EXECUTIVE SUMMARY

This document summarises the key features of the project EGEE (Enabling Grids for E-Science and industry in Europe), for the FP6 call "Communication Network Development – Grids". This summary briefly introduces Grid computing, outlines the vision and mission of EGEE, the stakeholder view of the project, the main activities covered by the project, the expertise and resources supporting the project, the management structure, the partners involved and distribution of activities.

Background

The state of computer and networking technology today makes the seamless sharing of computing resources on an international or even global scale conceivable. For scientific applications, the vision is that such computing Grids will integrate large, geographically distributed computer clusters and data storage facilities, and provide simple, reliable and round-the-clock access to these resources. The benefits that will flow include large increases in both the peak capacity and the total computing power delivered to various scientific projects, as well as new ways for scientific communities to share and analyse very large data sets. These benefits will translate into an increase of both the quality and quantity of scientific output in a broad spectrum of compute-intensive fields ranging from bioinformatics and climate simulation to the nanoscale design of new materials and integration of large engineering projects involving many partners.

Based on pioneering work in the US and in Europe, software toolkits for distributed computing – such as Globus, Condor, and Unicore – are available. As a result, a number of projects have demonstrated first early results for various aspects of computer Grids. Europe has achieved a prominent position in this field, in particular for its success in establishing a functional Grid testbed comprising more than 20 centres in Europe, in the context of the European DataGrid (EDG) project. Individual countries, such as the UK, France, and Italy, have developed comprehensive "e-Science" programs that rely on emerging national computing Grids to deliver unprecedented computing resources to science. However, as yet, there are no real production-quality Grids that can offer continuous, reliable Grid services to a range of scientific communities.

The EGEE Vision

EGEE aims to integrate current national, regional and thematic Grid efforts, in order to create a seamless European Grid infrastructure for the support of the European Research Area. This infrastructure will be built on the EU Research Network GEANT and exploit Grid expertise that has been generated by projects such as the EU DataGrid project, other EU supported Grid projects and the national Grid initiatives such as UK e-Science, INFN Grid, Nordugrid and the US Trillium (cluster of projects).

The EGEE vision is that this Grid infrastructure will provide European researchers in academia and industry with a common market of computing resources, enabling round-the-clock access to major computing resources, independent of geographic location. The infrastructure will support distributed research communities, including relevant Networks of Excellence, which share common Grid computing needs and are prepared to integrate their own distributed computing infrastructures and agree common access policies. The resulting infrastructure will surpass the capabilities of localised clusters and individual supercomputing centres in many respects, providing a unique tool for collaborative compute-intensive science ("e-Science") in the European Research Area. Finally, the infrastructure will provide interoperability with other Grids around the globe, including the US NSF Cyberinfrastructure, contributing to efforts to establish a worldwide Grid infrastructure. The scope of the project is illustrated in Fig. 1.

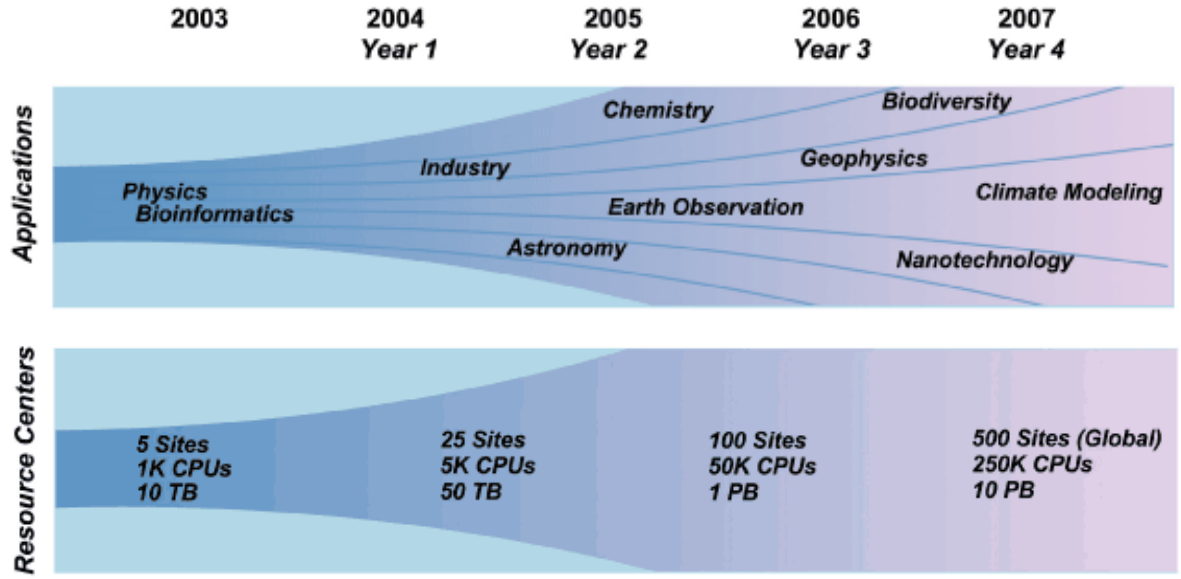

Figure 1 ***Schema of the evolution of the European Grid infrastructure from two pilot applications in high energy physics and biomedical Grids, to an infrastructure serving multiple scientific and technological communities, with enormous computer resources. The applications and resource figures are purely illustrative. The EGEE project covers Year 1 and 2 of a planned four year programme.***

EGEE is a two-year project conceived as part of a four-year programme. Major implementation milestones after two years will provide the basis for assessing subsequent objectives and funding needs. Given the service oriented nature of this project, two pilot applications areas have been selected to guide the implementation and certify the performance and functionality of the evolving European Grid infrastructure. One is the Large Hadron Collider Computing Grid (LCG: www.cern.ch/lcg), which relies on a Grid infrastructure in order to store and analyse petabytes of real and simulated data from high-energy physics experiments at CERN. The other is Biomedical Grids, where several

communities are facing equally daunting challenges to cope with the flood of bioinformatic and healthcare data – a prime example being the proposed Network of Excellence HEAVEN (HEAlth grid VENture).

Given the rapidly growing scientific needs for a Grid infrastructure, it is deemed essential for the EGEE project to "hit the ground running", by deploying basic services, and initiating joint research and networking activities before the formal start of the project. The LCG project will provide basic resources and infrastructure already during 2003, and Biomedical Grid applications will be planned at this stage. The available resources and user groups will then rapidly expand during the course of the project, as illustrated in Figure 1. To ensure that the project ramps up rapidly, project partners have agreed to begin providing their unfunded contribution prior to the official start of the project.

The EGEE Mission

In order to achieve the vision outlined above, EGEE has a three-fold mission:

1. To deliver production level Grid services, the essential elements of which are manageability, robustness, resilience to failure, and a consistent security model, as well as the scalability needed to rapidly absorb new resources as these become available, while ensuring the long-term viability of the infrastructure.

2. To carry out a professional Grid middleware re-engineering activity in support of the production services. This will support and continuously upgrade a suite of software tools capable of providing production level Grid services to a base of users which is anticipated to rapidly grow and diversify.

3. To ensure an outreach and training effort which can proactively market Grid services to new research communities in academia and industry, capture new e-Science requirements for the middleware and service activities, and provide the necessary education to enable new users to benefit from the Grid infrastructure.

Reflecting this three-fold mission, the EGEE proposal is structured in three main areas of activity: **services, middleware** and **networking**. Key aspects for each of these areas are summarised in separate sections below.

It is essential to the success of EGEE that the three areas of activity should form a tightly integrated "Virtuous Cycle", illustrated in Figure 2. In this way, the project as a whole can ensure rapid yet well-managed growth of the computing resources available to the Grid infrastructure as well as the number of scientific communities that use it. As a rule, new communities will contribute new resources to the Grid infrastructure. This feedback loop is supplemented by an underlying cyclical review process covering overall strategy, middleware architecture, quality assurance and security status, and ensuring a careful filtering of requirements, a coordinated prioritization of efforts and maintenance of production-quality standards.

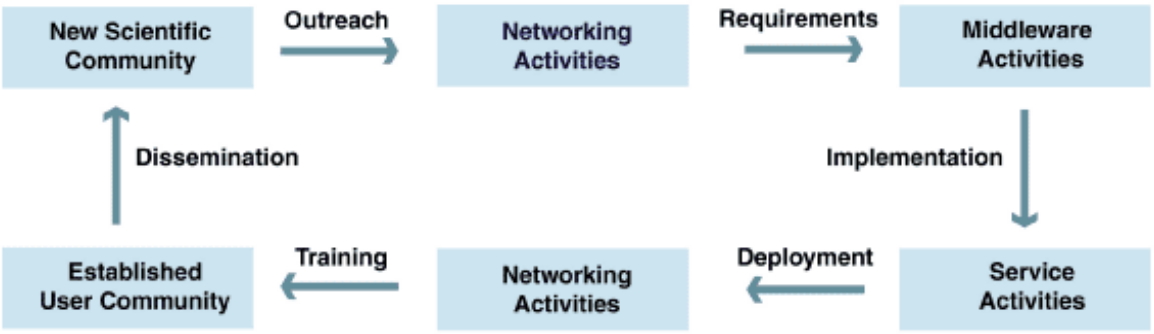

Figure 2 ***The "Virtuous Cycle" for EGEE development. A new scientific community makes first contacts to EGEE through outreach events organized by Networking Activities. Follow-up meetings by applications specialists may lead to definition of new requirements for the infrastructure. If approved, the requirements are implemented by the Middleware Activities. After integration and testing, the new middleware is deployed by the Service Activities. The Networking Activities then provide appropriate training to the community in question, so that it becomes an established user. Peer communication and dissemination events featuring established users then attract new communities.***

The Stakeholder Perspective

In order to convey the scope and ambition of the project, this section presents the expected benefits for EGEE stakeholders and an outline of the procedure for the stakeholder to participate in EGEE. The key types of EGEE stakeholders are *users, resource providers,* and *industrial partners.*

EGEE Users

Once the EGEE infrastructure is fully operational, users will perceive it as one unified large scale computational resource. From the user perspective, the complexity of the service organisation and the underlying computational fabric will remain invisible. The benefits of EGEE from the user perspective include:

- **Simplified access** – Today most users have accounts on numerous computer systems at several computer centres. The resource allocation procedures vary between the centres and are in most cases based on applications submitted to each centre or application area management. The overhead involved for a user in managing the different accounts and application procedures is significant. EGEE will reduce this overhead by providing means for users to join virtual organisations with access to a Grid containing all the operational resources needed.
- **On demand computing** – By allocating resources efficiently, the Grid promises greatly reduced waiting times for access to resources.
- **Pervasive access** – The infrastructure will be accessible from any geographic location with good network connectivity, thus providing regions with limited computer resources access on an as-need basis to large resources.
- **Large scale resources** – Through coordination of resources and user groups EGEE will be able to provide application areas with access to resources of a scale that no

single computer centre can provide. This will enable European researchers to address previously intractable problems in strategic application areas.

- **Sharing of software and data** – By providing a unified computational fabric the EGEE will allow wide spread user communities to share software and databases in a transparent way. The EGEE will act as the enabling tool for European collaborations, building and supporting new virtual application organisations.
- **Improved support** – By making use of the expertise of all the partners EGEE will be able to provide a support infrastructure that includes in depth support for all key applications and around the clock technical systems support for GRID services.

Conditions for user access

A potential user community will typically come into contact with EGEE through one of the many outreach events supported by the Dissemination and Outreach activity, and will be able to express their specific user requirements via the Applications Identification and Support Activity. After negotiating access terms, which will depend, amongst other things, on the resources the community can contribute to the Grid infrastructure, users in the community will receive training from the User Training and Induction activity. From the user perspective, the success of the EGEE infrastructure will be measured in the scientific output that is generated by the user communities it is supporting.

Resource Providers

EGEE resources will include national GRID initiatives, computer centres supporting one specific application area, or general computer centres supporting all fields of science in a region. The motivation for providing resources to the EGEE infrastructure will reflect the funding situation for each resource provider. EGEE will develop policies that are tailored to the needs of different kinds of partners. The most important benefits for resource providers are:

- **Large scale operations** – Through EGEE a coordinated large scale operational system is created. This will lead to significant cost savings and at the same time improved level of service provided at each participating resource partner. Through EGEE, the critical mass needed for many support actions can be reached by all participating partners.
- **Specialist competence** – By distributing service tasks among the partners EGEE will make use of the leading specialists in Europe to build and support the infrastructure. The aggregate level of competence obtained is a guarantee for the success of the EGEE project. In this sense the Grid is used to connect distributed competence just as much as it is connecting distributed computational resources. Each participating centre and its users will thus have access to experts in a wide variety of application and support fields.
- **User contacts** – The EGEE distributed support model will allow for regional adaptation and close contacts with regional user communities. The existence of regional support is of fundamental importance when introducing new users and user communities with limited previous experience of computational techniques. A resource partner in EGEE will become much more attractive as a collaboration partner on the regional level by representing the large scale EGEE infrastructure.
- **Collaborations among resource partners** – It is foreseen that several partners within the EGEE framework will form collaborations and launch development and

support actions not included the present proposal. This will lead to cost sharing of R&D efforts among partners and in the longer perspective allow for specialization and profiling of participating partners to form globally leading centres of excellence within EGEE.

These benefits motivate the many partners that support the EGEE proposal already, representing aggregate resources of over 17000 cluster nodes.

Conditions for resource provider access

EGEE builds on the integration of existing infrastructures in the participating countries, in the form of national GRID initiatives, computer centres supporting one specific application area, or general computer centres supporting all fields of science in a region. The motivation for providing resources to the EGEE infrastructure depends on the mission and funding situation for each of the resource partners. A new resource provider will typically approach EGEE through contact with the Regional Operations Centres. Specific policy and contractual issues for a given resource provider will be dealt with by dedicated staff in the Operations Management Centre, based on general guidelines defined and regularly reviewed by the Project Executive Board, with advice from the Project Management Board, and reviewed regularly.

Industrial Partners

The driving force for EGEE is scientific applications, and the current partners represent publicly funded research institutions and computer resource providers from across Europe. Nevertheless, it is envisaged that industry will benefit from EGEE in several ways:

- **Industry as partner** – Through collaboration with individual EGEE partners, industry has the opportunity to participate in specific activities where relevant skills and manpower are available, thereby increasing know-how on Grid technologies.
- **Industry as user** – As part of the networking activities, specific industrial sectors will be targeted as potential users of the installed Grid infrastructure, for R&D applications. The pervasive nature of the Grid infrastructure should be particularly attractive to high-tech SMEs, because it brings major computing resources – once only accessible to large corporations – within grasp.
- **Industry as provider** – Building a production quality Grid will require industry involvement for long-term maintenance of established Grid services, such as call centres, support centres and computing resource provider centres.

The EGEE vision also has inspiring long-term implications for the IT industry. By pioneering the sort of comprehensive production Grid services which are envisioned by experts – but which at present are beyond the scope of national Grid initiatives – EGEE will have to develop solutions to issues such as scalability and security that go substantially beyond current Grid R&D projects. This process will lead to the spin off of innovative IT technologies, which will have benefits for industry, commerce and society going well beyond scientific computing. Major initiatives launched by several IT industry leaders in the area of Grids and Utility computing emphasize the economic potential of this emerging field.

Conditions for industry partner access

Industry will typically come in contact with EGEE via the Industry Forum organised by the Application Identification and Support activity, as well as more general dissemination events run by the Dissemination and Outreach activity. Interested companies will be able to consult about potential participation in the project with the Project Director and with regional representatives on the EGEE Project Management Board. As the scope of Grid services expands during the second two years of the programme, it is envisaged that established core services will be taken over by industrial providers with proven service capacity. This service would be provided on commercial terms, and selected by a competitive tender.

The EGEE expertise and resources

The EGEE proposal has been prepared by experts in Grid technologies representing the leading Grid activities in Europe. The process of developing this project has lead to a structuring of the European Grid community, as illustrated in Figure 3, into eight partner regions. Each of these partners has representation on the Executive Committee established to prepare the EGEE proposal (see www.cern.ch/egee for details), as does the lead partner CERN as well as EU RN GEANT and LCG, which is a prime EGEE computing and data management resource supplier as well as a major service customer of EGEE.

A significant structuring effect due to EGEE is already apparent, as several of these partners have begun integrating regional Grid efforts in order to provide coordinated resources to the EGEE project. In addition, Russian and US representatives have observer status in the Executive Committee, and have contributed expertise to the preparation of this proposal. These countries have confirmed that they will participate actively in EGEE, and participation of Japan and the Asia-Pacific region is considered desirable and will be pursued.

A Technical Advisory Board and eight Task Forces have contributed to preparing the basis of this proposal. The implementation descriptions are based on overall guidelines given by the Executive Committee, but written by experts in each field, in order to ensure well-informed activity descriptions and realistic deliverables. The proposal thus reflects expert opinion in each aspect of the work that the project aims to undertake, and uses the terminology of the relevant field to enable concise descriptions of activities.

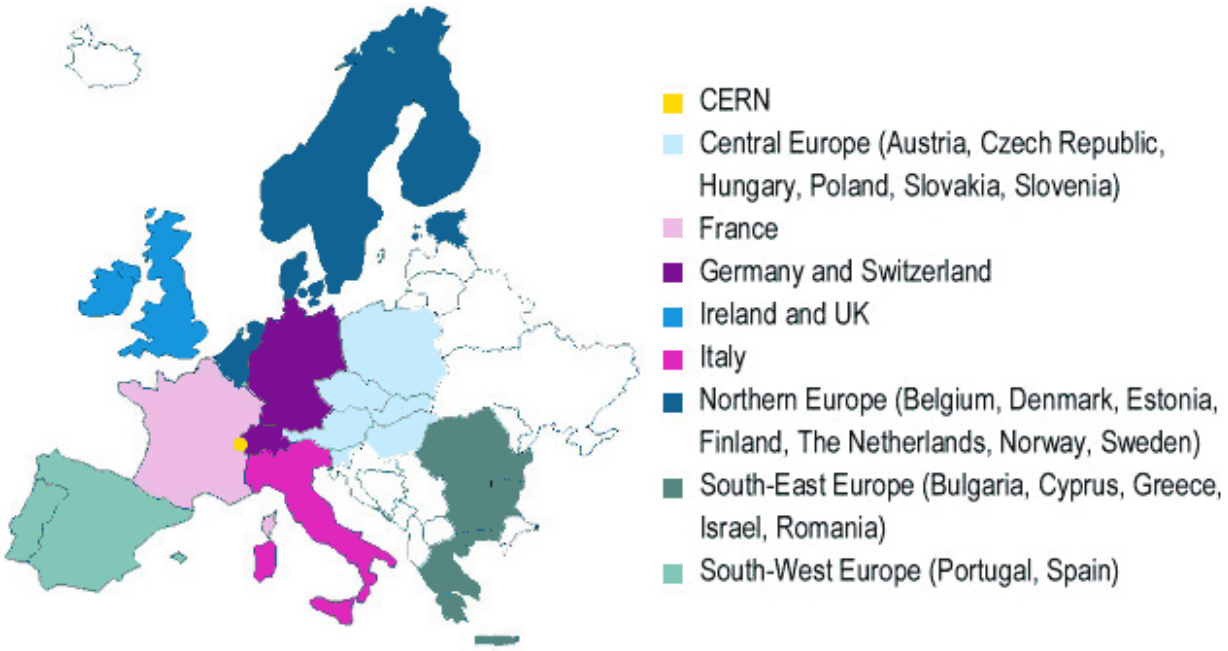

Figure 3 ***Map of the nine partners of EGEE. Details of representation for each partner country and region can be found on www.cern.ch/egee***

The lead partner CERN brings to the project experience in managing very large international scientific collaborations and major IT projects, such as the EU DataGrid project, to date the largest EU supported project on Grid technology

CERN and many EGEE partners are particularly strongly committed to the EGEE vision, because rapid deployment of a production Grid infrastructure is on the critical path for LCG, with a planned investment budget for this activity of over 200M€ over the next four years and a manpower of over 150 persons already active at CERN and in 25 regional computing centres. LCG will provide EGEE with resources which are a vital starting point for operating a production-quality Grid. The EGEE partners also bring critical technical expertise in middleware development to the project, built up through CERN-led initiatives such as the EU Data Grid and the EU DataTAG projects.

Participation of the Research Network Geant in EGEE is a key feature of the project, and specific service and middleware activities are planned as part of the project, in order to adapt the Geant network to support Grid operations optimally.

Service Activities

The Service Activities will create, operate, support and manage a production quality European Grid infrastructure which will make resources at many resource centres across Europe accessible to user communities and virtual organisations in a consistent way according to agreed access management policies and service level agreements, while maintaining an overall secure environment.

These activities will build on current national and regional initiatives such as the UK e-Science Grid, the Italian Grid, and NorduGrid, as well as infrastructures being established by specific user communities, such as LCG.

The structure of the Grid services will comprise: EGEE Operations Management at CERN; EGEE Core Infrastructure Centres in the UK, France, Italy and at CERN, responsible for managing the overall Grid infrastructure; Regional Operations Centres, responsible for coordinating regional resources, regional deployment and support of services. This structure is illustrated in Figure 4.

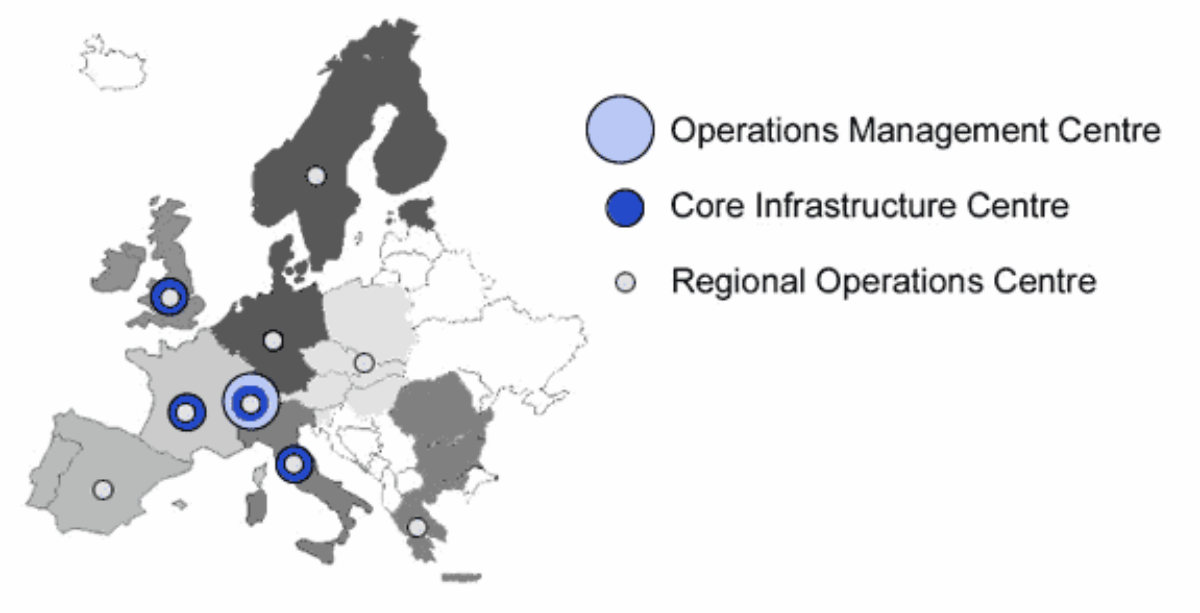

Figure 4 ***Distribution of Service Activities over Europe. The symbols illustrate regional distribution and do not reflect precise geographical location of activities***

The basic services that will be offered are: middleware deployment and installation; a software and documentation repository; Grid monitoring and problem tracking; Bug reporting and knowledge database; Virtual Organization (VO) Services; Grid Management Services.

Continuous, stable Grid operation represents the most ambitious objective of EGEE, and requires the largest effort. Based on experience of running computing centres, the partners estimate that to ensure round-the-clock service, each operations centre requires typically 14-16 persons. The partners estimate that a further 10 persons are required to staff the four Core Infrastructure Centres, which must resolve all issues related to load balancing across the entire Grid infrastructure as well as take primary responsibility for the implementation of the basic services. The EGEE Operations Management requires a team of 10 persons at CERN. In all cases, it is anticipated that EGEE will fund of order 50% of required manpower.

Middleware activities

The current state-of-the-art in Grid Computing is dominated by research Grid projects that aim to deliver test Grid infrastructures providing proofs of concept and opening opportunities for new ideas, developments and further research. Only recently there has been an effort to agree on a unified Open Grid Services Architecture (OGSA) and an initial set of specifications constituting the Open Grid Service Infrastructure that set some of the standards in defining and accessing Grid services. Building a European Grid infrastructure based on robust components is thus becoming feasible. However, this will still take a considerable integration effort in terms of making the existing components adhere to the new standards, adapting them to evolution in these standards, and deploying them in a production Grid environment.

The middleware activities in EGEE focus primarily on re-engineering existing middleware functionality, leveraging the considerable experience of the partners with the current generation of middleware. Based on experience, geographic co-location of development staff is essential, and therefore these activities are based on tightly-knit teams concentrated in a few major centres with proven track records and expertise, as illustrated in Figure 5.

The middleware Re-engineering Centres will take responsibility for the following key services: Resource Access (Italy); Data Management (CERN); Information Collection and Retrieval (UK); Resource Brokering and Accounting (Italy); Closely connected to this middleware development is a Quality Assurance team (France) and a Grid Security team (Northern Europe Federation), which also has responsibility for Authorisation and Authentication Services as well as Virtual Organisation management tools. A Middleware Integration team and Middleware Testing Centre will be located at CERN, providing EGEE middleware releases and automatic installation and testing suites.

The partners estimate that each of the middleware services and related support teams listed above requires 10-12 persons to provide critical mass.

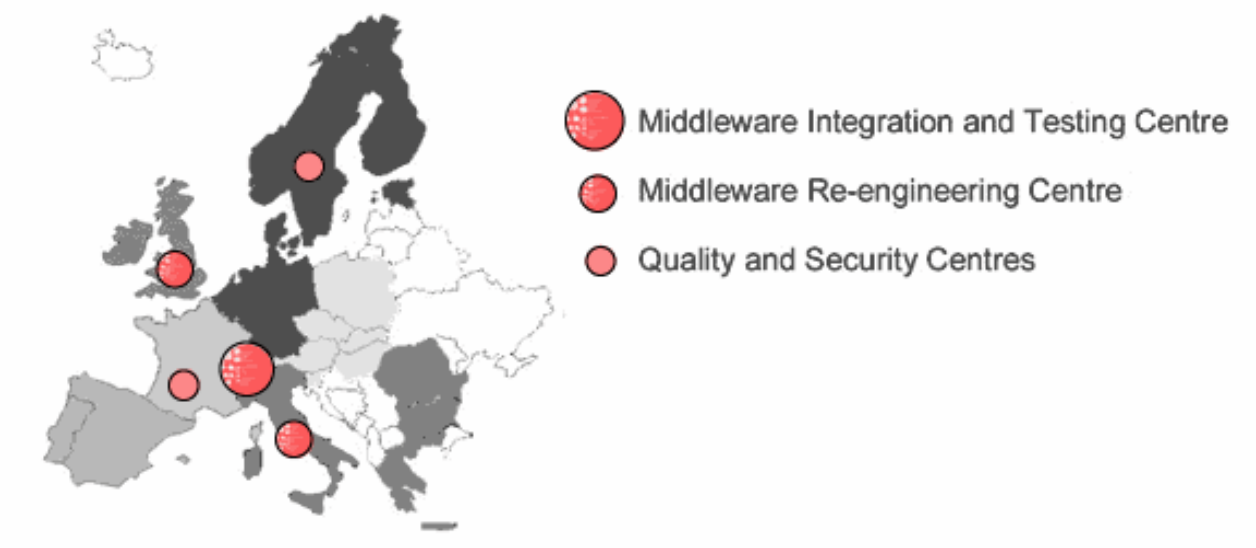

Figure 5 ***Distribution of middleware activities over Europe. The symbols illustrate regional distribution and do not reflect precise geographic location of activities.***

Networking activities

The networking activities in EGEE aim to facilitate the induction of new users, new scientific communities and new virtual organisations into EGEE community. EGEE will develop and disseminate appropriate information to these groups proactively, and take into account their emerging Grid infrastructure needs. The goal is to ensure that all users of the EGEE infrastructure are well supported and to provide input to the requirements and planning activities of the project.

Specific activities included in the EGEE proposal are: Dissemination and Outreach; User Training and Induction; Application Identification and Support; Policy and International Cooperation. The lead partner for the Training activity is the UK (NeSC, Edinburgh). The lead partner for the Dissemination activity is the European Research Network organisation TERENA (Amsterdam). Both lead partners will rely on a supporting network in the partner regions, partially funded by the project. The networking activity is envisaged as a distributed effort, with coordination provided by the lead partner, on the basis that many aspects of such support need to be adapted to regional needs, and this is best done locally.

The Application Identification and Support Activity has three components, two Pilot Application Interfaces – for high energy physics and biomedical Grids – and one more generic component dealing with the longer term recruitment of other communities. Coordination of these activities is provided by the CNRS in France, an organisation well-suited to this task since it covers all scientific domains. The Pilot Application Centre for high-energy physics is based at CERN, the one for biomedical is in France (lead) and South-West Europe Federation, and the generic component is managed by Italy and Central Europe Federation with participation of all partners, in order to ensure as broad a contact with scientific communities as possible.

The Networking activities are by nature highly distributed, in order to be effective. Therefore the breakdown of manpower by specific activity for each partner must be very flexible. Partners will focus on establishing teams of 4-6 persons in each region to support all aspects of networking, with an emphasis that will vary with time and by region. Additional manpower is allocated to the Lead Partners and Pilot Applications coordinators.

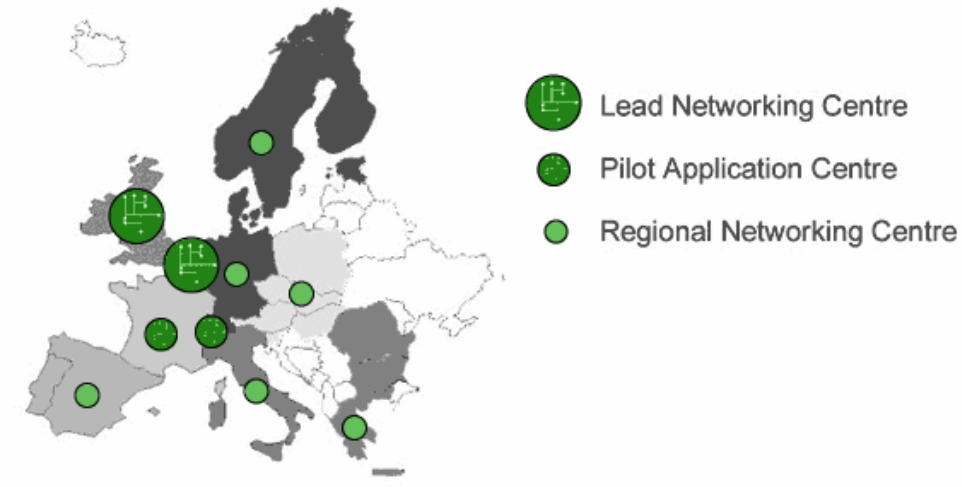

Figure 6 ***Distribution of Networking activities over Europe. The symbols illustrate regional distribution and do not reflect precise geographic location of activities.***

The EGEE management

To ensure the success of a project of this scale, a clear overall management structure with strong leadership is essential. The EGEE partners propose a structure where a Project Executive Board is located at CERN, led by the Project Director, and including Managers of all major activities and resources relevant to the project (see Figure 7).

The Project Director reports to the Project Management Board, which includes representatives of the EGEE partner countries and regions and CERN. The Project Director also reports to the EU

The Project Executive Board is supported by a Project Office, which includes the necessary administrative support for a project which is estimated to involve in total over 300 persons. The scope of such a Project Office is estimated to be six persons: a project senior administrator, a second project administrator, a project secretary and assistant to the Project Director, a project accountant and finance administrator, a dissemination and PR officer and a project administration Web site manager.

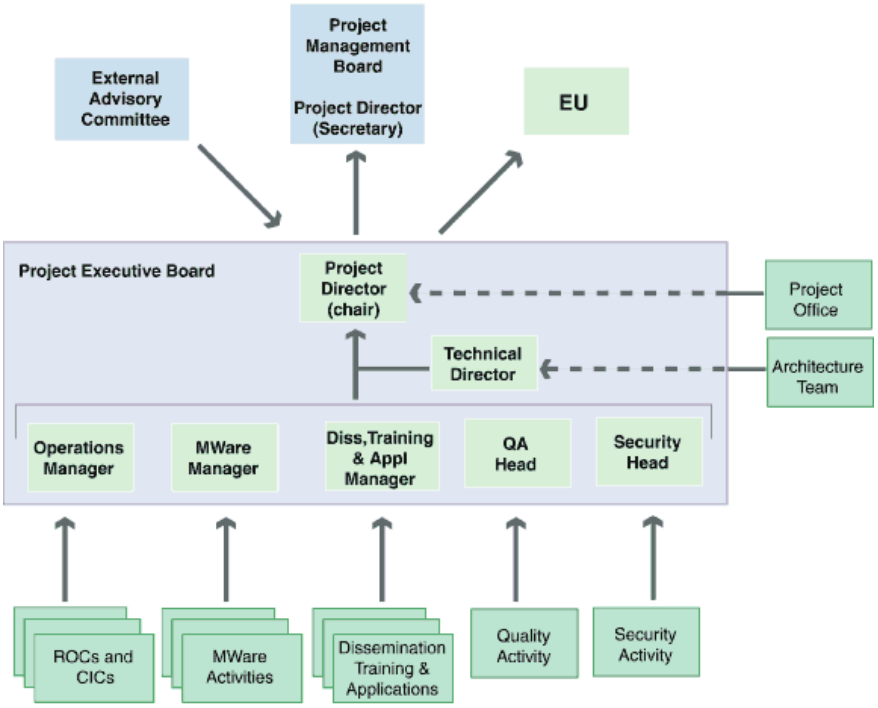

Figure 7 ***Management diagram for EGEE***

The Project Executive Board receives independent technical advice from an External Advisory Committee that reviews progress of EGEE regularly, and includes international Grid experts. It is important to emphasize that EGEE is not an R&D project, but a project to establish a reliable infrastructure that provides high quality service to a wide range of users. Therefore, evaluation of the project must be based on metrics that include the size, respectability, breadth and international scope of the user base, the total computer power, storage capacity and number of sites contributing to the infrastructure, and the availability, job turnaround rate and job success rate of the services. The rate and success of user induction as well as the rate of successful implementation of new features are further criteria management must optimize.

Summary of activity distribution for EGEE

The vision of EGEE is to integrate existing computer resources in the project member states, therefore this project does not make any infrastructure hardware requests. The bulk of the requested funding is for human resources and operational costs. As described in the previous sections, this request is based on building strong teams where there is already existing expertise, in order to progress as quickly as possible. In all cases, host partners for these teams will provide matching funding.

An overview of the breakdown of activities amongst the partners for the two years of the project is provided in Table A below. After this first phase the partners will submit a new proposal to a future EU solicitation for completing and improving the deployment of the Grid.

Partner/ Region	**Services**				**Middleware**				**Networking**				
	Regional Operations Centre	Core Infrastructure Centre	Operations Management Centre	Network Resource Provision	Middleware Engineering and Integration	Quality Assurance	Security	Network Development Services	Management of the I3	Dissemination and Outreach	User Training and Induction	Application Identification and Support	Policy and International Cooperation
Central Europe	X									X	X	X	
CERN	X	X	X		X				X	X	X	X	X
France	X	X				X				X	X	X	
Germany & Switzerland	X									X	X	X	
Italy	X	X			X					X	X	X	
Ireland & UK	X	X			X					X	X	X	
Northern Europe	X						X			X	X	X	
South-East Europe	X									X	X	X	
South-West Europe	X									X	X	X	
Joint activity w. Geant				X				X					
Terena										X			

Table A ***Overview of the breakdown of EGEE main activities by partner region. Activities involving Geant and Terena are indicated separately.***

List of Participants

Below are listed the 70 partners in the EGEE consortium, which are organised in eight regional federations for Europe, with the Lead Partner being CERN. Also, the organisations GEANT and TERENA have partner status, as do Russia and the United States of America. In addition to the 70 partners, 30 other organisations are contributing to the project without being signatories of the contract. These include five industrial groups (IBM Montpellier, Microsoft European Innovation Centre, Enterprise Applications Integration, NICE, HELIDE).

LEAD PARTNER

1 European Organization for Particle Physics, Geneva, Switzerland (CERN)

CENTRAL EUROPE

2 Institut fuer Technische Informatik und Telematik Johannes Kepler University, Linz, Austria (GUP)
3 Institut fuer Informatik der Universitaet Innsbruck- Innsbruck Austria (UNIINNSBRUCK)
4 CESNET, Prague Czech Republic (CESNET)
5 Budapest University of Technology and Economics - Budapest, Hungary (BUTE)
6 Eotvos Lorand University Budapest, Hungary (ELUB)
7 KFKI Research Institute for Particle and Nuclear Physics, Budapest-Hungary (KFKI RMKI)
8 Magyar Tudomanyos Akademia Szamiastecnikai es Automatizalasi Kutato Intezet, Budapest, Hungary (MTA SZTAKI)
9 Office for National Information and Infrastructure Development- Budapest, Hungary (NIIFI)
10 Akademickie Centrum Komputerowe CYFRONET akademii Gorniczo-Hutniczej im.St. Staszica w Krakowie-Cracow Poland (CYFRONET)
11 Warsaw University Interdisciplinary Centre for Mathematical and Computational Modelling- Warszawa – Poland (ICM)
12 Institute of Biorganic Chemistry PAN, Poznan Supercomputing and Networking Center - Poznan Poland (PSNC)
13 Ustav Informatiky, Slovenska Akademia vied - Bratislava Slovakia II (SAS)
14 Jozef Stefan Institute - Lyubljana, Slovenia (JSI)

FRANCE

20 Commissariat à l'Energie Atomique, Direction des Sciences de la Matière, Paris-France (CEA/DSM)
21 Compagnie Générale de Géophysique, Massy, France (CGG)
22 Centre National de la Recherche Scientifique, Paris- France (CNRS)
23 CS Système d'Information Communication & Systèmes, Clamart –France (CSSI)
24 Centrale Recherche S.A, Chatenay-Malabry-France (CRSA)

GERMANY & SWITZERLAND

25 Deutsches Elektronen Synchrotron - Hamburg Germany (DESY)
26 Deutsches Klimarechenzentrum GmbH, Hamburg, Germany (DKRZ)
27 Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung e.V., Muenchen, Germany (FhG)
28 Forschungszentrum Karlsruhe GmbH, Karlsruhe, Germany (FZK)
29 Gesellschaft für Schwerionenforschung mbH, Darmstadt, Germany (GSI)
69 Verein zur Foerderung eines Deutschen Forschungsnetzes e.V., Berlin, Germany (DFN)

ITALY

30 DATAMAT S.p.A., Roma, Italy (DATAMAT)
31 Istituto Nazionale di Fisica Nucleare, Frascati (Roma), Italy (INFN)
64 Ente per le Nuove Tecnologie, l'Energia e l'Ambiente, Roma, Italia (ENEA)
65 Università degli Studi della Calabria, Arcavacata di Rende (CS), Italia (UniCal)
66 Università degli Studi di Lecce, Lecce, Italia (UniLe)
67 Università degli Studi di Napoli "Federico II", Napoli, Italia (UniNa)
70 Consortium GARR, Roma, Italy (GARR)

IRELAND & UK

15 The Provost Fellows and Scholars of the College of the Holy and Undivided Trinity of Queen Elizabeth near Dublin, Ireland (TCD)
16 Council for the Central Laboratory of the Research Councils, Oxfordshire – UK (CCLRC)
17 The University of Edinburgh- Edinburgh, UK (NESC)

18 Particle Physics and Astronomy Research Council, Swindon, UK (PPARC)
19 University College of London (UCL)

NORTHERN EUROPE
33 Brussels Free University, Brussels, Belgium (ULB)
34 Faculty of Science University of Copenhagen, Copenhagen, Denmark (KU-NATFAK)
35 University of Helsinki, Helsinki, Finland (UH.HIP)
36 Foundation for Fundamental Research on Matter, Utrecht, Netherlands (FOM)
37 Stichting Academisch Rekencentrum Amsterdam, Amsterdam, Netherlands (SARA)
38 Universiteit van Amsterdam, Amsterdam, Netherlands (UvA)
39 University of Bergen, Norway (UiB)
40 Vetenskapsrådet, the Swedish Research Council, Stockholm, Sweden (VR)
63 Royal Institute of Technology - Center for Parallel Computers (PDC KTH)

SOUTH-EAST EUROPE
50 University of Cyprus, Nicosia, Cyprus (UCY)
51 Greek Research and Technology Network, Athens, Greece (GRNET)
52 Tel Aviv University, Tel Aviv, Israel (TAU)
53 National Institute for Research and Development in Informatics, Bucharest, Romania (ICI)
49 Central Lab. for Parallel Processing, Bulgarian Academy of Sciences, Sofia, Bulgaria (CLPP-BAS)

SOUTH-WEST EUROPE
54 Laboratório de Instrumentação e Física Experimental de Partículas, Lisboa, Portugal (LIP)
55 S.A.X. Centro de Supercomputación de Galicia, Santiago de Compostela, Spain (CESGA)
56 Consejo Superior de Investigaciones Cientificas, Madrid, Spain (CSIC)
57 Institut de Física d'Altes Energies, Barcelona, Spain (IFAE)
58 Instituto Nacional de Técnica Aeroespacial, Madrid, Spain (INTA)
59 Universidad Politécnica de Valencia, Valencia, Spain (UPV)

JOINT ACTIVITY WITH GEANT
68 Delivery of Advanced Network Technlogy to Europe Limited, Cambridge, (UK DANTE)

TERENA
32 Trans-European Research and Networking Association, Amsterdam- The Netherlands (TERENA)

RUSSIA AND USA
41 Institute of High Energy Physics - Protvino Moscow Region Russia (IHEP)
42 Institute of Mathematical Problems of Biology of Russian Academy of Sciences, Pushchino, Moscow Region Russia (IMPB RAS)
43 Institute of Theoretical and Experimental Physics, Moscow, Russia (ITEP)
44 Joint Institute for Nuclear Research, Dubna Russia (JINR)
45 Keldysh Institute of Applied Mathematics of Russian Academy of Sciences Moscow – Russia (KIAM RAS)
46 Petersburg Nuclear Physics Institute of Russian Academy of Sciences - Gatchina, Leningrad district – Russia (PNPI)
47 Russian Research Centre "Kurchatov Institute",Moscow Russia (RRC KI)
48 Skobeltsyn Institute of Nuclear Physics of Moscow State University - Moscow Russia (SINP-MSU)
60 University of Chicago, Chicago IL-USA (University of Chicago)
61 University of Southern California, Marina del Rey CA, USA (USC)
62 The Board of Regents for the University of Wisconsin System - Madison USA (Wisconsin-Madison Univ.)