



Enabling Grids for
E-science in Europe

*International Conference "Baltic Grid"
Induction to the EGEE project,
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EGEE Operations: Towards an international production-quality Grid infrastructure

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Presentation is based on available EGEE SA1 presentation material

EGEE is a project funded by the European Union

Objectives of this session

- Highlight EGEE key position in European Research Infrastructures arena
- Give an overview of EGEE operations internal organisation
- Provide information on resources numbers at a pan-European and regional scale
- Provide an example of regional operations structure

Outline

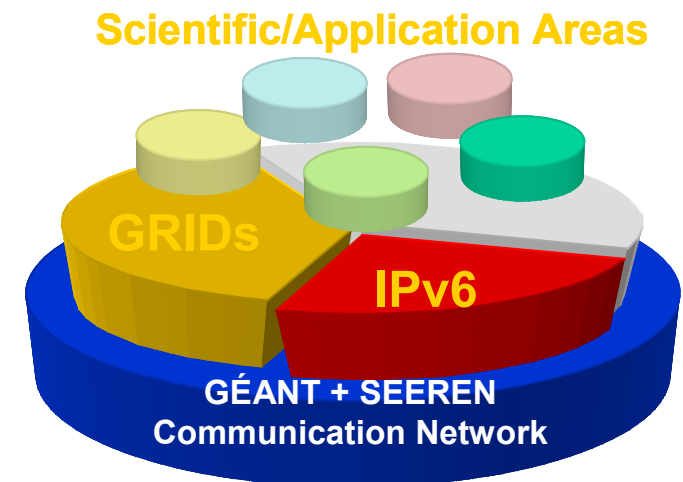
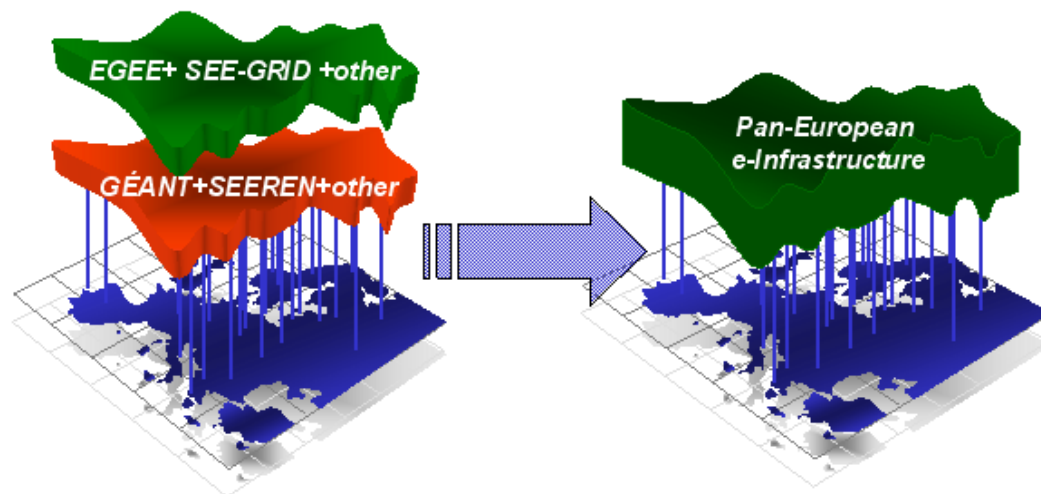


- Background - eInfrastructures
- EGEE Figures and Organization
- EGEE Operations
- EGEE-SEE: a regional example

- **GEANT Success: pan-European high-speed research network**
 - 33 states & 3900 institutes connected (www.dante.net/geant)
 - Fully-fledged administrative & operational support
 - Multi-tier architecture (campus-(regional MAN)-NREN-(regional WAN)-GEANT)
 - Implemented "eEurope 2002" directives
 - Successful extensions to SEE region through SEEREN and Eumedconnect projects
- **Grid technologies getting mature**
 - Multiple successful FP5 Grid projects (e.g. Datagrid, CrossGrid)
 - Grid middleware getting stable (Globus, Unicore, Condor, etc.)
 - Applications becoming "grid-ready" (High Energy Physics, Bio-informatics, other)
- **Getting ready for eInfrastructures:**
 - Unified high-speed networking + grid middleware environment for distributed computing - storage - networking sharing platform (www.einfrastructures.org)
 - Allows new methods of global collaborative research: "eScience"
 - Implementing "eEurope 2005 directives: World Wide Grid" and FP6 RI objectives
 - EU has heavily invested in FP6 Research Infrastructures projects:
 - GEANT-GN2, EGEE, DEISA, SEE-GRID!

Getting ready for eInfrastructures

- Grid layers should be considered as infrastructure layers
- Network + Grid M/W = *electronic Infrastructure*
- Applications run on top of the *eInfrastructure*

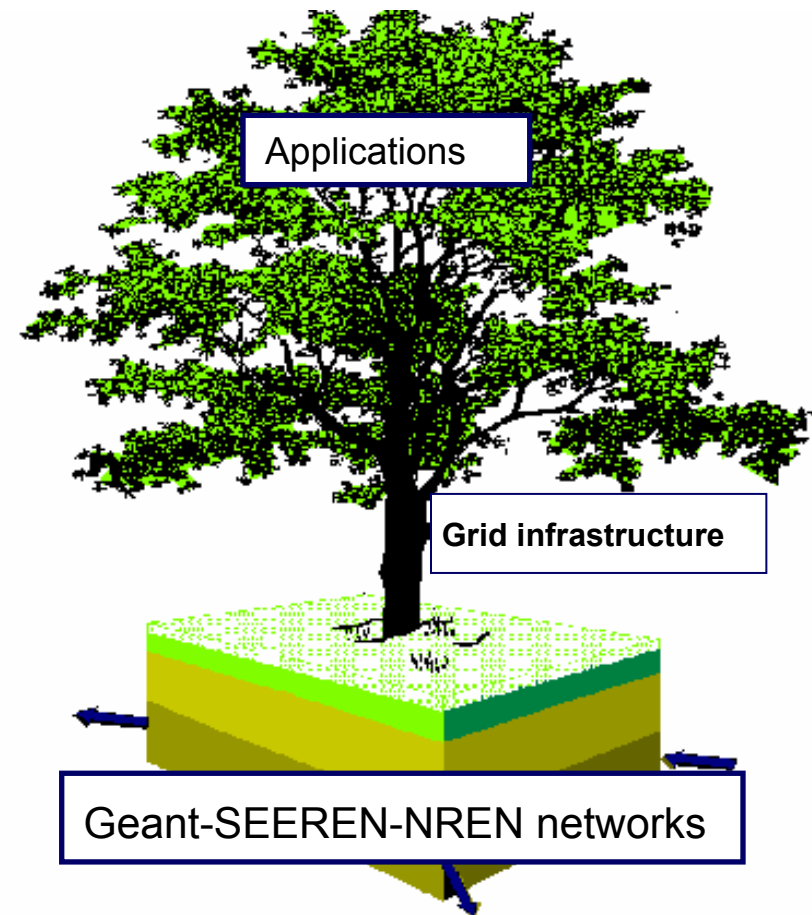


eInfrastructure background

- **But still missing...**
 - **Production-quality (stable, mature) Grid middleware**
 - **Production-quality operational support**
 - Grid Operation Centres (as NOCs), Helpdesks, etc.
 - **Multi-discipline grid-enabled application environment**
 - Now led by HEP, Bio-info
 - **Administrative and policy decision framework in order to share resources at pan-European scale (and beyond)**
 - Areas such as AAA (Authentication, Authorisation, Accounting)
 - An EU-wide Acceptable Usage Policy (AUP) for the Grid; similar to the National Research & Education Networks (NRENs) AUPs
 - Funding Policies harmonisation
 - **All the above will enable panEuropean Resource Sharing**
- **EGEE project** will tackle most of the above issues

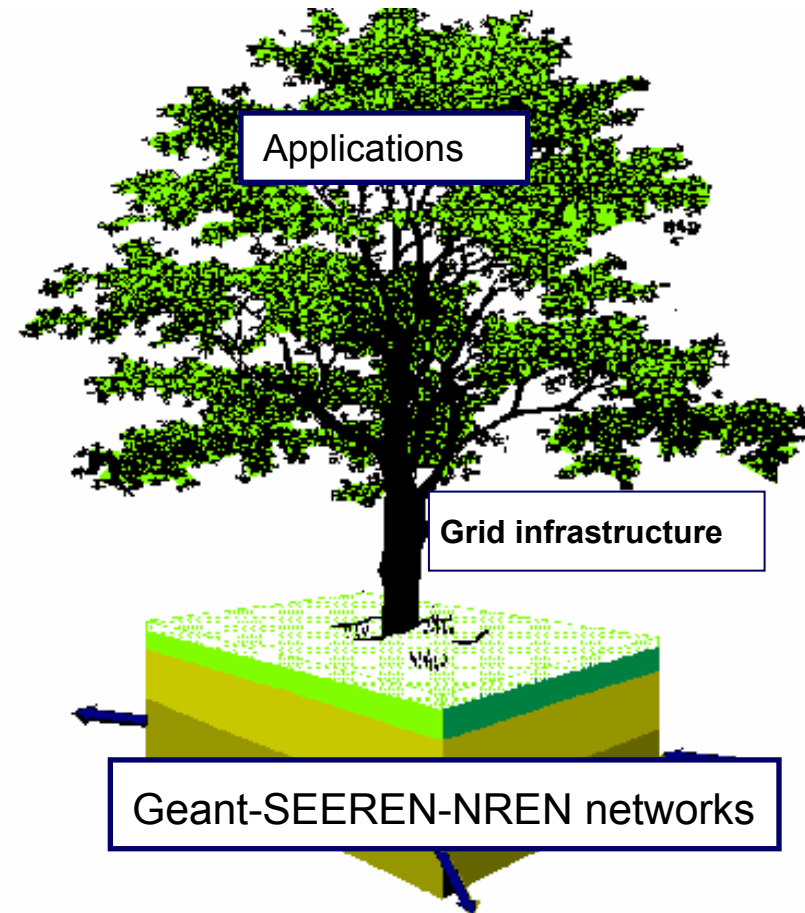
EGEE Overview (I)

- **Goal:**
 - Create a Europe-wide production-quality Grid infrastructure for e-Science on top of present and future EU Research Networking infrastructure
- **Build on:**
 - EU and EU member states major investments in Grid Technology
 - International connections (US and AP)
 - Several pioneering prototype results
 - Large Grid development teams in EU require major EU funding effort
- **Approach**
 - Leverage current and planned national and regional Grid initiatives and infrastructures
 - Work closely with relevant industrial Grid developers, NRENs and US-AP projects
- <http://www.cern.ch/egEE>



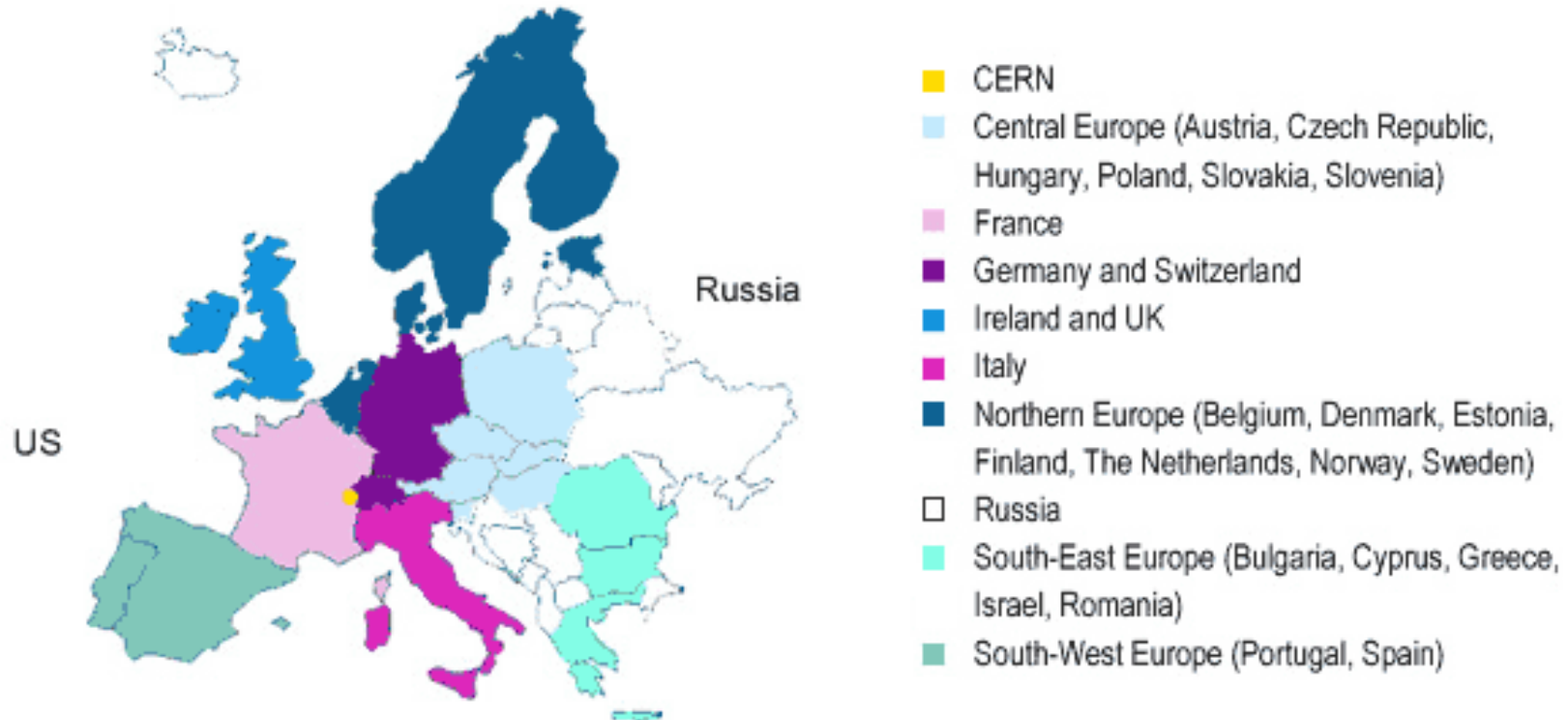
EGEE Overview (II)

- **In plain words:**
 - EU does not fund infrastructures (CPUs, Storage, etc.)
 - Infrastructures (in terms of resource centres) will be funded by National Grid Projects
 - Resource Centres' (RCs) integration into the pan-European eInfrastructure is eligible for EU funding support
 - EU supports mainly labour – e.g. middleware, operations, training teams
 - GEANT + NREN networks will be used to interconnect the Resource Centres



EGEE Figures & Organization

- Coordinator: European Organization for Nuclear Research - **CERN**
- **70** leading institutions in **27** countries, federated in regional Grids
- **32 M € EU** funding in 2004-2005 (twice from partners)



EGEE Activities

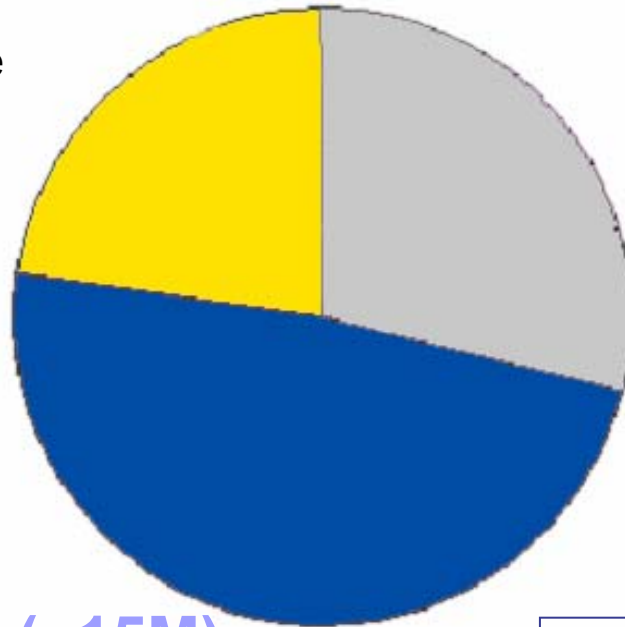
24% Joint Research

JRA1: Middleware Engineering and Integration

JRA2: Quality Assurance

JRA3: Security

JRA4: Network Services Development



28% Networking

NA1: Management

NA2: Dissemination and Outreach

NA3: User Training and Education

NA4: Application Identification and Support

NA5: Policy and International Cooperation

48% Services (~15M)

SA1: Grid Operations, Support and Management

SA2: Network Resource Provision

Emphasis in EGEE is on operating a production-quality grid including end-users' support

EGEE Service Activity 1: Grid operations, support and management

- Create, operate, support and manage a production quality infrastructure
- Offered services:
 - Middleware deployment and installation
 - Software and documentation repository
 - Grid monitoring and problem tracking
 - Bug reporting and knowledge database
 - VO services



- Operations Management Centre
- Core Infrastructure Centre
- Regional Operations Centre

SA1 detailed objectives

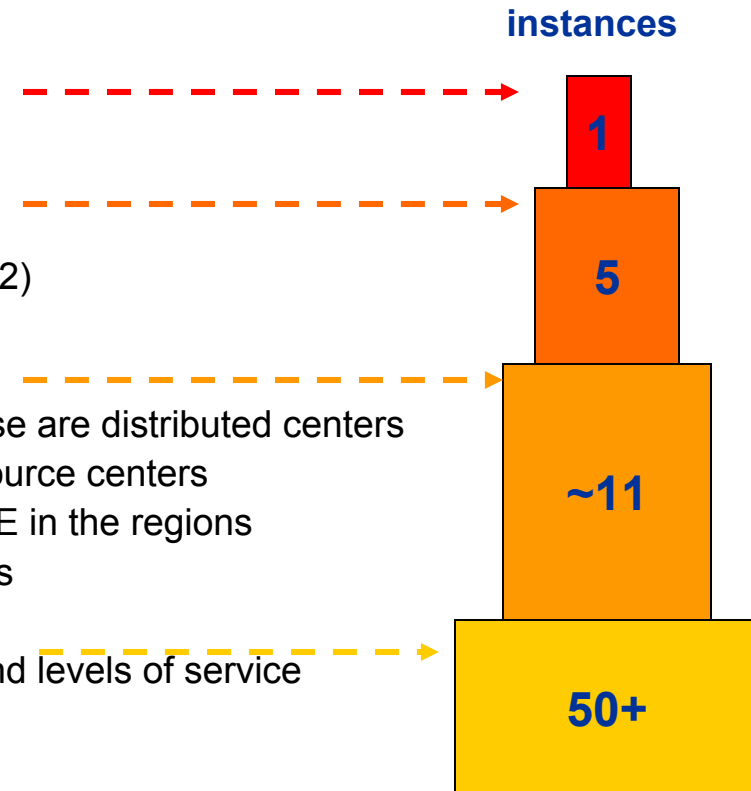
- **Core infrastructure services: (CIC, ROC)**
 - Operate essential grid core services
- **Grid monitoring and control: (CIC, ROC)**
 - Proactively monitor the operational state and performance
 - Initiate corrective action
- **Middleware deployment and resource induction: (OMC, ROC)**
 - Validate and deploy middleware releases
 - Set up operational procedures for new resources
- **Resource provision and user support: (ROC, CIC)**
 - Coordinate the resolution of problems from both Resource Centres and users
 - Filter and aggregate problems, providing or obtaining solutions
- **Grid management: (OMC, ROC)**
 - Coordinate ROCs and CICs
 - Manage the relationships with resource providers via service-level agreements.
- **International collaboration**
 - Drive collaboration with peer organisations in the U.S. and in Asia-Pacific
 - Ensure interoperability of grid infrastructures and services for cross-domain VO's
 - Participate in liaison and standards bodies in wider grid community

Operations centers: hierarchy

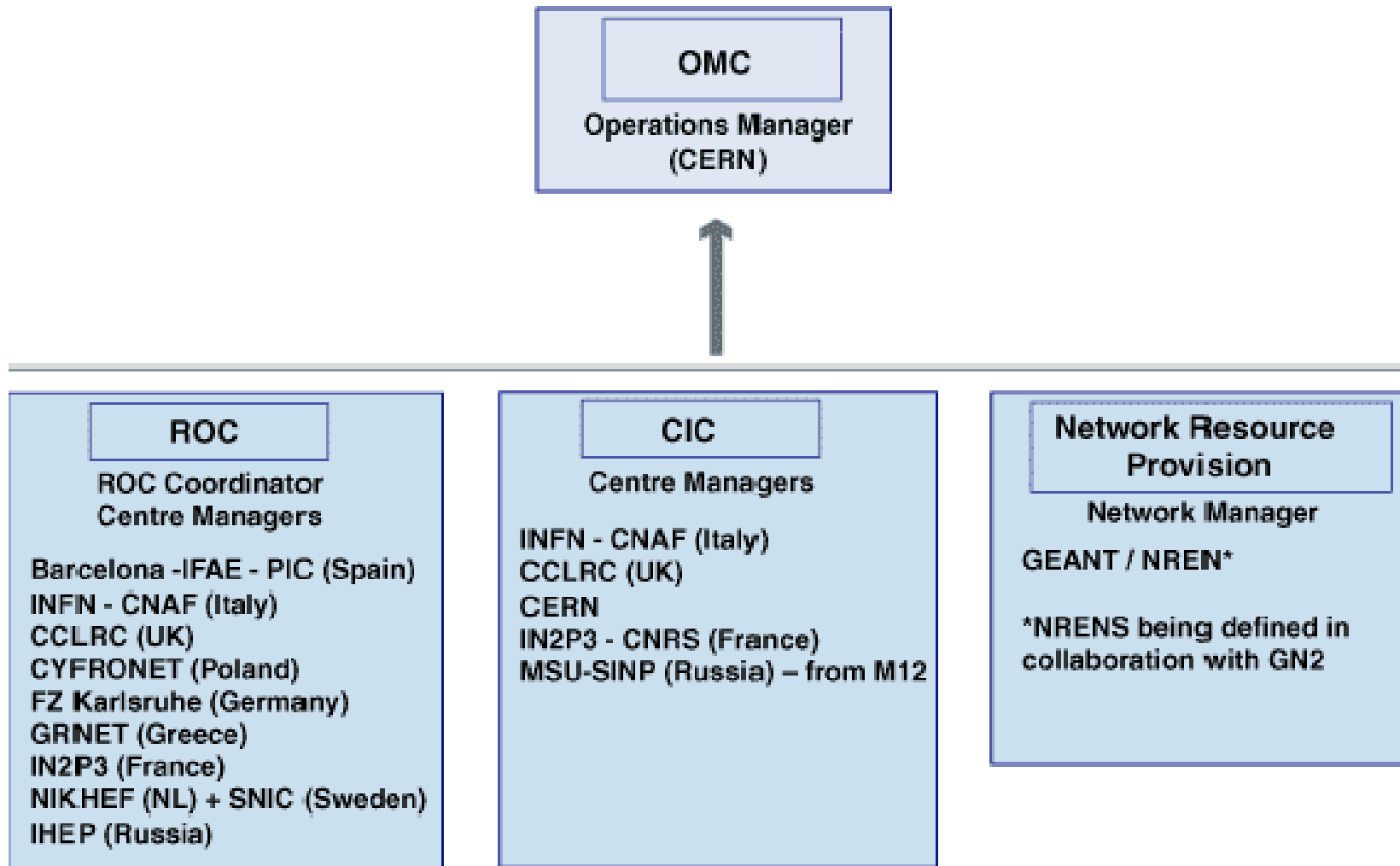
- Implement the objectives to provide
 - Access to resources
 - Operation of EGEE as a reliable service
 - Deploy new middleware and resources
 - Support resource providers and users

- With a clear **layered** structure

- **Operations Management Centre (CERN)**
 - Overall grid operations coordination
- **Core Infrastructure Centers**
 - CERN, France, Italy, UK, Russia (from M12)
 - Operate core grid services
- **Regional Operations Centers**
 - One in each federation, in some cases these are distributed centers
 - Provide front-line support to users and resource centers
 - Support new resource centers joining EGEE in the regions
 - Support deployment to the resource centers
- **Resource Centers**
 - Many in each federation of varying sizes and levels of service
 - Not funded by EGEE directly



Operations centers: hierarchy



EGEE Resources

- Resource Centers

Month 1: 10

Month 15: 20

Region	CPU nodes	Disk (TB)	CPU Nodes Month 15	Disk (TB) Month 15
CERN	900	140	1800	310
UK + Ireland	100	25	2200	300
France	400	15	895	50
Italy	553	60.6	679	67.2
North	200	20	2000	50
South West	250	10	250	10
Germany + Switzerland	100	2	400	67
South East	146	7	322	14
Central Europe	385	15	730	32
Russia	50	7	152	36
Totals	3084	302	8768	936

EGEE Production vs. Pre-production

- **Production service**

- Main production service for production apps
- MUST run reliably, runs only proven stable, debugged middleware and services – start with LCG2 M/W
- Full support – 24x7 as soon as possible
- Start with 16x(5-7?) – rotation of coverage between CICs

- **Pre-production service**

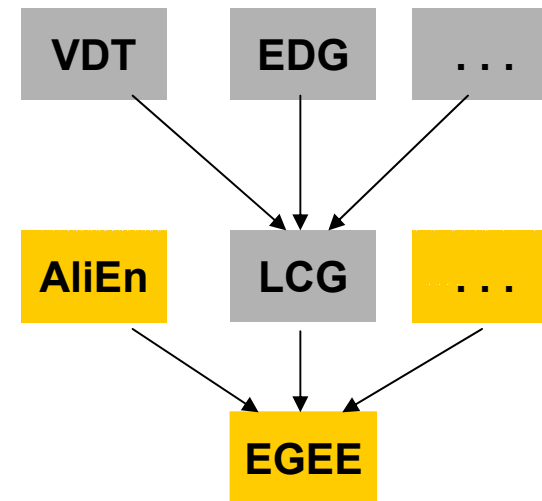
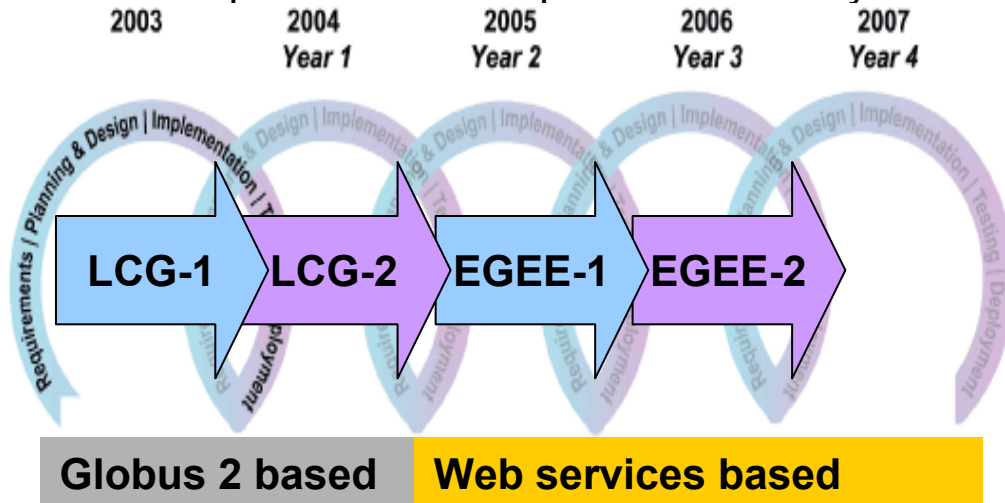
- For testing purposes (ops, m/w, apps)
- Running next M/W version
- For year 1 pre-prod will run EGEE 1
- When EGEE M/W ready – move to production and pre-prod service will be next EGEE candidate release
- Initial resources from test-bed sites



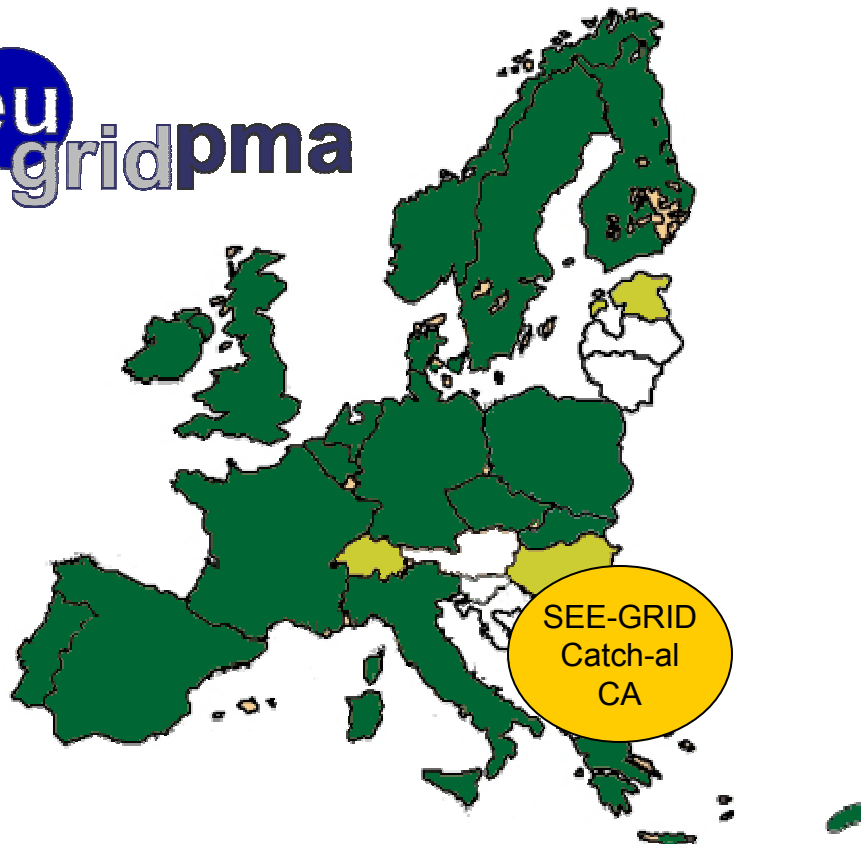
- Operations Management Centre
- Core Infrastructure Centre
- Regional Operations Centre

EGEE Middleware

- From day 1 (1st April 2004)
 - Production grid service based on the LCG* infrastructure running LCG-2 grid middleware (*LCG= *Large Hadron Collider Computing Grid* – www.cern.ch/lcg)
 - LCG-2 will be maintained until the new generation has proven itself (fallback solution)
- In parallel develop a “next generation” grid facility (*JRA*)
 - Produce a new set of grid services according to evolving standards (Web Services)
 - Run a development service providing early access for evaluation purposes
 - Will replace LCG-2 on production facility in 2005



- *Policy Management Authority: “Club” of trusted Certification Authority managers www.eugridpma.org*



- Green: CA Accredited
- Yellow: being discussed

Other Accredited CAs:

- DoEGrids (US)
- GridCanada
- ASCCG (Taiwan)
- ArmeSFO (Armenia)
- CERN
- Russia (*HEP*)
- FNAL Service CA (US)
- Israel
- Pakistan

EGEE Conferences - Training

- 1st project conference held at Cork- Ireland, April 18-22, 2004
- 2nd project conference: Den Haag, the Netherlands, 18-26 November, 2004
- 3rd project conference: Athens, Greece, 23-27 April, 2005
- 4th project conference: UK-Scotland, fall 2005



Course Type	Average Attendance	Course Requirements	Number per Year
Induction	50	2 Day, Web Access	≥ 10
Application Developer Training	25	4 Day, Workstations	≥ 8
Advanced Courses	25	5 Day, Workstations	≥ 2
Technical Activity specific Retreats	30	2 Day	≥ 6

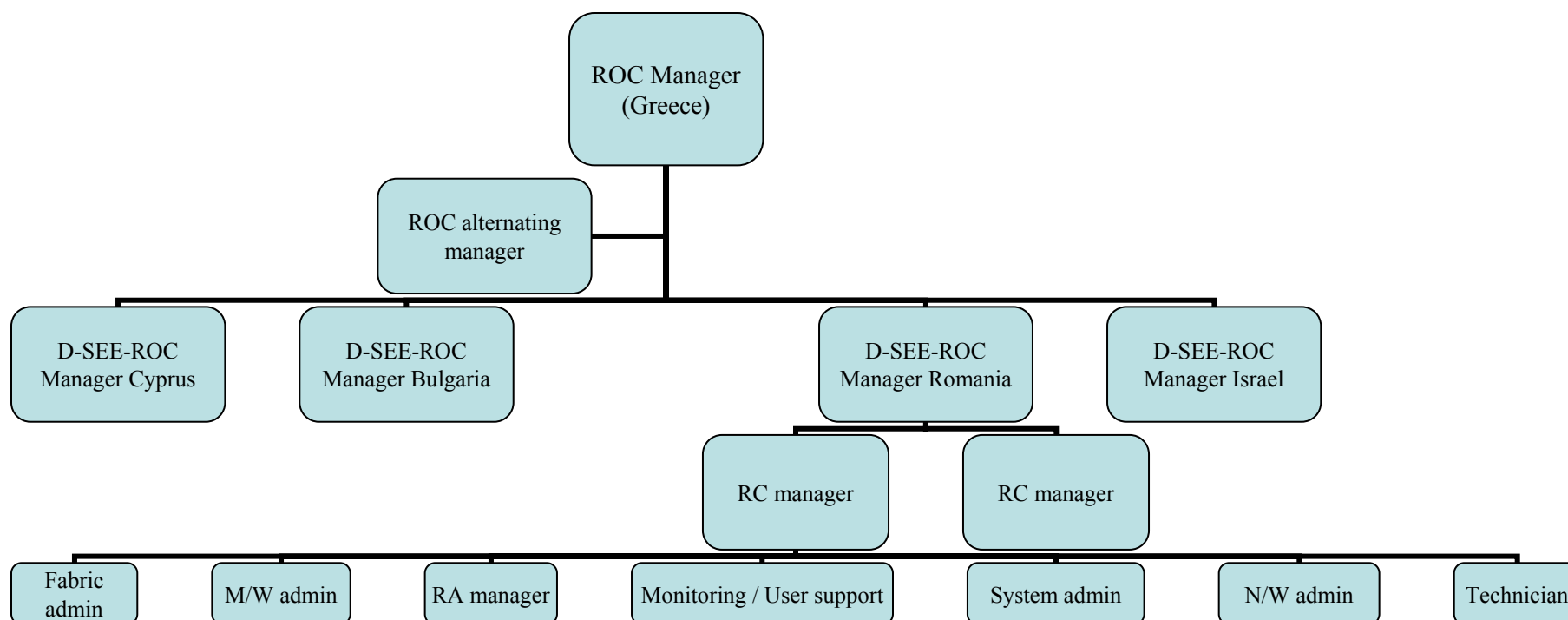
An example: EGEE South Eastern Europe federation organisation

- Objectives: Build expertise & operational procedures that will allow SEE to:
 - Be integrated into European production-level infrastructure
 - Operate a coherent Grid infrastructure
 - Create teams of core m/w and apps experts for the future
 - Attract applications users from Academic & Research community

Participant	Role	FTE (EU funded + unf.)
GRNET	ROC coordinator	4
CLPP-BAS	ROC branch	2
ICI	ROC branch	2
TAU	ROC branch	2
UCY	ROC branch	2
Total effort		12

ROC organization: distributed scheme

- EGEE-SEE follows a distributed organization model:
 - Both geographical and functional
 - Geographical (vertical): each ROC branch is responsible for its region core operation
 - Functional (horizontal): Horizontal teams per specific functions with corresponding coordinator- e.g. helpdesk coordinator is Romania



SEE ROC organization: vertical view

- **ROC Manager**, supported by the **alternate** ROC Manager, coordinates the distributed ROC operations
- In collaboration with the peers in all SEE countries
- Each **country's manager** coordinates the country's RC operations
- In each RC there is a **RC manager** and a set of administrators responsible for different aspects of the operations
- Collaboration with the **SEEGRID** project (South Eastern European Grid eInfrastructure Development)
www.seegrid.org

SEE ROC organization: horizontal view

- Certification and distribution of middleware. This is the responsibility of the *ROC Release*.
- Installation and deployment. This is the *Team* responsibility of the *ROC Management Team*.
- Operational and user support. This is the responsibility of the *Operational and User Support Service Team*.
- Monitoring. This is responsibility of the *Monitoring Team*.
- **Logical** grouping within each of the D-SEE-ROCs.
- Roles can be taken by different combinations of people (funded and unfunded) within each region/ROC/RC

Evolution of RCs

Site	Vector (Gflops)	Parallel (Gflops)	Cluster (num. nodes)	Disk (Tb)	Automated Tape (Tb)	Avg. LAN (Mbps)	Avg. WAN (Mbps)	Join	VOs supported
HG1 (GRNET)	N/A	N/A	64*2*30%	10.0	5.0	1000.0	2500.0	M6; M15	
Israel	N/A	N/A	50	2.2	N/A	100.0	15.5	M6	
UCY	N/A	4	18	0.1	N/A	100.0	15.0	M6	
HG2 (Athens2)			128*30%					M15	
HG3 (Saloniki)			128*30%					M15	
HG4 (Patra)			128*30%					M15	
HG5 (Heraklion)			128*30%					M15	
CLPP-BAS	N/A	N/A	12	0.2	N/A	10.0	3.4	M15	
ICI	N/A	4.5	50	1.5	N/A	250.0	77.5	M15	
TOTAL		8,5	322	14	5				

EGEE-SEE Effort



Part, Number	Part, Short name	Cost Mode l	Amounts (€)	Networking activities (NA)						Specific service activities (SA)			Total expected	Max Community contribution
				NA1	NA2	NA3	NA4	NA5	All NA	SA1	SA2	All SA		
49	CLPP-BAS	A C	exp, budget	6 000	70 000				76 000	192 000		192 000	268 000	
			req, contrib	6 000	70 000				76 000	192 000		192 000		268 000
50	UCY	A C	exp, budget	6 000	70 000				76 000	192 000		192 000	268 000	
			req, contrib	6 000	70 000				76 000	192 000		192 000		268 000
51	GRNET	F C F	exp, budget	6 000		240 000		230 000	476 000	775 000	115 000	890 000	1 366 000	
			req, contrib	6 000		120 000		115 000	241 000	387 500		387 500		628 500
52	TAU	A C	exp, budget	6 000		70 000			76 000	191 500		191 500	267 500	
			req, contrib	6 000		70 000			76 000	191 500		191 500		267 500
53	ICI	F C	exp, budget	6 000		140 000			146 000	383 000		383 000	529 000	
			req, contrib	6 000		70 000			76 000	191 500		191 500		267 500

EC
Funded
/ Total

30K/
30K

140K/
140K

260K/
450K

0/
0

115K/
230K

545K/
850K

1,15M/
1,73M

0/
115K

1,15M/
1,85M

Total
2,7M

EC
Funded
1,7M

Conclusions

- EGEE (together with DEISA www.deisa.org, SEE-GRID www.see-grid.org) will provide the Grid layer of the **eInfrastructure** on top of GEANT (GEANT-GN2 project started on September 1st)
- EGEE will provide a **production-quality** Grid infrastructure for European Researchers and students
 - enabling distributed resource (CPU, storage, etc.) sharing
- We have accomplished so far all we committed-to more than one year ago:
 - All **partners** are on-board, the contract has been signed, the administrative procedures fulfilled
 - The **federations** are working very well – distributed schema is essential to cope with 70 partners! An example was given
 - The various technical activities' meetings have shown that the project has started with unfunded resources and leveraging the good progress of LCG
- In a few words: “we have hit the ground running...”
- Still many challenges to be resolved!
- But we have to start thinking on EGEE phase 2

- Thanks!
- For more information:
 - EGEE Portal www.eu-egee.org
 - EGEE SA1 pages www.eu-egee.org/sa1
 - EGEE- SEE Portal www.egee-see.org
 - fkara@grnet.gr