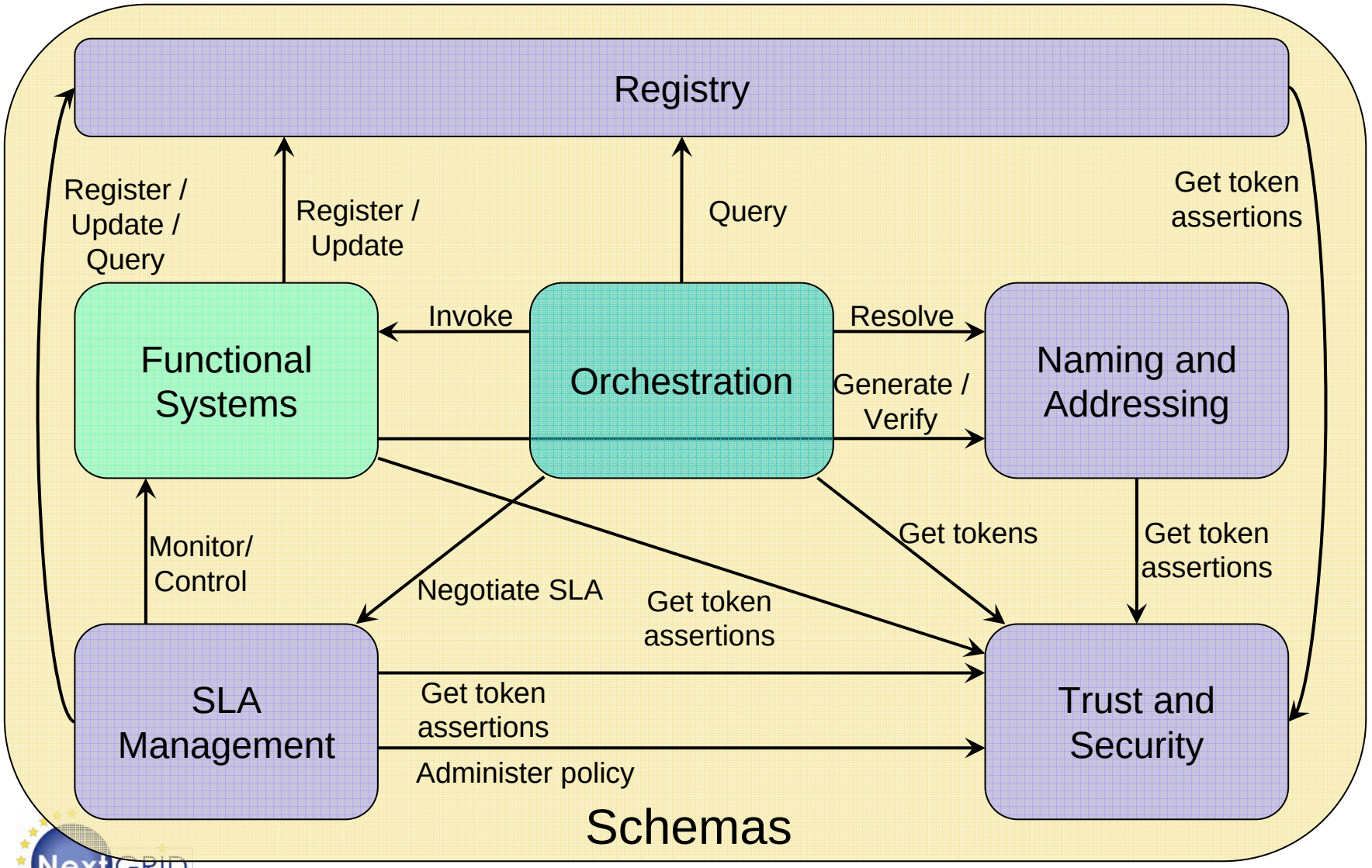
www.nextgrid.org

NextGRID Project Vision

- Business focus
  - Grids Applicable to Industry
  - Inter Enterprise Grids
- SLAs & QoS (not just best effort).
- Basis in Standards (for interoperability & stability).



NextGRID Architecture Interactions



Focus areas & Challenges

- Service Level Agreements
  - Establishing SLAs & negotiation
  - Evaluation and monitoring; Quality of Service
  - Aftermath; Accounting, billing, dissolution
- Workflows (across domains)
- Security
  - Security and operational integrity are critical
  - Dynamic trust establishment
  - Multiple security mechanisms
  - Process-based authorization
- Data

Application Examples & Experiments

- NextGRID reference applications from WP7 focus on 3 primary developments from the areas:
  - Financial modelling
    - Implied Volatility
    - Derivatives Pricing
  - Digital media production
    - On-demand video rendering
  - Supply chain management

- Challenges are manifested in these applications and resolved by the NextGRID experiments.
- Key components being developed and evaluated.

NextGRID Architecture White Paper

- Presents the NextGRID Vision and Technical Challenges, plus future work of the project
- Architectural Principles
  - Dynamics, Composition, Infrastructure
  - NextGRID Generalized Specifications and Profiles

http://www.nextgrid.org/download/publications/NextGRID_Architecture_White_Paper.pdf

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- NextGRID Architecture WP1 & many others

www.nextgrid.org

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- Long-term
  - NextGrid