



A sustainable e-Infrastructure for Europe

Barcelona, Spain

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- **The vision of an e-Infrastructure for Europe**
- **The international perspective**
- **Proposing a possible model**
 - Mission
 - Structure
 - Key services
 - Funding & Governance
- **Discussion**
- **Additional material – details of key services**

- **The Vision** (1)
 - *“An environment where research resources (H/W, S/W & content) can be readily shared and accessed wherever this is necessary to promote better and more effective research”*

(1) “A European vision for a Universal e-Infrastructure for Research” by Malcolm Read http://www.e-irg.org/meetings/2005-UK/A_European_vision_for_a_Universal_e-Infrastructure_for_Research.pdf

International Perspective

Recommendations⁽¹⁾ of the Global Science Forum⁽²⁾ of the Organisation for Economic Co-operation and Development

1: ***“Grids deserve to be treated as research infrastructures in their own right.....***

Governments should also consider taking steps to strengthen the international mechanisms for co-operation and co-ordination at the scientific, commercial and intergovernmental levels”

2: ***“A number of important Grid-related issues need to be addressed in a strategic, systematic, organised, international manner, with the participation of all the stakeholders: funding agency officials, Grid architects, implementers, and users from the scientific, academic and industrial communities”***

3: ***“Consideration should be given to the creation of new mechanisms (or the strengthening of existing ones) to facilitate access to Grids for researchers and research organisations in developing countries, plus other appropriate measures to broaden international participation in grid projects”***

(1) Report on Grids and Basic research Programmes, Sydney September 25-27 2005, <http://www.oecd.org/dataoecd/30/36/36213997.pdf>

(2) Australia, Austria, Belgium, Denmark, France, Germany, Italy, Japan, Netherlands, New Zealand, Sweden, United Kingdom, United States

e-IRG Recommendation:



“The e-IRG recognises that the current project-based financing model of grids (e.g., EGEE, DEISA) presents continuity and interoperability problems, and that new financing and governance models need to be explored – taking into account the role of national grid initiatives as recommended in the Luxembourg e-IRG meeting.”

White Paper: <http://www.e-irg.org/publ/2005-Luxembourg-eIRG-whitepaper.pdf>

e-IRG Open Workshop: April 10-11, 2006, Linz, Austria
➔ Towards Sustainable e-Infrastructures

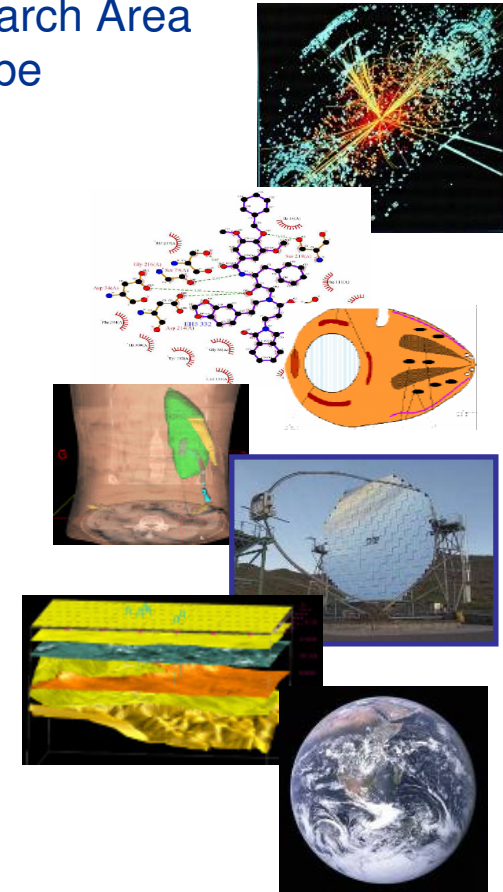
Proposed model of a e-Infrastructure for Europe

- This model builds on the experience gained with the EGEE project, infrastructure and applications
- Takes into account the OECD & eIRG recommendations
- Input from EGO paper ⁽¹⁾ and the workshops held in Thoiry (France) 30-31st January and Kassel (Germany) 10th March

(1) *Establishing an European Grid Organisation (EGO)*,
<http://www.e-irg.org/meetings/2005-UK/050617-EGO-position-paper.pdf>

Mission

- **Infrastructure**
 - Manage and operate production Grid for European Research Area
 - Interoperate with e-Infrastructure projects around the globe
 - Contribute to Grid standardisation and policy efforts
- **Support applications from diverse communities**
 - Astrophysics
 - Computational Chemistry
 - Earth Sciences
 - Finance
 - Fusion
 - Geophysics
 - High Energy Physics
 - Life Sciences
 - Multimedia
 - ...
- **Business**
 - Forge links with the full spectrum of interested business partners
- **Disseminate knowledge about the Grid through training**



**Federated model bringing together
National Grid Initiatives (NGIs) to build
a European organisation**

EGEE federations would evolve into NGIs

Each NGI is a national body

- Recognised at the national level
- Mobilises national funding and resources
- Contributes to international standards and policies
- Operates the national e-Infrastructure
- Application independent
- Supports existing and new communities

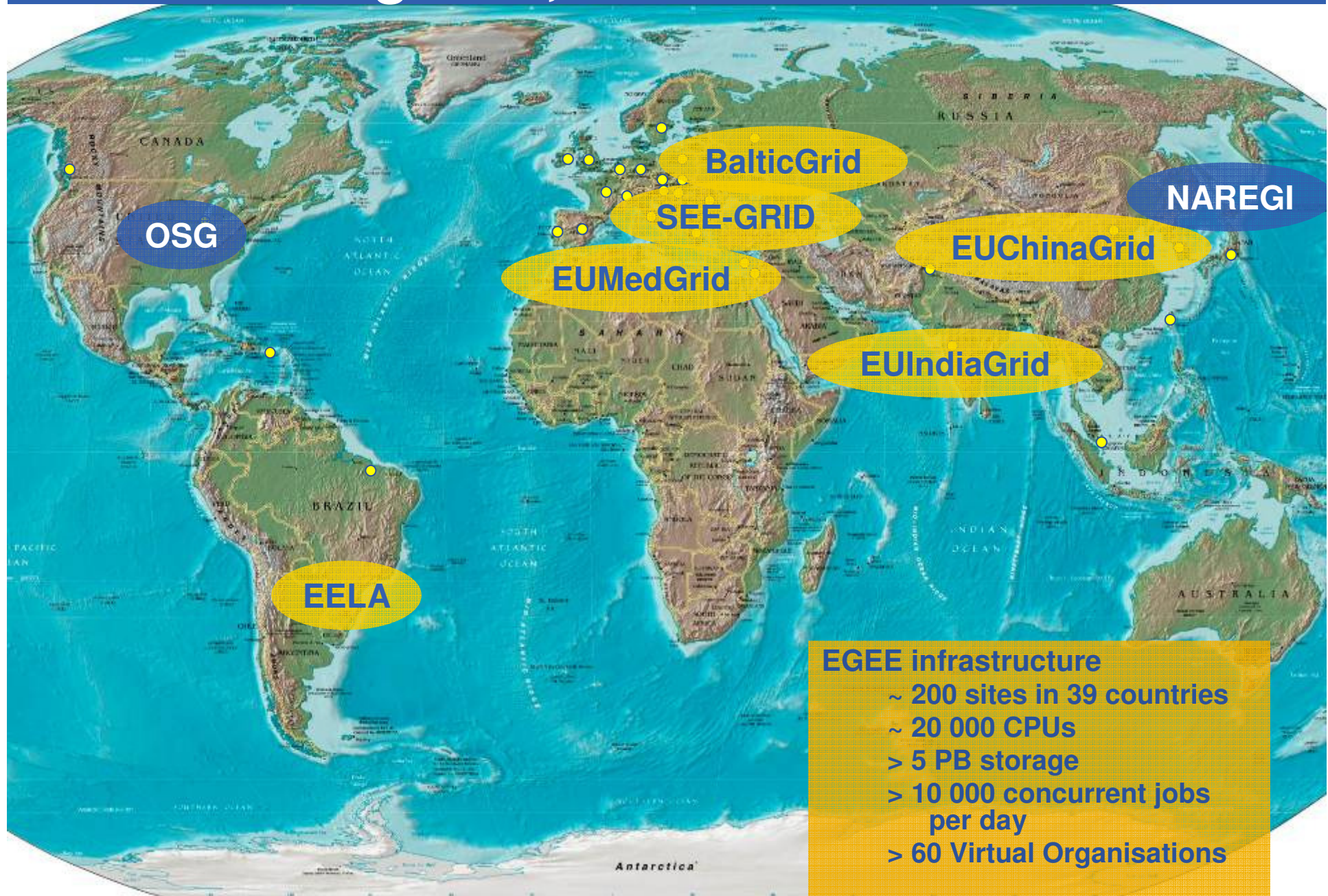


European National Grid Projects

- Austria – AustrianGrid
- Belgium – BEGrid
- Bulgaria – BgGrid
- Croatia – CRO-GRID
- Cyprus – CyGrid
- Czech Republic- METACentre
- Slovakia
- Denmark
- Finland
- France - *planned*
- Germany – D-GRID
- Greece - HellasGrid
- Hungary
- Ireland - Grid-Ireland
- Israel – Israel Academic Grid
- *Italy - planned*
- Netherlands – DutchGrid
- Norway – NorGrid
- Poland
- Portugal - *planned*
- Romania – RoGrid
- Serbia – AEGIS
- Slovenia SiNET
- Spain - *planned*
- Sweden – SweGrid
- Switzerland
- Turkey – TR-Grid
- United Kingdom - eScience

Based on information gathered for EGEE-II proposal in September 2005

A global, federated e-Infrastructure



EGEE infrastructure

- ~ 200 sites in 39 countries
- ~ 20 000 CPUs
- > 5 PB storage
- > 10 000 concurrent jobs per day
- > 60 Virtual Organisations

EGI Key Services

- **Based on experience gathered during EGEE, the following key services have been found necessary for a central organisation in coordination with the NGIs**
 - The information on the following slides are taken from existing EGEE structures and procedures as a means of explaining the concepts
- **Operation of Infrastructure**
 - Runs Operational Coordination Centre linking a Regional Operations Centre (Point of Presence) in each NGI
 - Coordinates the managed upgrades of services deployed by NGIs
 - Coordinates the grid security (incident response etc.)
 - Coordinates the grid resource accounting
 - Negotiates resources for user communities
 - General management of the User Support process
 - Interaction point with GEANT for grid issues
 - Provides documentation for end users and resource providers

EGI Key Services (cont)

- **Middleware testing and certification**
 - Integrates middleware from other sources to produce distributions
 - Provides first-level middleware support team
 - Operates beta-test services for upcoming distributions
- **Application support**
 - No direct support but rather coordination of NGI support groups and management of overall application lifecycle (virtuous cycle)
- **Dissemination and outreach**
 - Branding, media relations, production of promotional material, websites etc
 - Event organisation
 - Public outreach & surveys - Ensuring higher level of media coverage as technology matures and becomes available to more end users
 - Representation of NGIs in international bodies and standards groups at a policy level
- **Training**
 - Aid in the formation of NGIs and their management/operations
 - Training material repository

EGI/NGIs and industry

- **Business model for how industry can commercially exploit the research infrastructure managed by EGI/NGIs is unclear**
 - Do not have mechanisms by which clients could pay for use of resources
 - Use of GEANT network for commercial application is restricted
- **Likely to see transfer of technology from research to industry by adoption/internalisation of EGI/NGI backed products and services (e.g. middleware, operations procedures/techniques)**
 - For multi-site corporate usage or to offer a service to a set of SMEs
 - Several examples already exist for EGEE
- **EGI/NGIs could subcontract infrastructure support to industry and make use of commercial software as standards evolve**

EGI Managed Resource Centres

- **Given the existence of such an e-Infrastructure, EGI managed resources centres can be established:**
 - Create shared pool of resources (CPU, disk and data curation) independent of funding for specific user communities
 - Joint capital funding from NGIs and EU as part of new resource infrastructure
 - Selection based on bids against a defined service level agreement
 - Business models with pay-per-usage to cover operational and depreciation costs
 - Would create/test example business models for potential future commercial supply and/or exploitation

EGI Governance and Funding

- **Governance**
 - Organisation with its own legal identity
 - NGIs are the stakeholders
 - NGIs would form the governing council
 - Annual reviews by independent experts nominated by the EU
- **What to Fund**
 - Basic infrastructure and its operation including national Points-of-Presence, regional resource centres and central organisation
- **How to Fund**
 - Basic funding by NGIs (50%) and EU (50%) ?
 - EU willing to fund preparatory project to set-up EGI (~12 months?)
 - Full EU co-funding (FP7) to start in 2008/9

Possible parallel streams for Grids Structures

1. Sustainable e-Infrastructure

- Targeted non-competitive call open to EGI & NGIs only
- Linked to established roadmap as proposed by ESFRI
- Long-term cycle (up to 7 years)
- Production/operations focus
- Application independent

2. On-going developments

- Competitive calls focused on IST priorities
- Examples: projects such as EGEE, OMII-Europe, NextGrid, DILIGENT etc.
- Limited duration

Complementary streams where successful developments (2) should become part of the sustainable infrastructure (1)

Possible combination of use of EU instruments for on-going and new infrastructures

- **The need for a European e-Infrastructure has been identified**
- **The current structures are reaching their limits**
- **A model committing the National Grid Initiatives and building a central organisation is proposed – your input and feedback is actively sought**
- **Such a scheme will ensure a sustainable e-Infrastructure for research and help maintain Europe's leading position**

Details on EGI key services

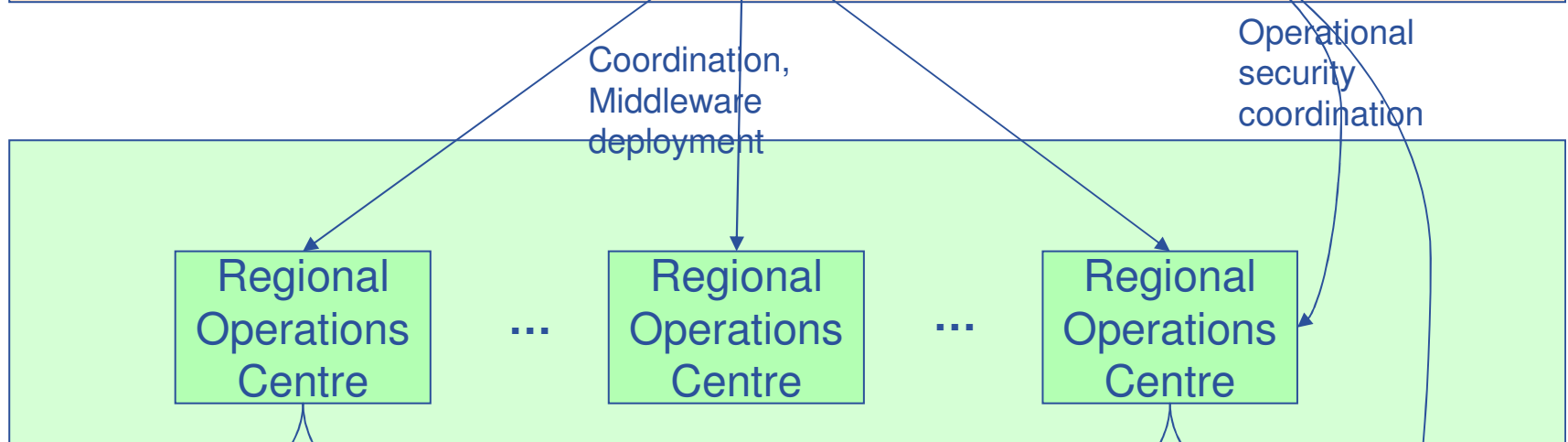
- **The following slides provide greater detail of the key services proposed for the central organisation in coordination with the NGIs**
- **These details are based on the experience gathered through EGEE and related projects**

Operations Coordination

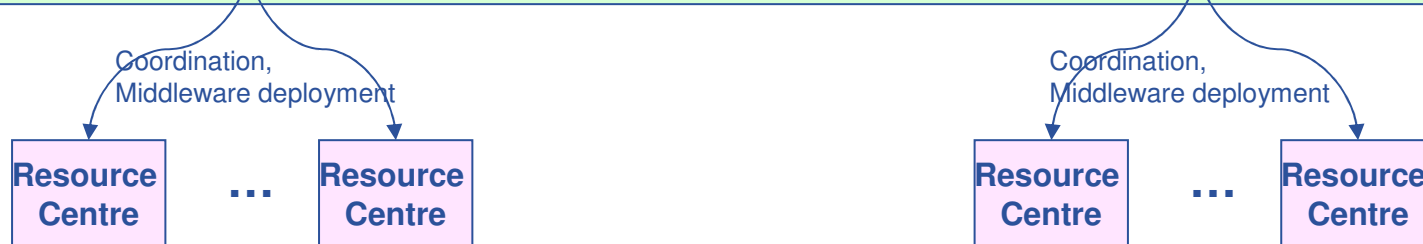
EGI



NGI



local

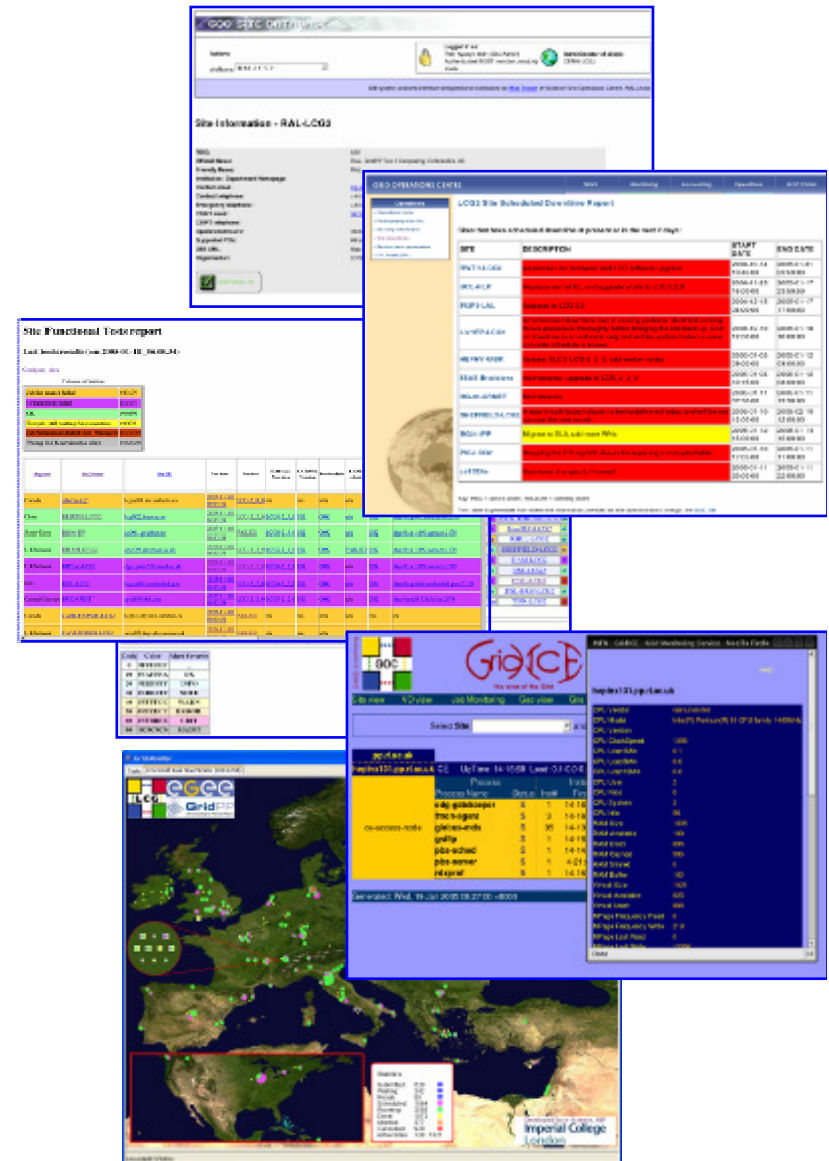


JSPG: Joint Security Policy Group
OSCT: Operational Security Coordination Team

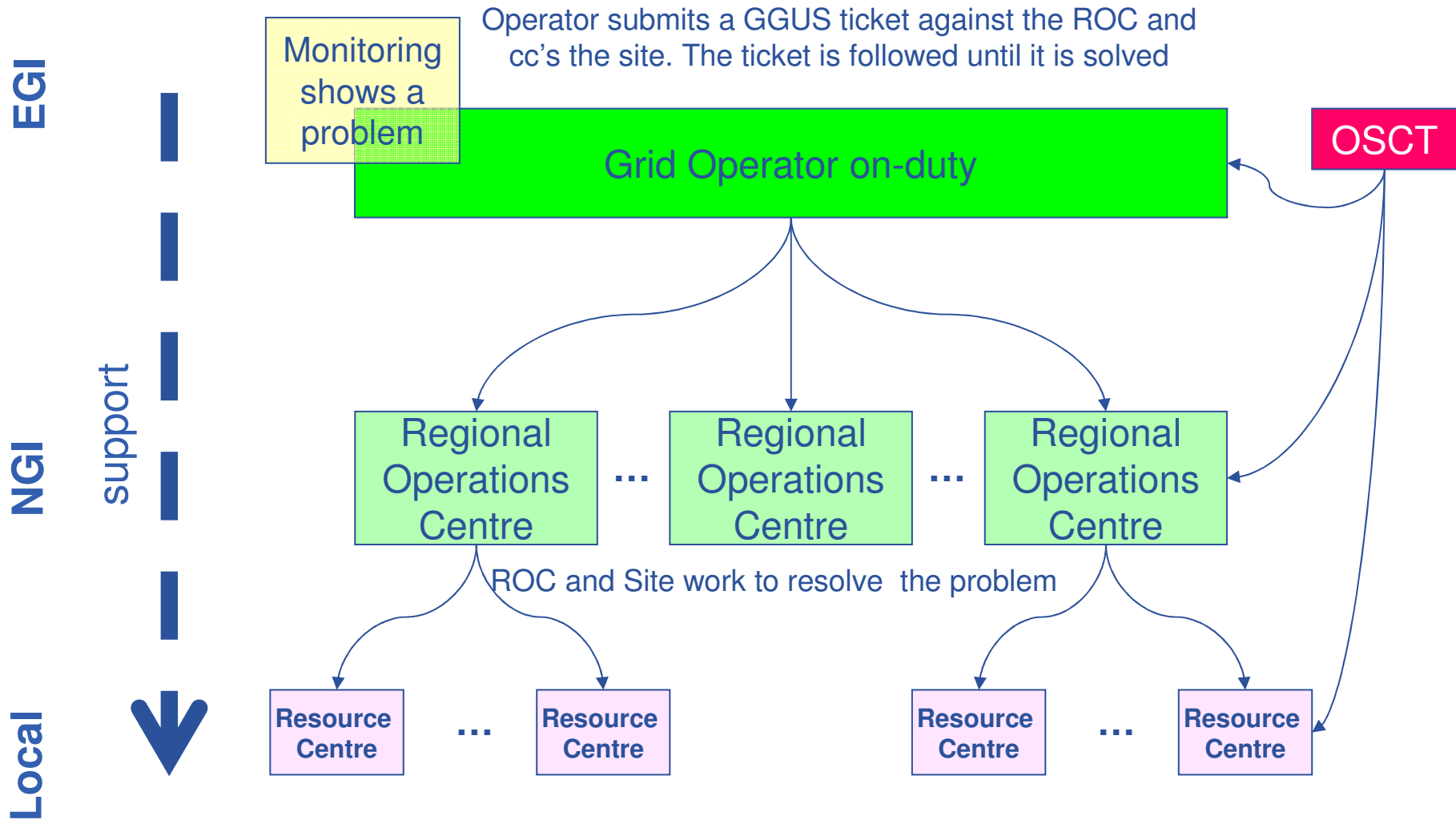
Regional Operations Centre (ROC)

Distributed responsibility for operations:

- **One ROC in each NGI**
 - A grid “Point of presence”
 - Manage daily grid operations – oversight, troubleshooting
 - **“Operator on Duty”** with weekly rota between NGIs
 - Run infrastructure services (not applications themselves)
 - Support for user and operations issues
 - Provide regional knowledge and adaptations
- **Operations coordination**
 - Regular operations & managers meetings
 - Series of Operations Workshops
- **Procedures described in Operations Manual**
 - Introducing new sites
 - Site downtime scheduling
 - Suspending a site
 - Escalation procedures
 - Etc.



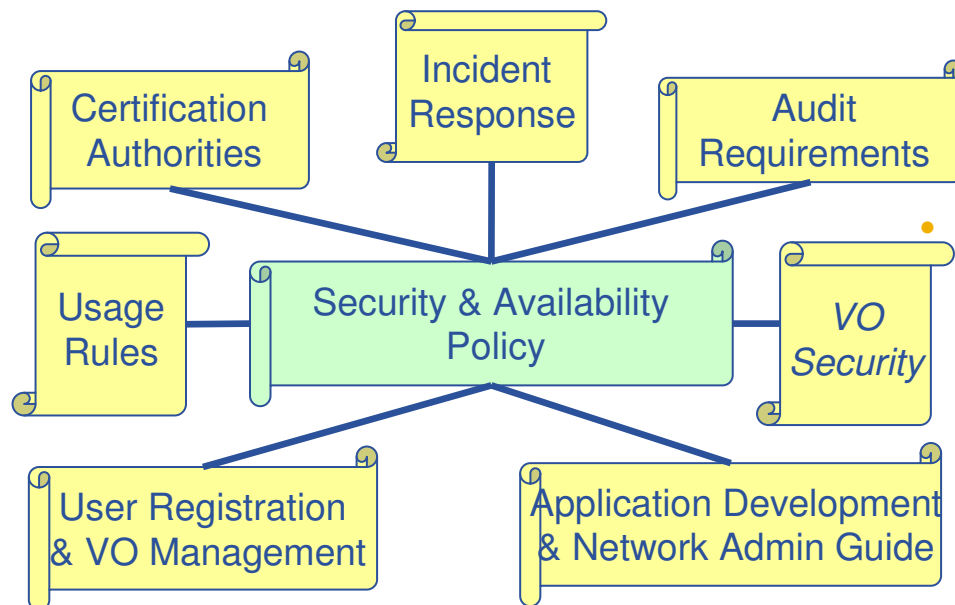
Operations support workflows



Coordination of Grid Security

Joint Security Policy Group

- Across many Grid infrastructures
- Policy Set:



Policy Revisions

- **Grid Acceptable Use Policy (AUP)**
 - for all VO members using many Grid infrastructures
 - EGEE, OSG, SEE-GRID, DEISA, national Grids...

- **VO Security**

- responsibilities for VO managers and members
- VO AUP to tie members to Grid AUP accepted at registration

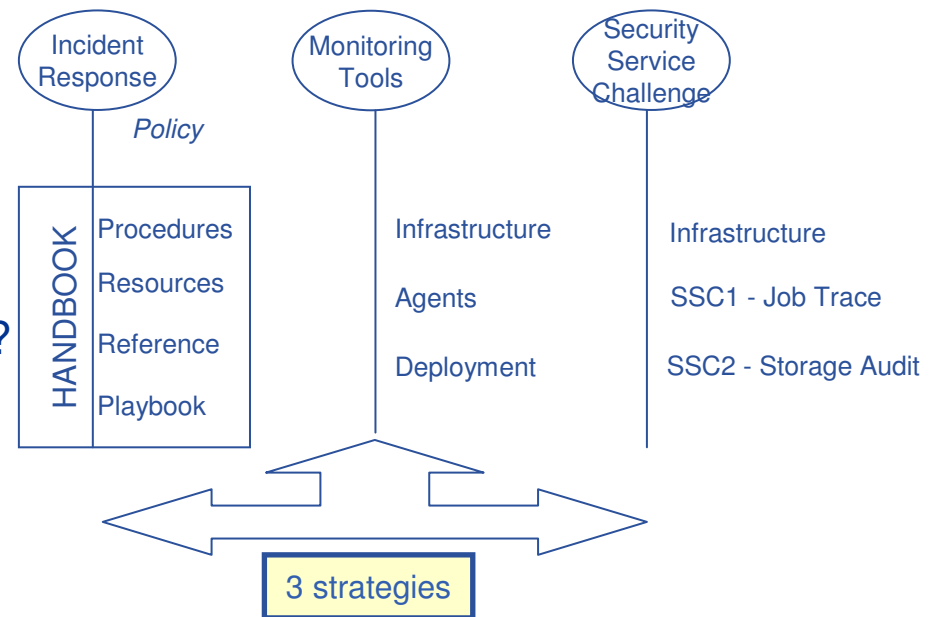
Incident Handling and Response

- defines basic communications paths
- defines requirements
 - reporting
 - response
 - protection of data
 - analysis
- not to replace or interfere with local response plans

Operational Security Coordination Team (OSCT)

OSCT membership → ROC security contacts

- **What it is not:**
 - Not focused on middleware security architecture
 - Not focused on vulnerabilities (see *Vulnerabilities Group*)
- **Focus on Incident Response Coordination**
 - Assume it's broken, how do we respond?
 - Planning and Tracking
- **Focus on 'Best Practice'**
 - Advice
 - Monitoring
 - Analysis
- **Coordinators for each ROC**



Vulnerability Group

- **Purpose: inform developers, operations, site managers of vulnerabilities as they are identified and encourage them to produce fixes or to reduce their impact**
- **Set up (private!) database of vulnerabilities**
 - To inform sites and developers
- **Urgent action → OSCT to manage**
- **After reaction time (45 days)**
 - Vulnerability and risk analysis given to OSCT to define action – publication?
 - Will not publish vulnerabilities with no solution
- **Report progress and statistics on vulnerabilities**
- **Balance between open responsible public disclosure and creating security issues with precipitous publication**

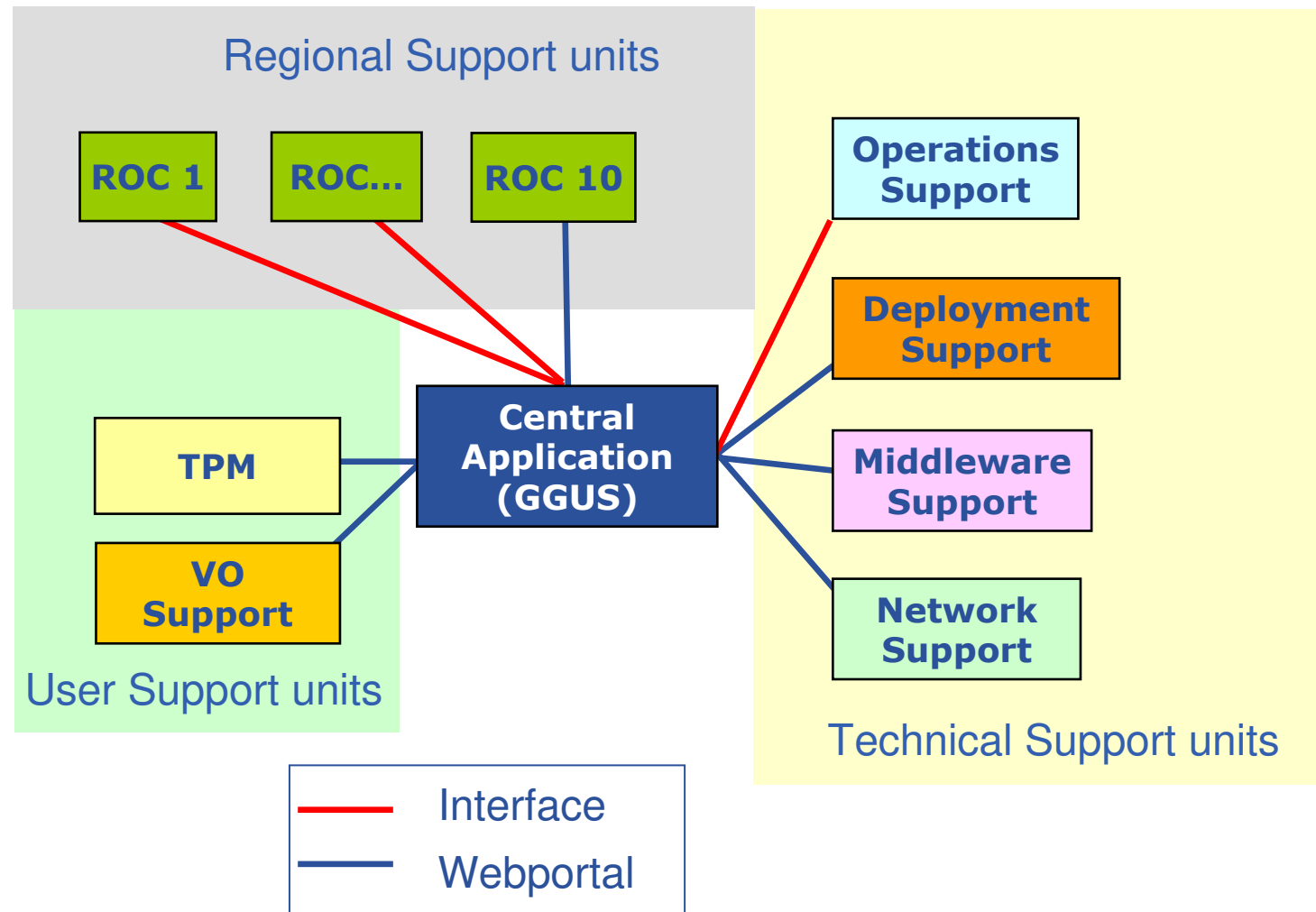
General management of the User Support process

- **A portal with a well structured information and updated documentation**
- **Knowledgeable experts**
- **Correct, complete and responsive support**
- **Tools to help resolve problems**
 - search engines
 - monitoring applications
 - resources status
- **Examples, templates, specific distributions for software of interest**
- **Interface with other Grid support systems**
- **Connection with developers, deployment, operation teams**
- **Assistance during production use of the grid infrastructure**

The Support Model

"Regional Support with Central Coordination"

The ROCs, VOs are connected via a central integration platform provided



Negotiates resources for user communities

- **Brings together VOs and NGIs**
- **Negotiate for services and resources**
 - Run services on behalf of the VO
 - Provide compute and/or storage resources

NOTE: Computational and storage resources are not funded by EGI

Interaction point with GEANT for grid issues

- Technical Network Liaison Committee to address grid issues with GEANT/NRENs
- Definition and establishment of Service Level Agreements for end-to-end services
- Joint operation of ENOC (e-Infrastructure Network Operations Centre)
- Deployment of network performance mgmt tools
- Coordination of input to GGF Network Measurements Working Group

Middleware testing and certification

