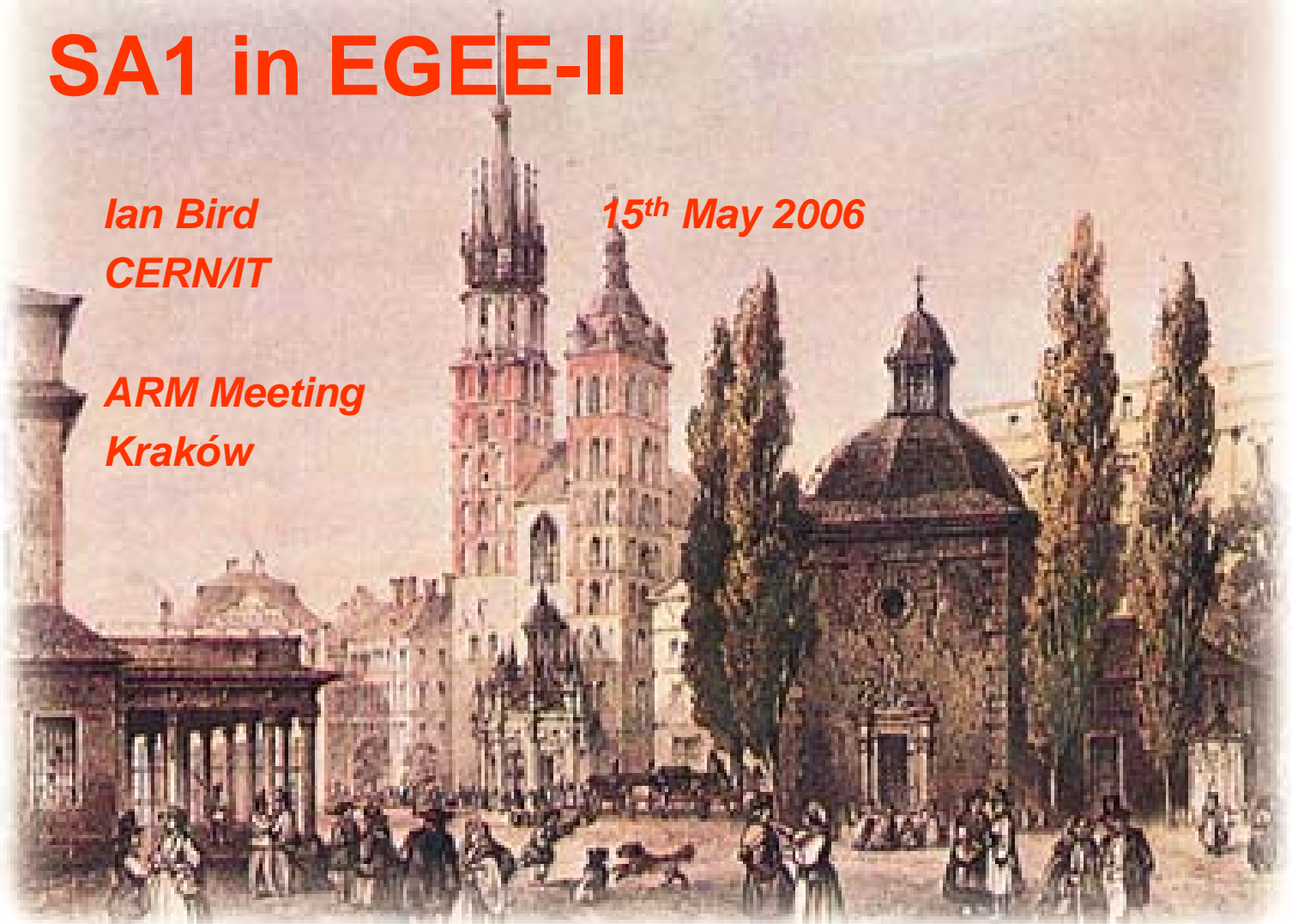# egee

Enabling Grids for E-sciencE

SA1 in EGEE-II

Ian Bird
CERN/IT

15th May 2006

ARM Meeting
Kraków

www.eu-egee.org

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Enabling Grids for E-sciencE

- **SA1 goals**
- **SA1 from EGEE → EGEE-II**
  - Changes
- **Management structure**
- **SA1 Tasks & Partners**
  - Reviews and reporting
- **Milestones**
- **Deliverables**
- **Interactions with other activities**
- **Risk analysis**
- **gLite-3.0 –**
  - status, what next, process, new services, obsolete services
- **Long term sustainability**
  - ROCs important
  - Add some EGG slides

SA1 has achieved a lot in EGEE

- ☞ ~180 sites; 25k CPU
- ☞ sustained & regular workloads of 20K jobs/day
- ☞ massive data transfers with FTS > 1GB/s

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Enabling Grids for E-sciencE
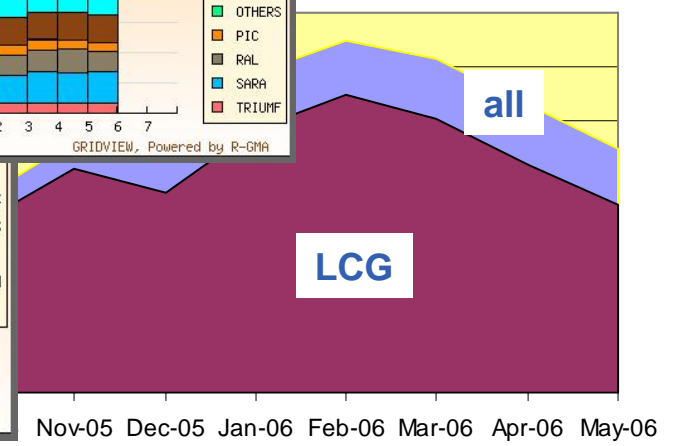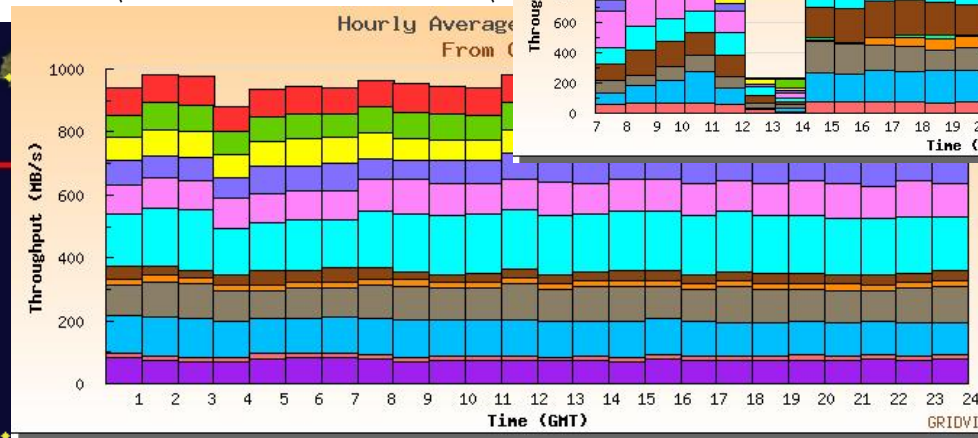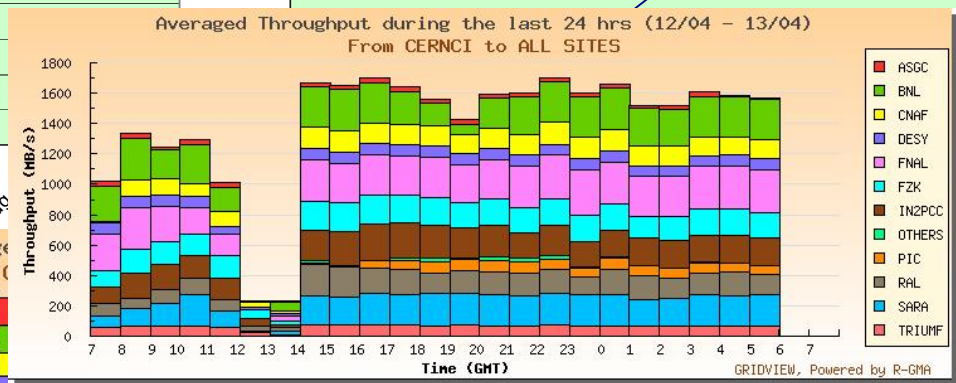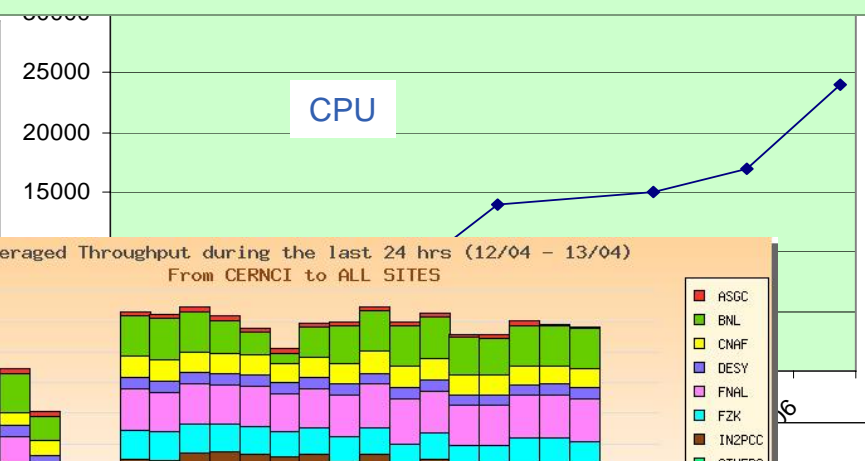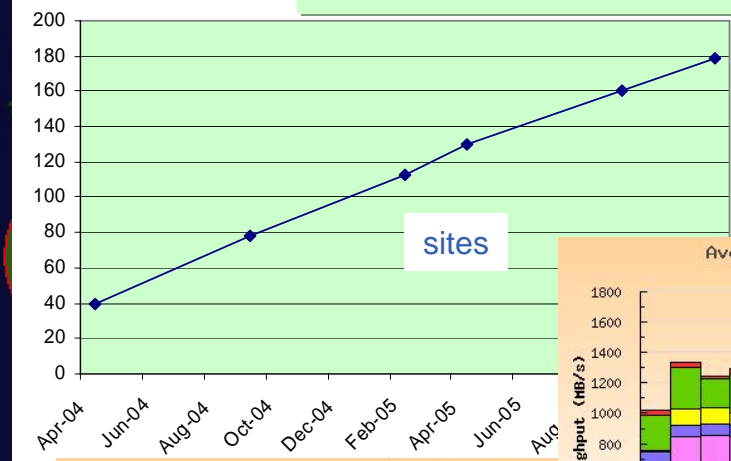
- **Key goal:**
  - We have a large running production infrastructure; But EGEE-II MUST take what we have now and make it:

    - **Reliable**
      - *It fails too often – middleware fails, error reporting is missing, …*
        - o **There is an application responsibility here too – needs effort**
    - **Robust**
      - *Services need to be more like real services and not prototypes*
    - **Usable**
      - *It is too hard to use for many users; its still too hard to introduce new VOs*
    - **Acceptable**
      - *It must be easy to deploy in a wide variety of environments and coexist with other grid infrastructures*
    - **Sustainable**
      - *The infrastructure must become sustainable for the long term*

Enabling Grids for E-sciencE

a) **Grid management**
- Coordination of ROCs; resource providers → SLAs

b) **Operate core infrastructure services**
- Basic essential grid services that form the infrastructure

c) **Grid monitoring and control**
- Operator on duty; etc.

d) **Middleware deployment and introducing new resources**
- Support for deploying SA3 distributions and new sites joining

e) **Resource and user support**
- All aspects of user and operational support; GGUS etc.

f) **International collaboration**
- Interoperability and interoperation; specifically OSG, DEISA, ARC (in DoW) and NAREGI; also GIN

g) **Capture and provide requirements**
- Feedback to middleware suppliers and TCG

h) **Long term sustainability**
- Put in place structures (PoPs→ROCs?) for long term

egee

- **Simplify operations structure**
  - ROCs take responsibilities of CICs
  - Mandatory set of responsibilities for all ROCs
  - Optional set for those that can do it
  - Spread knowledge and expertise
- **Introduce SA3 (was part of SA1)**
  - Integration, certification, distribution preparation
  - Emphasises focus on stability, reliability, performance rather than new features
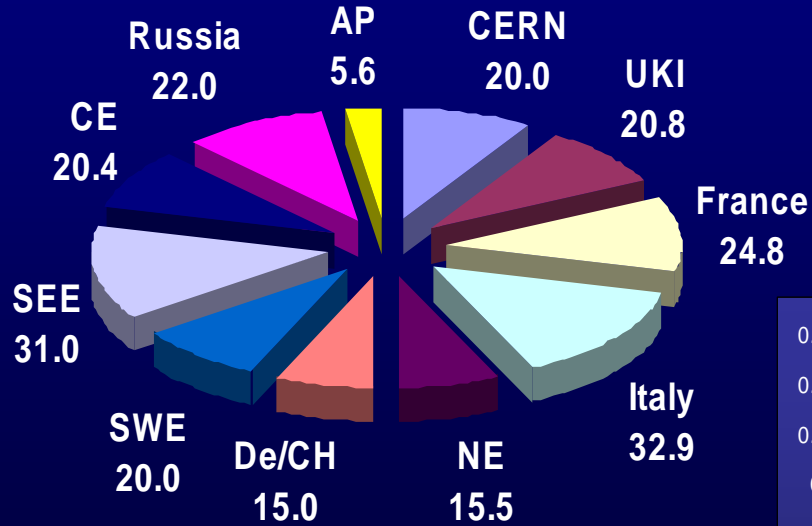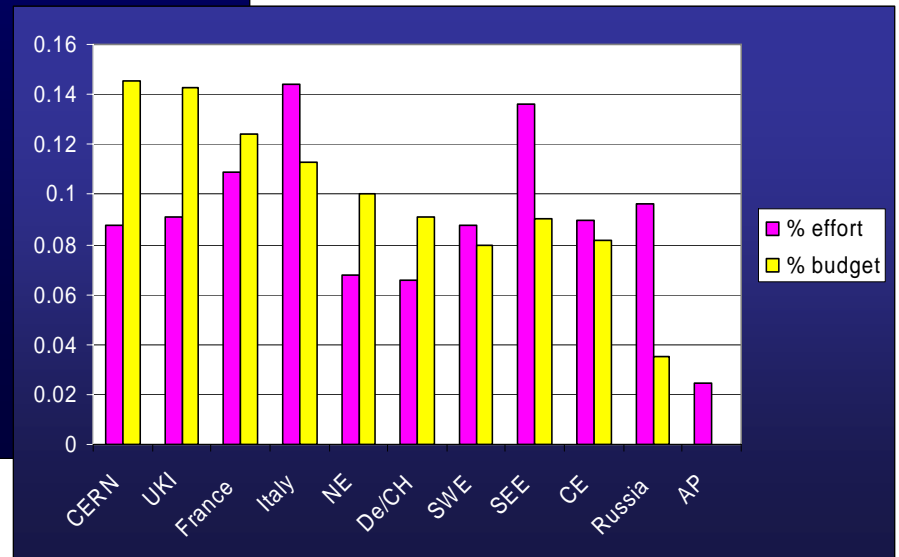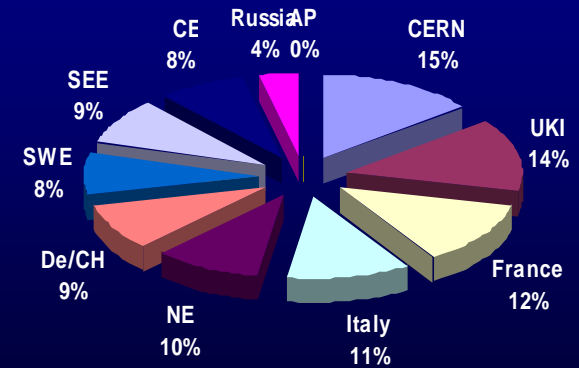 - Mechanism for integrating non-EGEE software – according to need
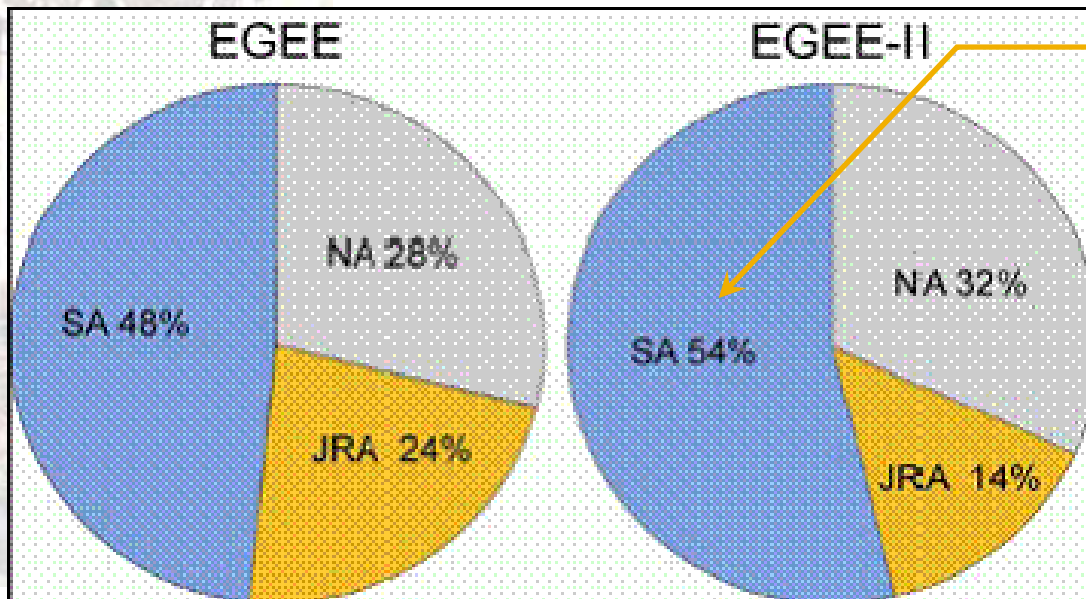
SA: 54% of total
- SA1 (operations) : 86%
- SA2 (network)   : 3%
- SA3 (certification): 11%

Effort (FTE)

% budget

Enabling Grids for E-sciencE

- **All operational security tasks now in SA1:**
  - EUGridPMA; JSPG; Incident response and operational security monitoring;
  - New vulnerability group: should do full vulnerability and risk analysis
- **Network monitoring from JRA4 now in SA1**
- **Emphasis on collaboration and interoperability/interoperation with other grids (international, regional, national, local, campus) & other middleware stacks**
  - With related infrastructure and application projects:
    - SEE-Grid(2), BalticGrid, EUMedGrid, EUChinaGrid, EELA, Health-e-Child
  - With other middleware infrastructure projects:
    - ETICS, OMII-Europe
  - With other grid & network project projects:
    - DEISA, Geant2, ARC
  - With other grid infrastructures:
    - OSG, ARC, NAREGI
- **Implies an emphasis on portability and co-existence;**
  - OS portability (other OS, 64-bit), virtual machines
  - Simplified deployment for coexistence

Enabling Grids for E-sciencE

Support, analysis, debugging

SA3

Middleware providers

VDT/OSG

OMII-Europe

:

JRA1

SA3

Integration

Testing & Certification

Pre-production service

Production service

Certification activities SA3+SA1

SA1

Enabling Grids for E-sciencE
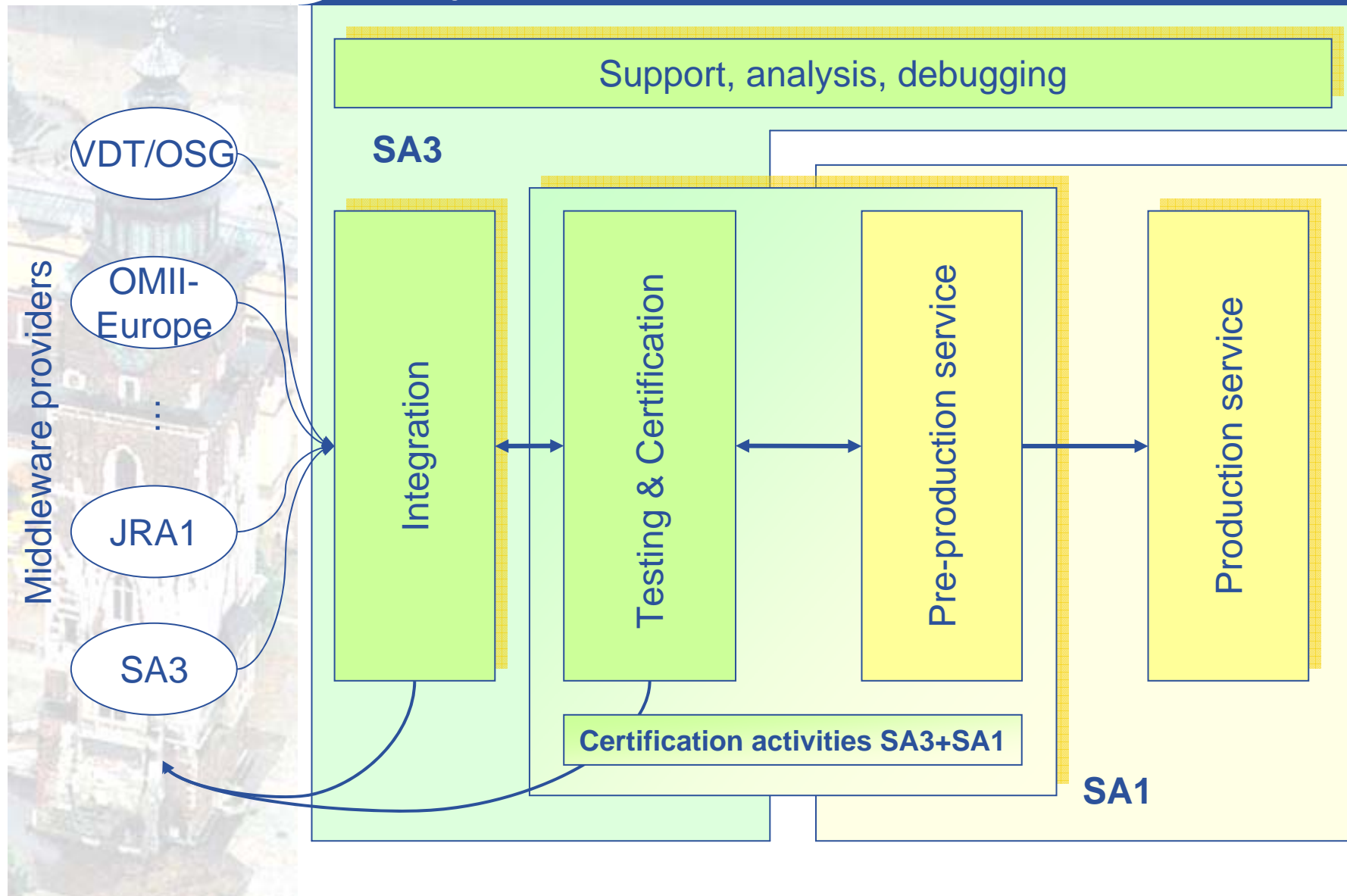
Task	Oblig
TSA1.1: Operate a production and pre-production service	
TSA1.1.1: ROC management	Y
TSA1.1.2: Pre-production service site	Y
TSA1.2: Middleware deployment and support	
TSA1.2.1: Coordination and support for middleware deployment	Y
TSA1.2.2: Regional certification of middleware releases	
TSA1.3: Grid Operations and support	
TSA1.3.1: 1st line support for operational problems in region	Y
TSA1.3.2: Oversight and management of operational problems	Y
TSA1.3.3: Run essential regional grid services	Y
TSA1.3.4: Weekly operator on duty support	
TSA1.3.5: Grid services for infrastructure or VOs	
TSA1.4: Grid security and incident response	
TSA1.4.1: Grid incident response coord in region	Y
TSA1.4.2: Security vulnerability and risk analysis	
TSA1.4.3: CA management	
TSA1.4.4: Coordinate JSPG	
TSA1.4.5: Coordinate EUGridPMA	

Task	Oblig
TSA1.5: VO, application, and user support	
TSA1.5.1: GGUS	
TSA1.5.2: Call centre, helpdesk for ROC	Y
TSA1.5.3: VO support, integration support	Y
TSA1.5.4: User training in region	Y
TSA1.5.5: Site admin training in region	Y
TSA1.5.6: Regional contribution to GGUS - support teams	
TSA1.6: Grid Management	
TSA1.6.1: OCC - CERN	
TSA1.6.2: Accounting coordination in region	Y
TSA1.7: Interoperation	
TSA1.7.1: National and regional grid project coordination	Y
TSA1.7.2: International grid projects	
TSA1.8: Application<->resource provider coordination	
TSA1.8.1: ROC management of resources/SLAs	Y
TSA1.8.2: OAG management	
TSA1.9: Application/resource provider/mw provider coord	
TSA1.9.1: ROC representation in coordination	Y
TSA1.10: Network Monitoring	
TSA1.10.1: Deploy network monitoring tools	

Enabling Grids for E-sciencE

- **As in EGEE:**
  - Quarterly and periodic reporting
    - Want regional quarterly reports – from each ROC
- **We have to be judged (and judge) on the quality of the infrastructure**
  - Full set of public metrics (See Maite's talk)
  - Response to problems
  - How well are commitments fulfilled
    - Sites, ROCs, GGUS, Ops, etc.
  - EU want to see ROCs becoming cores of national grid infrastructures
    - Implication is that the EU will look closely at ROC performance and issues
- **For monitoring the performance of partners in the tasks (asked for in general by the project across all activities)**
  - SA1 has ~60 partners, and 228 FTE:
    - 1-1 checking is not possible
    - But we need to make sure all partners are performing adequately
  - Propose a series of internal reviews:
    - Each federation should present status of tasks, work done, issues arising; OCC should flag particular problems to be addressed in advance
    - 3 regions every 3-6 months:
      1. *(PM4?) NE, SEE, CE in first round*
      2. *(PM 8?) SWE, De//CH, Ru and follow-up issues from 1st round*
      3. *(PM 12?) UKI, Fr, It and any follow up from earlier*
      4. *(PM 16?) Follow up*

Will report against in QRs etc; but also really used for monitoring the infrastructure, sites, services, etc.

To focus on gaps and tools that are needed and avoid duplication of effort

Have been missing this – will form part of a site SLA with the project

Milestone	Description		
MSA1.1	Operations metrics defined		
MSA1.2	Inventory of operations tools, procedures & gap analysis	2	CERN
MSA1.3	Site operations policy agreement in place and signed by existing sites	5	Nikhef
MSA1.4	CERT teams in place – all ROCs, roles and p		
MSA1.5	GGUS operational		
MSA1.6	User requirements for NPM diagnostic tool captured	7	UEDIN
MSA1.7	Security and availability policy	8	CCLRC
MSA1.8	Assessment of GGUS support	11	INFN
MSA1.9	Operational Accounting portal	15	CCLRC
MSA1.10	Report on work carried out by the NPM activity	23	UEDIN

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Enabling Grids for E-sciencE

An update/rewrite of existing cookbook: EU interested in pushing EGEE experience to GGF and wider grid community.

+ expand in collaboration with DEISA and GEANT-2 to describe full range of services on the ERA infrastructure

Deliverable	Description		
DSA1.1	GGUS implementation plan	1	FZK
DSA1.2	Operations Advisory Group (OAG) Procedures & Policy report	1	IN2P3
DSA1.3	Grid Services Security Vulnerability and Risk Analysis	10	CCLRC
DSA1.4	Assessment of production service status	11	SARA
DSA1.5	Grid operations cookbook	16	PIC
DSA1.6	Report on ROC progress and issues	18	CERN
DSA1.7	Assessment of production grid infrastructure service status	22	SARA

Requested by EU. Status report on progress with moving extra tasks to ROCs for long term sustainability. In the long term view National or Regional grid infrastructures have a point-of-presence: ROC. Includes open issues.

eGee

- **SA1 must work with:**
  - SA2: ENOC & etc.
  - SA3: teams work together
  - NA4: via OAG, VO managers group, UIG
  - NA5: SA1 has strong relations with many other grid projects
  - TCG: SA1, SA3, NA4

  - NA2? → UIG?
  - NA3? → UIG?

  - Should also work with Industry Forum and/or openlab (with SA3)

eGee

- **Reliability, performance, security not on a par with traditional computing services:**
    - Middleware providers must address basic issues of reliability, performance, etc.
    - Balance between response to user expectations of fixes, new functionality and trying to achieve stability: SA3 and PPS must put strict controls on what gets into production
    - Frustration of user communities with perceived slowness of getting new things into production; can the PPS be a platform for early adopters?
    - Unrealistic expectations of what the grid will deliver must be avoided so that failure is not perceived even though project goals are met.

- **Terminology:**
  - EGEE deploys a _middleware distribution_
    - Drawn from various middleware products, stacks, etc.
    - Do not confuse the _distribution_ with development projects or with software packages
    - Count on 6 months from software developer "release" to production deployment
  - The EGEE distribution:
    - Current production version labelled: LCG-2.7.0
    - Next version labelled: gLite-3.0
    - Name change to hopefully _reduce_ confusion

- **EGEE distribution contents:**

LCG-2.7.0:
  - VDT – packaging Globus 2.4, Condor, MyProxy
  - EDG workload management
  - LCG components:
    - BDII (info sys),
    - catalogue (LFC),
    - DPM, data management libraries and CLI tools
    - monitoring tools
  - gLite: R-GMA, VOMS, FTS

evolution

gLite-3.0:
  - Based on LCG-2.7.0, and
  - gLite workload management
  - Other gLite components (not in the distribution but provided as services):
    - AMGA, Hydra, Fireman
    - gLite-IO

eGee

Job Management:

- **Workload Management –**
  - Resource Broker
  - DLI/SI interface to catalogues for data-based scheduling
  - Bulk job submission (gLite-3.0)
  - DAGs (gLite-3.0)
  - Push/pull mode (pull untested – gLite-3.0)
- **Compute Element (CE):**
  - Globus/EDG/LCG → Condor_C (VO-based scheduling) in gLite-3.0
- **Logging & Bookkeeping**
- **Local Batch systems:**
  - LSF, PBS, Condor, (Sun Grid Engine)
- **Additional tools:**
  - Ability to "peek" at stdout/stderr of running jobs
  - User job monitoring – look at the status (state, cpu time, etc) of running jobs

Data Management

- **File and replica catalogues (LFC)**
  - Central or local (not distributed)
  - Replication via Oracle, or squid caches tested by LCG
  - Secure
- **File Transfer Service (FTS)**
  - Reliable data transfer
  - Uses gridftp or srmcopy as transport
- **Storage Elements based on SRM interface**
  - DPM: implements Posix ACLs, VOMS roles/groups (gLite-3.0)
  - Other available SEs: dCache, Castor
  - Deprecated: "Classic SE" – basically just gridftp
- **Metadata catalogue:**
  - AMGA (gLite-3.0 – partial support)
- **Secure Keystore:**
  - Hydra (gLite-3.0 – partial support)
- **Utilities and IO libraries:**
  - Lcg-utils
  - GFAL – this is the SRM client library
  - gLiteIO – expect functionality to be replaced

Information system

- BDII (implementation of Globus MDS)
- GLUE schema
- Several tools to access information
- FCR site selection tool

Monitoring & Accounting

- R-GMA used as monitoring framework
- Aggregation for various sources of monitoring data
- Accounting: APEL package:
  - After-the-fact accounting
  - Uses GGF User Record as schema
  - Does not provide user-level data – but this is a legal/privacy issue not technical!

Enabling Grids for E-sciencE
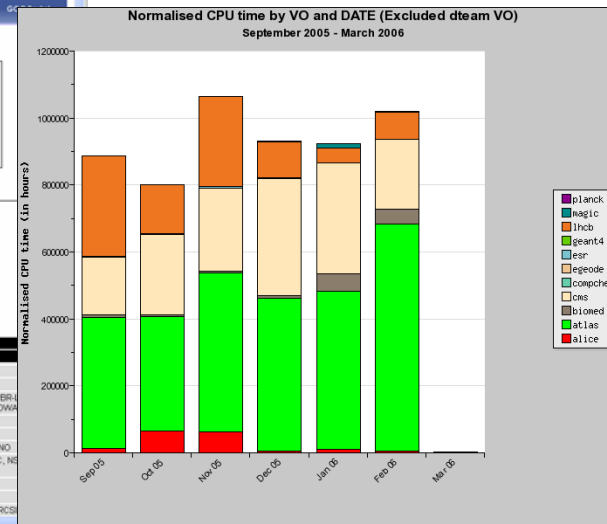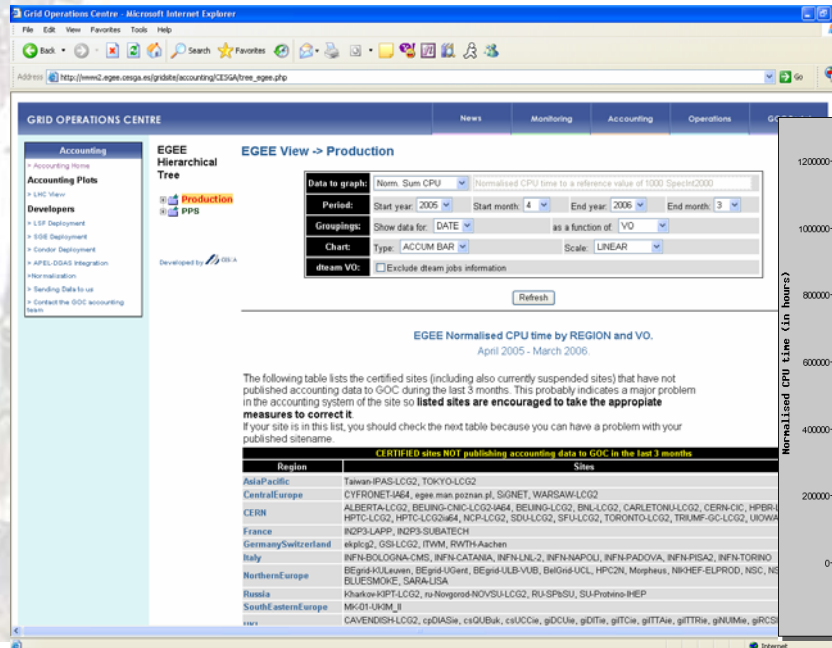
What is needed once gLite-3.0 is released for deployment:

- **Stability and robustness:**
  - Top priority should be bug fixes to existing 3.0 services
    - Bugs found in deployment and production use
    - Bugs/issues suspended in certification/release process
- **Use (updated) "Flavia list" to prioritize what is updated or changed**
  - Should not be a developer jamboree, but:
  - For each feature/bug on the list provide a timescale for new version
  - Sequential not parallel (one new thing at a time!) – no "free" additional stuff!
  - Separate by service or component
  - Have a clear timescale for developments in each service/component
  - Then we can plan that on a certain date we can expect x, y, z
  - The list must prioritize equally bug fixes, new features, reliability, scalability, etc. issues.
    - Don't complain that it keeps crashing if your top priority is another feature!

- **SA3 (integration/certification) should make clear that they will reject software updates that violate a carefully controlled update process**

- **Development:**
  - Not intended to stop development
- **BUT:**
- **Need discipline and real managed development process, where:**
  - Separate branches MUST be maintained for
    - all versions in production
    - Version on PPS
    - Version in integration/certification/test
    - Development
  - ... and bug fixes must be consistently propagated through all these branches
  - We must be able to get fixes, security patches, etc for all of these and expect to see that in all versions
  - Should however limit number of versions supported in production (but it is >1!)

- **Operations workshop**
  - CERN: June 19th, 20th
- **1st OSCT at CERN on June 21st**
  - Essential that ROC security contact is there
    - Must be a real person (not 1FTE spread over 12 people)
  - Meeting will decide what should be done
- **EGEE-II contract**
  - All outstanding issues have been resolved;
  - Expected at CERN this week, then signature process starts

egee

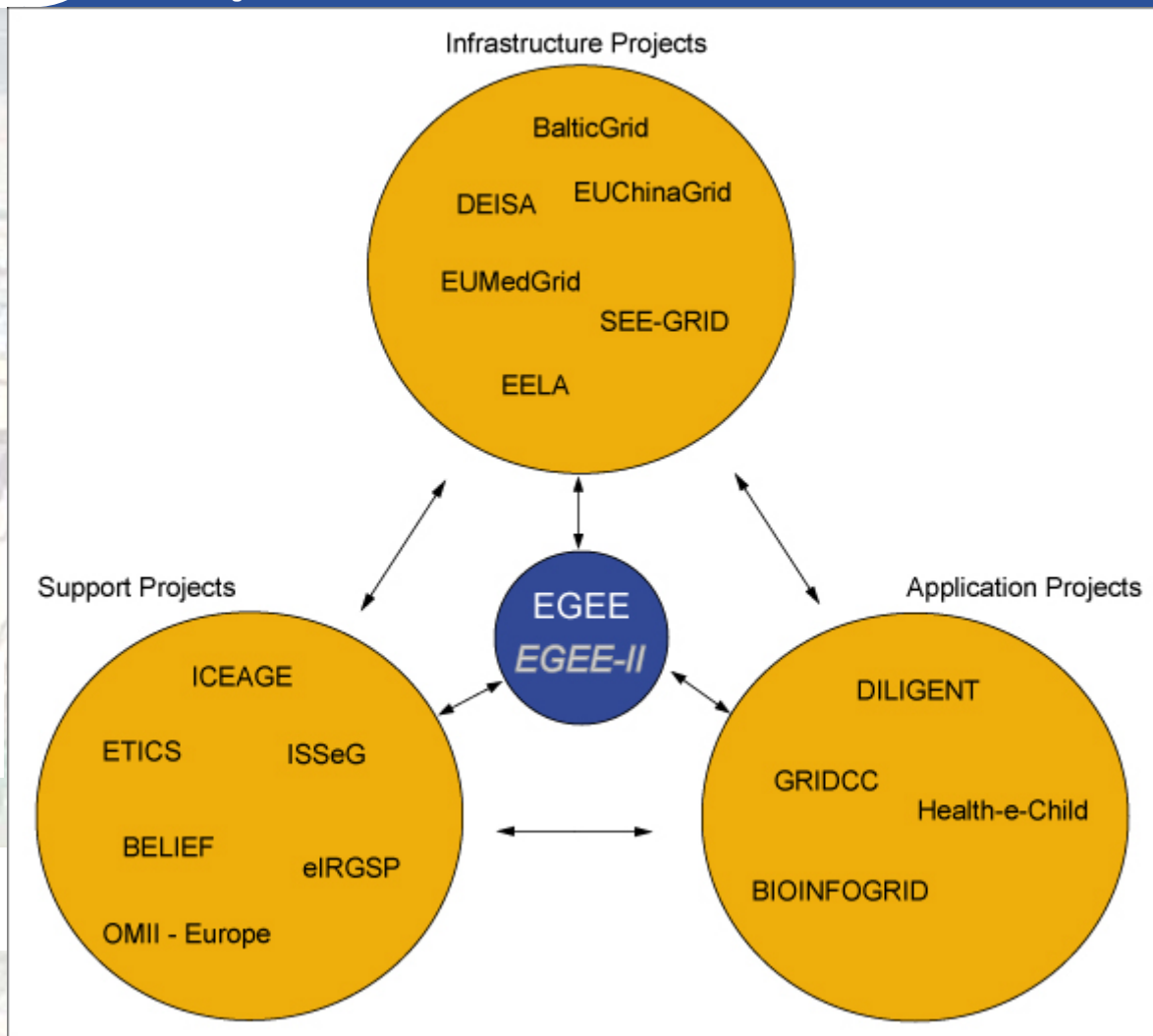Enabling Grids for E-sciencE

A sustainable e-Infrastructure for Europe

EGG Meeting
5th May 2006
Ian Bird
Ian.Bird@cern.ch

www.eu-egee.org

Information Society
and Media

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Enabling Grids for E-sciencE

Infrastructure Projects

BalticGrid
DEISA   EUChinaGrid
EUMedGrid
SEE-GRID
EELA

Support Projects

ICEAGE
ETICS   ISSeG
BELIEF   eIRGSP
OMII - Europe

EGEE
EGEE-II

Application Projects

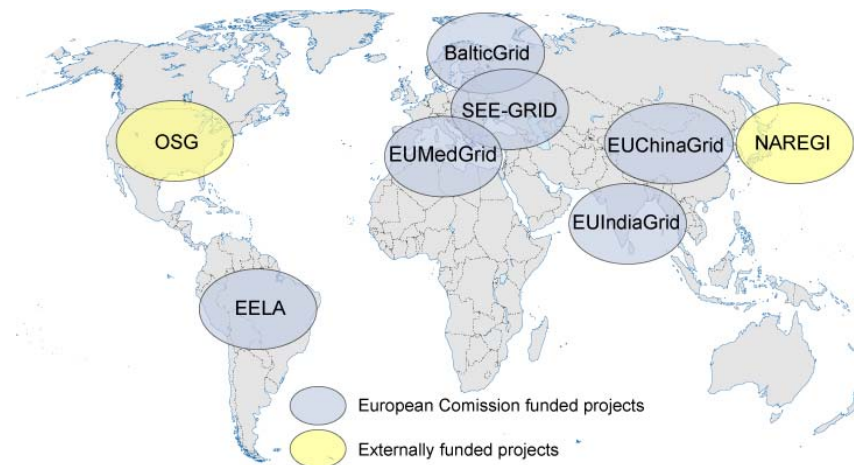DILIGENT
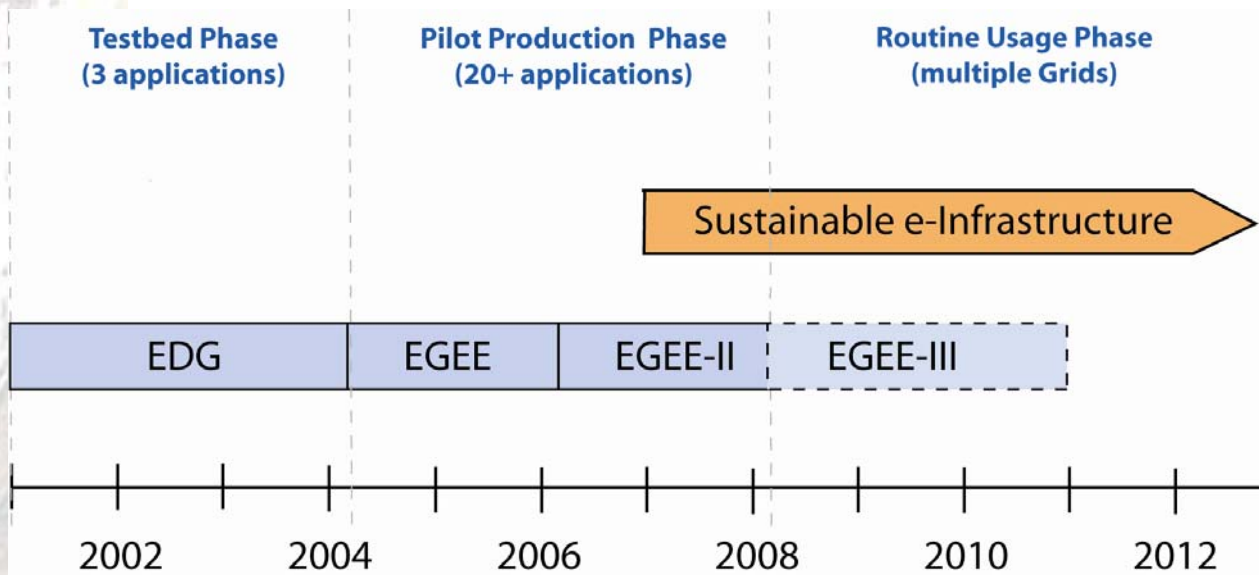GRIDCC
Health-e-Child
BIOINFOGRID

- **32 countries**
- **13 federations**
- → **Major and national Grid projects in Europe, USA, Asia**

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

- **Need to prepare for permanent Grid infrastructure**
  - Maintain Europe's leading position in global science Grids
  - Ensure a reliable and adaptive support for all sciences
  - Independent of short project funding cycles
  - Modelled on success of GÉANT
    - Infrastructure managed in collaboration with national grid initiatives

Testbed Phase (3 applications)	Pilot Production Phase (20+ applications)	Routine Usage Phase (multiple Grids)

Sustainable e-Infrastructure

EDG	EGEE	EGEE-II	EGEE-III

2002   2004   2006   2008   2010   2012

- ## **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

Enabling Grids for E-sciencE

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

- **Builds on the experience gained with EGEE and related projects to define a European Grid Infrastructure (EGI)**

- **Takes into account the eIRG recommendations**

- **Input from EGO paper [1] and the workshops**
  - Thoiry (France) 30-31st January – *EGEE federations, EU*
  - Kassel (Germany) 10th March – *Germany*
  - Barcelona (Spain) 28th March – *France, Portugal, Spain, EU*
  - Athens (Greece) 19th April – *Bulgaria, Cyprus, Greece, Israel, Romania, Serbia, Turkey, EU*
  - Vilnius (Lithuania) 26th April – *Estonia, Latvia, Lithuania, Poland, Sweden, Ukraine*
  - Paris (France) 28th April – *Terena/NRENS grid workshop*

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

- **Infrastructure**
  - Co-ordination of production e-Infrastructure open to all user communities and service providers
  - Interoperate with e-Infrastructure projects around the globe
  - Support access to commodity computing and super-computers
  - 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
  - Material Sciences
  - Multimedia   etc.…

Encourage inter-disciplinary research and increase data inter-operability

- **Business**
  - Forge links with the full spectrum of interested business partners to aid industrial take-up of grids
- **Disseminate knowledge about the Grid through training**

Enabling Grids for E-sciencE
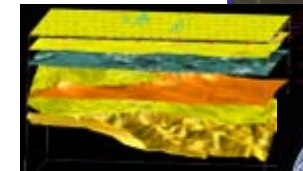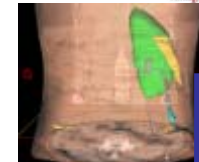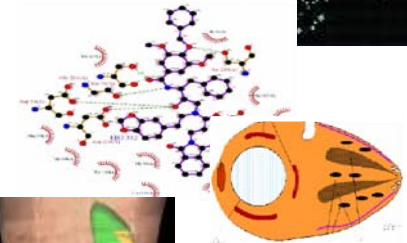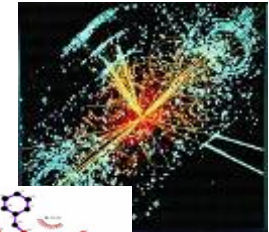
Federated model bringing together National Grid Initiatives (NGIs) to build a European organisation

EGEE federations would evolve into NGIs

Asia
Central Europe
CERN
France
Germany/Switzerland
Italy
Networking

Northern Europe
Russia
South-Eastern Europe
South-Western Europe
UK/Ireland
USA

Each NGI is a national body

- Recognised at the national level
- Mobilises national funding and resources
- Contributes and adheres to international standards and policies
- Operates the national e-Infrastructure
- Application independent, open to new user communities and resource providers

Enabling Grids for E-sciencE

- Austria – AustrianGrid
- Belgium – BEGrid
- Bulgaria – BgGrid
- Croatia – CRO-GRID
- Cyprus – CyGrid
- Czech Republic- METACentre
- *Denmark*
- *Estonia - EstoniaGrid*
- *Finland*
- *France – ICAR*
- Germany – D-GRID
- Greece - HellasGrid
- *Hungary*
- Ireland - Grid-Ireland
- Israel – Israel Academic Grid
- *Italy - planned*

- *Latvia – Latvian Grid*
- Lithuania - LitGrid
- Netherlands – DutchGrid
- Norway – NorGird
- *Poland - Pionier*
- *Portugal – launched Apr'06*
- Romania – RoGrid
- Serbia – AEGIS
- *Slovakia*
- Slovenia - SiGNET
- *Spain – IBERgrid*
- Sweden – SweGrid
- *Switzerland – SwissGrid*
- Turkey – TR-Grid
- *Ukraine - UGrid*
- United Kingdom - eScience

Italics indicate in planning stage

- **The following key services are deemed necessary for a central organisation <u>coordinated with the NGIs</u>**

  - **Coordination of infrastructure operations**
    - Joint Security Policy Group
    - Operational Security Coordination Team
    - Vulnerability Group
  - **Middleware testing and certification**
  - **Application support**
  - **Dissemination and outreach**
  - **Training**

- **Additional services**
  - Data management and curation services
  - Resource centres operated by NGIs, coordinated by EGI

- **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 and EU

  – EU could fund preparatory project to set-up EGI (~12 months?)

  – Full structure could start in 2008/9

eGee

- **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**

- **Proposed key services**
    - Coordination of Infrastructure operations
    - Middleware testing and certification
    - Application support
    - Dissemination and outreach
    - Training

- **Such a scheme will ensure a sustainable e-Infrastructure for research and help maintain Europe's leading position**

- **Now working with European Commission and member states, national grid representatives and user communities to develop the details of such a structure and how it can be put in place**