SEVENTH FRAMEWORK PROGRAMME
Research Infrastructures
INFRA-2007-2.1.2 – Design Studies for eInfrastructures

Grant agreement for: **Coordination and Support Actions: Supporting**

Annex I – "Description of Work"

Project acronym: EGI_DS
Project full title: European Grid Initiative Design Study
Grand agreement no.: 211693

Date of preparation of Annex I: 09-10-2007
Version number: 1.12 (without budget details)
Date of approval of Annex I by Commission: *(to be completed by Commission)*

List of Beneficiaries

Beneficiary Number	Beneficiary name	Beneficiary short name	Country	Date enter project	Date exit project
1 (coordinator)	Johannes Kepler Universitaet Linz	GUP	A	M1	M27
2	Greek Research and Technology Network S.A.	GRNET	GR	M1	M27
3	Istituto Nazionale di Fisica Nucleare	INFN	I	M1	M27
4	CSC - TIETEELLINEN LASKENTA OY	CSC	FI	M1	M27
5	CESNET, ZAJMOVE SDRUZENI PRAVNICKYCH OSOB	CESNET	CZ	M1	M27
6	European Organization for Nuclear Research	CERN	CH	M1	M27
7	Verein zur Foerderung eines Deutschen Forschungsnetzes - DFN-Verein	DFN	D	M1	M27
8	Science & Technology Facilities Council	STFC	UK	M1	M27
9	Centre National de la Recherche Scientifique	CNRS	F	M1	M27

Document Log

No	Issue	Responsibility	Completed
1			

Table of contents

PART A

A1. Budget breakdown and project summary

A.1.1 Overall budget breakdown for the project

Proposal number:	211693	*Proposal acronym:*	EGI_DS

Participant number in this project	Organisation short name	Estimated eligible costs (whole duration of the project)			TOTAL A+B+C	Total receipts	Requested EC contribution
		Coordination / Support (A)	Management (B)	Other (C)			
1	GUP						
2	GRNET						
3	INFN						
4	CSC						
5	CESNET						
6	CERN						
7	DFN-VEREIN						
8	STFC						
9	CNRS						
TOTAL							

Participant number in this project	Organisation short name	Estimated eligible costs (whole duration of the project)					
		Coordination / Support (A)					Management (B)
		WP2	WP3	WP4	WP5	WP6	WP1
1	GUP						
2	GRNET						
3	INFN						
4	CSC						
5	CESNET						
6	CERN						
7	DFN-VEREIN						
8	STFC						
9	CNRS						
SUM							

A.1.2 Project summary

Project number:	211693	*Project acronym:*	EGI_DS

General information

Project Title	European Grid Initiative Design Study		
Starting Date	01/09/2007		
Duration in months	27	*Call (part) identifier*	FP7-INFRASTRUCTURES-2007-1
Activity code(s) most relevant to your topic		INFRA-2.1-02	
Free keywords			

Abstract

The EGI Design Study represents a project for the conceptual setup and operation of a new organizational model of a sustainable pan-European grid infrastructure. The project will address key questions concerning the assessment of technical and financial feasibility of such a sustainable grid service, producing a "conceptual design report" addressed at member state policy makers and funding agencies. The project will interact and encourage the member states to make the strategic decisions required to establish and support a sustainable grid infrastructure, and initiate its implementation.

Europe has developed a scientific grid infrastructure in and across many member states which is being used by many research communities. This has come about by investments from member states into national resources as well as by the European Commission with project awards for European flagship projects such as EGEE (Enabling Grids for E-sciencE) and support projects to develop interoperable middleware technologies and co-ordination mechanisms. At present and on a project-basis, this production service infrastructure cannot be sustained indefinitely, and there is a clear need to establish a long term technical and financial structure. This need is confirmed by a series of recommendations from the e-Infrastructure Reflection Group (e-IRG), and the European Grid Initiative (EGI) represents the coordinated effort to advance on this matter.

The EGI Design Study will identify the conditions and develop the framework for a sustainable Grid infrastructure which should take over the coordination and operation of the future European grid infrastructure from today's projects. The design study will foster the emergence of a new organisational model designed to consolidate a sustainable approach to e-Infrastructures, in particular in the domain of grids, facilitating new service provisioning schemes, more application neutral and open to all user communities and resource providers.

A.1.3 List of beneficiaries

Beneficiary Number	Beneficiary name	Beneficiary short name	Country	Date enter project	Date exit project
1 (coordinator)	Johannes Kepler Universitaet Linz	GUP	A	M1	M27
2	Greek Research and Technology Network S.A.	GRNET	GR	M1	M27
3	Istituto Nazionale di Fisica Nucleare	INFN	I	M1	M27
4	CSC - TIETEELLINEN LASKENTA OY	CSC	FI	M1	M27
5	CESNET, ZAJMOVE SDRUZENI PRAVNICKYCH OSOB	CESNET	CZ	M1	M27
6	European Organization for Nuclear Research	CERN	CH	M1	M27
7	Verein zur Foerderung eines Deutschen Forschungsnetzes - DFN-Verein	DFN	D	M1	M27
8	Science & Technology Facilities Council	STFC	UK	M1	M27
9	Centre National de la Recherche Scientifique	CNRS	F	M1	M27

PART B

B1. Concept and objectives, progress beyond state-of-the-art, S/T methodology and work plan

B.1.1 Concept and project objective(s)

Europe has invested heavily in e-science programmes over the past years both at the National and the European levels, with impressive results. Grid technology is recognised as a fundamental component for e-infrastructures. Many countries have launched **National Grid Initiatives (NGI)** to establish National Grid Infrastructures. While the maturity level and the implementations are not necessarily the same, they all aim at providing in the long-term a common e-Science Infrastructure in support of all sciences. Helped by the strong support from the European Commission, Europe has established itself as the world leader in the field. A fast growing number of communities are adopting Grids and many rely already today on Grids to achieve their missions.

As the Virtual Organizations (VOs) established by scientific communities move from a pilot phase of testing their applications on Grid infrastructures to a phase of more routine usage, it becomes increasingly urgent to ensure that reliable and adaptive Grid infrastructures are maintained, independent of project funding cycles. Without such continuity, scientific communities will tend to diverge into specific proprietary solutions of this new computing paradigm, potentially jeopardising the large investments and practical successes for a general common e-Infrastructure for e-Science that have been made so far.

The current situation for Grid infrastructures requires a consolidation effort similar to the one occurred in scientific networks fifteen years ago. Research networks started as incompatible testbeds, using different protocols and tools. Independent national initiatives led to the EU-EC promoting common standards, resulting ultimately in the GÉANT network infrastructure, in TERENA, the Trans-European Research and Education Networking Association offering a forum to collaborate, innovate and share knowledge in order to foster the development of Internet technology, infrastructure and services to be used by the research and education community, and the creation of the DANTE organization in 1993 to plan, build and operate the central European network and its international connections. As a result, a high-quality research network has become an essential part of the technological infrastructure for European and global scientific cooperation in many fields. A similar but more complex evolution of e-infrastructures needs to be planned now, to maintain Europe's leading position in global science Grids. Grid Infrastructures, as the EGEE one, are in fact built on top of Open Source technical services developed in general by the Research Communities themselves inside National or European projects. Contrary to NRENs who could rely on well established commercial products NGIs and EGI need to guarantee for the future also the evolution and consolidation of such services within the same sustainable framework.

The Vision

Research does not stop at national borders. While national infrastructures are fundamental in providing local connectivity and resources to researchers, they need to be linked seamlessly at a world-wide level to enable global scientific collaboration. This is in particular required inside Europe itself where the construction of an European Research Area (ERA) overcoming of the current limit of the Member States research, has been recognized as one of the top European priorities. Taking the existing political structures and funding schemes into account, we believe that a European Infrastructure based on National Grid Infrastructures and linked to similar infrastructures outside of Europe is the correct approach. This activity is pushed forward by the European Grid Initiative (EGI).

To ensure that Europe capitalises fully on its large investment in Grid infrastructures, middleware development and applications, the **objectives of the future EGI organization** should be to:

- Ensure the long-term sustainability of the European e-infrastructure
- Coordinate the integration and interaction between National Grid Infrastructures
- Operate the European level of the production Grid infrastructure to link National Grid Infrastructures for a wide range of scientific disciplines;
- Provide global services and support that complement and/or coordinate national services (Authentication, VO-support, security, etc);
- Coordinate middleware development and standardization to enhance the infrastructure by soliciting targeted developments from leading EU and National Grid middleware development projects;
- Advise National and European Funding Agencies in establishing their programmes for future software developments based on agreed user needs and development standards;
- Integrate, test, validate and package software from leading Grid middleware development projects and make it widely available;
- Provide documentation and training material for the middleware and operations. (NGIs may wish to make the material available in turn in their local language);
- Take into account developments made by national e-science projects which were aimed at supporting diverse communities.
- Link the European infrastructure with similar infrastructures elsewhere;
- Promote Grid interface standards based on practical experience gained from Grid operations and middleware integration activities, in consultation with relevant standards organizations;
- Collaborate closely with industry as technology and service providers, as well as Grid users, to promote the rapid and successful uptake of Grid technology by European industry.

The above is a partial list and further details will need to be worked out during the EGI design study (EGI_DS).

Following the design study and the acceptance by the participating countries and the European Commission, the responsibility for most of the tasks carried out today by Grid infrastructure projects such as EGEE, but also ETICS and OMII-EU, would gradually be handed over to the combination of EGI and NGIs.

Grid technologies still have a way to go before they reach the maturity level of networks. It is therefore essential to start with an organisation strong enough to support a variety of solutions and to make them interoperate, while pushing for standardisation.

While we expect the European Commission to support the design study of EGI and thereafter its initial implementation, co-funding should come from the outset from the member states through the NGIs. Therefore, the EGI organization should be “owned” by the NGIs, and the inclusion of NGIs in the Design Study is an essential part of our work.

With this respect, we would like to point to Table 1.3f, which lists institutions supporting the EGI Vision and the EGI_DS proposal. Please note that from the EU27, only Malta and Slovenia are missing, and in total a 31 National Grid Initiatives have provided their input and support for this activity. In addition, we received letters of support from Asia, the US, Latin America, and a number of related projects, such as ETICS, OGF-EU, and PACE.

Design study objectives

The aim of the EGI Design Study is to bring about the creation of an EGI (the institution) which will be capable of fulfilling this vision of a sustainable European grid infrastructure for research. The main objective of the project is thus to study the appropriate requirements, design the functionality & model, and to implement a prototype structure of a European Grid Initiative for research, which will take up the operation of the pan-European Grid infrastructure. The specific objectives of the design study are to:

1) Consolidate the requirements for an EGI from the member states and a broad range of academic disciplines.
2) To define the functional role of the EGI with respect to the NGIs at the start of the EGI, and plan for the evolution of its functions as it matures.
3) To establish a legal, financial and organisational basis for the EGI to undertake these functions that has support from the member states.
4) To establish the EGI organization and manage the transition from the existing project based grid support to a sustainable production service.
5) To ensure that all stakeholders within the member states, international standards bodies, research grid services in other countries, etc are aware of the EGI and have manageable relationships with it.

Each of these objectives is addressed by a work package in the design study in order to achieve it.

Representatives from all EU member states will be involved in the decision making process of the design study, and have already written letters of support for the study.

Design study contribution to the coordination of high quality research

Europe has been able to show through a federated approach, co-funded by the European Commission and member states on top of national infrastructures, that it is able to take a leadership role in the field of e-Infrastructures. Many disciplines in the areas of the humanities and social sciences are poised to exploit these developments that have been championed by domains such as life sciences and physics. Digital libraries, repositories and other cultural resources have already proved to be a valuable asset to meet the challenges in many research disciplines.

In general, scientific research existed before the e-Infrastructures and would presumably exist anyhow without them. However, e-Infrastructures add substantial value by integration of resources and enabling new efficient ways of collaboration through new services and enhancing the capabilities and potentials of the existing computational infrastructures. In some particular key areas e-Infrastructures have a stronger enabling role, in the sense that research as it is done today would be impossible in their absence—both in working on grand challenges and in enabling interdisciplinary collaboration. The future e-Infrastructure eco-system is built around components and services predominantly already available within existing systems today. In the future these should be available in a much more powerful and flexible way capable of crossing thematic and regional borders. This e-Infrastructure is built using components including those ranging from data management, curation and analysis, computational and visualisation resources to tools for collaborative computing.

The e-Infrastructures established during the EU Sixth Framework Programme (FP6) represent a big step forward. The efforts required to build a large scale production e-Infrastructure are extremely expensive and in order to protect Europe's current investment, the next phase of the pan-European e-Infrastructure needs to be based on existing e-Infrastructures. To ensure the long term sustainability, shared e-Infrastructures should be economically and resource-wise independent of any individual user community or resource provider.

E-Infrastructures are mainly driven by national funding, addressing specific user communities but mechanisms are required to coordinate and pool investments across national borders in order to reach the scale necessary to compete on a global level. Sustainability and competitiveness can only be achieved through strong national e-Infrastructure initiatives willing to merge efforts to form coordinated pan-European structures and be open to all user communities.

Modern research requires a greatly improved and well developed infrastructure maintained on a sustainable and long term basis. The short stop-start approach to funding is inefficient and cannot sustain the effort to create and improve such infrastructures.

To ensure the long term sustainability, e-Infrastructures, as a key general powerful enabling factor of the European Research Area should be largely shared and not depend economically from any individual user community or resource provider and rely on a financing model based on user communities' usage.

The strong position of Europe in Grid computing and Grid infrastructures is recognised world-wide. Europe's cutting-edge Grid activities have leveraged advancements in diverse domains of science and research. Following a sequence of successful infrastructure projects in this area, such as DataGrid, EGEE and DEISA, the research community has accepted the services provided by Grids as an important utility in their daily work. The ever-increasing number of Virtual Organisations registering with projects such as EGEE and using the infrastructure on a daily basis shows that this is a growing trend. Supporting all of these researchers requires a generalized, multi-disciplinary and persistent infrastructure for the entire European Research Area (ERA), raising the need to establish a sustainable European Grid infrastructure. To achieve this important goal, the next clear step is the transition from the current project-based organisation to a long-term sustainable and institutional setup. The EGI Design Project aims at defining the plan and implementing the necessary organizational steps that should be taken together with NGIs (National Grid Initiatives) to develop a sustainable Grid infrastructure in Europe.

In preparation for this project proposal a number of steps have been taken culminating in a workshop held in Munich in February 2007 that informed national-level representatives about the planned EGI_DS proposal and gathered their support for the initiative (as confirmed by the letters of support received by the consortium).

The EGI Design project will act as a focus point, building on the support of national grid initiatives as primary stakeholders to provide a concrete plan consolidating the national Grid infrastructures and corresponding national funding. The project will form an Advisory Board consisting of NGI representatives to which the project team will submit a sequence of proposals for endorsement, key to the establishment of the EGI. Such an advisory board will be an essential element for interaction between EGI and the respective NGIs in the participating countries. The EGI Design Project will work with the NGIs and the experts from the existing infrastructure projects to determine which parts of the operation will be performed by EGI organization, and which parts will remain within the responsibility of the NGIs as well identify what level of maturity and mandate is required from the individual NGIs in order to provide steering and control of the operation of the infrastructure.

As the current leading Grid infrastructures in Europe, EGEE and related infrastructure projects such as BalticGrid and SEEGRID-2, represent a key source of the experience and ideas needed to make any European-level structure work. The EGI Design Project will work closely with the EGEE and related infrastructure projects to permit a transition into an EGI-like structure before the end of the next phase of those projects (envisioned in spring 2010). The close relationship established with these projects (see letters of support in annex) will ensure that the EGI design project can profit from the experience and expertise gathered across more than 40 countries and engage with a wide range of research and industrial user communities supported by the current infrastructures. Key events, such as the annual EGEE user forums and conferences, will provide excellent opportunities to disseminating the status and planning of the EGI developments, gathering feedback and generating increased engagement.

In addition, the third and expected final phase of EGEE, will embody aspects necessary during the preparation of EGI. For example, it is anticipated that a possible follow-up project of EGEE-II will be composed by one partner per country (possibly by using the Joint-Research-Unit, JRU, mechanism), which can be seen a predecessor to the NGI model of EGI.

The EGI design project will also maintain links with the e-Infrastructure Reflection Group (e-IRG) which is engaging on the policy level for a European e-Infrastructure framework. With respect to

sustainable e-Infrastructures in Europe, the eIRG has issued a number of recommendations that are consistent with goals of this EGI_DS project. Through this link, the key concepts of EGI will be disseminated to a body of European policy makers that will further enforce the uptake and impact of the EGI design project.

B.1.2 Quality and effectiveness of the support mechanisms and associated work plan

B.1.2.1 Overall strategy and general description

The project will undertake a conceptual design study for the setup and operation of a new organizational model of a sustainable pan-European grid-based Research Infrastructure. The project will address the key questions concerning the assessment of the technical and financial feasibility of a sustainable European grid infrastructure, producing a "conceptual design report" addressed at NGI representatives, member state policy makers and their advisors. The project will encourage the member states to make the strategic decision to support a sustainable grid infrastructure for Europe, and initiate the implementation of that infrastructure. This overall aim has been broken down into the five objectives stated above in section 1.1.

The first objective requires the identification of the stakeholders in the proposed infrastructure to ensure that they all have a role in its design. It also assesses the requirements of those different stakeholders for the proposed infrastructure. The design study partners already have a good understanding of the requirements from previous EGEE projects, and, additionally the project participants arranged the EGI Workshop in February 2007 attended by representatives of the NGIs of 32 of the countries eligible for EU FP funding where they **unanimously supported the principal vision of an EGI to co-ordinate a European grid infrastructure on a sustainable basis**.

The second and third objectives address the key questions concerning the assessment of the technical and financial feasibility respectively. The fourth objective encompasses the next phase in the process of creation for the EGI by obtaining agreement from the member states and transferring the existing operational infrastructure into the new EGI entity. The fifth objective ensures that both the NGIs who contribute the EGI are sufficiently informed but also that all stakeholders' needs to interact with the EGI are addressed.

The NGI representatives will be involved in decision making throughout the project as members of the advisory board, and either by attending or nominating experts to attend workshops. A description of the advisory board, its role and its membership are provided in section 2.1 on project management.

Given these objectives as a route to creating the EGI, the mechanisms chosen to achieve each within the design study will now be justified.

Objective 1: Consolidate the requirements for an EGI from the national member states and a broad range of academic disciplines.

This objective will be achieved by WP2.

The main objective of WP2 is to ensure that the future EGI organisation takes into account in a prioritised way the requirements posed by the different actors, in particular the NGIs and other related stakeholders including the application communities and related projects such as EGEE. EGEE has been running a production infrastructure for more than 3 years and has a very good understanding of the requirements; WP2 will take into account such experience and go one step further, updating, adapting and consolidating the existing requirements in the new foreseen environment, i.e. of a central EGI organisation and national bodies in each country (NGIs). WP2

will continue and extend the preparatory work that EGEE has been doing in this area and will pass those requirements to WP3, which will define the functionality of the EGI central organisation.

The main tasks that were agreed among the NGIs during the EGI workshop in Munich were the following:

- Update, extend and consolidate existing preparatory work (e.g. EGEE work)
- Consult with major stakeholders, in particular the NGIs
- Build a knowledge base for NGIs and EGI
- Collect use cases for EGI
- Reflect on the results of the above tasks and incorporate potential feedback

WP2 will build on the experience accumulated by today's operational infrastructures, in particular the EGEE project. It will also take into account the recommendations elaborated by the e-Infrastructure Reflection Group (e-IRG). It will also profit from the work already done with EGEE collecting feedback from the NGIs in Europe and their views on creating a sustainable e-infrastructure. This information will need to be continuously kept up-to-date in a knowledge base. The methodology to achieve this is described in the next section.

Besides the work on NGI status and views, WP2 should also focus on the requirements of the different actors for the construction of a central organisation, currently referred to as EGI, which will be responsible for the coordination of the operation of the European Grid Research Infrastructure. WP2 has to identify all the actors that can interact with the EGI organization, and an initial list includes the NGIs, the application communities, and the projects that have been working in this direction, such as the EGEE project. WP2 will work on top of previously published work and experience, such as the EGEE-II NA5 deliverable on the EGI road-map consolidating EGEE views, as well as e-IRG related work. This will be followed by continuous consultation with NGIs, application communities, NRENs, and big infrastructure projects like EGEE, DEISA and GEANT, in order to further collect and prioritise requirements for EGI. In particular, the EGEE project that has been running the different technical and non-technical activities for more than three years will provide its understanding and experience to WP2. Since a possible follow-up project of the EGEE-II project will be operating on a similar to the EGI/NGI environment, i.e. with one national partner per country, open and direct channels should be maintained bringing the EGEE views into the EGI consortium. The experience of the NRENs and DANTE will be also taken into account through the NRENs of the EGI design project consortium, while links with the PACE/HET design proposal of the corresponding ESFRI roadmap and DEISA will be established to agree on an overall high performance computing strategy and vision for Europe. All the afore-mentioned actors or stakeholders will be used to collect a set of use cases for EGI, which will form the main body of the EGI requirements. The requirements and maturity plans of EGI will be also recorded in the knowledge base.

As outlined above, WP2 will make use of the usual cycle of designing "systems", i.e. identifying the different actors interacting with the EGI system, collecting their requirements and previous experience, and after analyzing them and consolidating them, proposing related use cases. These use cases will be fed into the WP3 work, which will design the functionality of the system.

WP2 must also deal effectively with the changing environment concerning the status and composition of NGIs. Although EGEE has produced voluminous material on the evolution of NGIs, and their perspectives on the creation of EGI, this represents only a snapshot in time. NGIs evolve at a rapid pace, and the EGI design project must ensure that its requirements are aligned with the relevant changes. For this purpose the main focus of WP2 will be on the continuous interaction with the NGIs. Such interaction will culminate on events like workshops, where the situation in all NGIs will be assessed in toto, but will also be complemented by establishing direct communication channels between the EGI design project and the NGIs so that the design project is notified and kept up to date with all recent developments. Direct communication channels can take the form of NGI representative interviews or one-to-one communication with other means (e.g. via e-mail). (In

addition, the option of reusing and updating existing questionnaires about this topic as e.g. used in EGEE NA5 work will be evaluated by WP2 partners.)

As mentioned, we expect that, apart from the NGIs, an important role will be played by big infrastructure projects in Europe, such as EGEE, DEISA and GEANT. These will also be consulted and appropriate liaison links will be established. As these projects may contribute their own effort towards the building of a sustainable infrastructure, it is important that such effort is complementary and does not overlap with the work undertaken in the context of the EGI design project. An EGI workshop during the EGEE conference in October 2007 with all related actors will be proposed to the appropriate EGEE instruments, so that the actors provide their inputs into the EGI requirements consolidation. Representatives from the PACE Preparatory Phase project will be invited also, along with the interfaces from the major regional projects such as SEE-GRID, BalticGrid, EELA, EuChinaGrid, EumedGrid, EuIndiaGrid, etc. Provided that there is a consensus on such a proposal, WP2 will work together with EGEE, requesting support from the EGEE NA5 activity (policy and international cooperation). In addition, application communities and the NRENs will also be included in this process. WP2 will therefore seek to have each NGI, NREN, application community, and selected infrastructure projects appoint specific contact persons for this interaction.

All the above feedback will be recorded in the aforementioned EGI Knowledge base. The existing material gathered from EGEE will be used as a basis for building the public EGI Knowledge Base reflecting the status of NGIs and their views on EGI. This EGI Knowledge Base is being conceived as maximally interactive and easy to use, to facilitate its success as an up to date informational tool on the entire EGI-NGI universe and perspectives. It will have articles on each individual NGI, plus general sections (or Portals) on the functions and structure of EGI, funding issues, Virtual Organisations and Application Areas, etc. A first prototype is currently being tested using MediaWiki - a tool that has proven itself in environments such as Wikipedia.org; this site is being populated with data from the NGI questionnaire conducted in 2006 by EGEE's NA5 activity. Once the initial testing and population of this knowledge base is complete, the NGIs will be notified of its existence and will be asked to contribute to its updates, as this will be a dynamic document comprising the latest developments. Requests for updates will be sent at regular intervals (e.g. quarterly), while NGIs will be able to contact WP2 for updates on their own initiative whenever appropriate. The knowledge base will constitute a "living" prototype deliverable, a snapshot of which will be presented at the EGI Workshop (month 2) for feedback, while a second snapshot will be provided just after the end of the WP2 duration (month 5). WP2 will handover the EGI Knowledge Base package to WP3, which will take it up for further development and updates.

The e-IRG will be also consulted in this process and WP2 will make every effort to ensure that the e-IRG feedback is taken into account. In order to avoid duplicate efforts, it will be proposed to start the interaction and take the first actions as part of the already planned e-IRG events during the Portuguese presidency of the second half of 2007. The requirements for EGI will be elicited and consolidated in the form of use cases. Based on the consultation process, WP2 will produce an initial body of such use cases, which, like the knowledge base, will be made available to interested parties. These will be able to comment on them and suggest new ones. WP2 will play a mediator role in the effort to arrive at a commonly accepted set of use cases. After the completion of the above processes, the EGI project will present the above outcome to the NGI representatives as part of an internal EGI workshop and reflect on the results. WP2 will seek to incorporate potential feedback to its first cycle of work and consolidate further the work. At the end of the WP2 work package these will be fed to WP3. WP2 will have one deliverable comprising the set of use cases describing the functions required by EGI and a second deliverable being the EGI Knowledge Base prototype.

Objective 2: To define the functional role of the EGI with respect to the NGIs at the start of the EGI, and plan for the evolution of its functions as it matures.

This objective will be achieved by WP3.

The task of **defining the core functions of the EGI** requires a complete and thorough understanding of the very different and complex realities surrounding the current use of grid infrastructures in the various European countries and the ability to identify a new European more sustainable organizational framework and to monitor and model its evolution.

To achieve this Objective, WP3 will perform an **analysis** of the different functions exercised by current projects or national initiatives, to determine those necessary to continue the successful evolution and operation of the current leading edge European e-Infrastructure. From this analysis WP3 will **identify** in terms of possible **options** those functions which will be carried out by the EGI vs. those to be delegated in part or in total to other bodies, such as the NGIs, or those which should remain within EU R&D projects, to guarantee the necessary development and evolution of the e-Infrastructure. Examples of such functions include the release of a coherent set of grid services within a compatible security framework, the coordination of the operation and user support activities, the representation of the European e-Infrastructure in the outreach and dissemination activities towards new user communities and at an international level.

The main input to this work package is the set of requirements and EGI use cases obtained from WP2 from current NGIs. In particular, WP3 will collaborate with WP2 from the very beginning of its requirements consolidation work through regular meetings and information exchange between the two WP leaders and exploiting the fact that the two WPs share some key personnel. As mentioned under *Objective 1*, staff from INFN, CESNET, DFN, GUP and GRNET who will be working on the two work packages have pre-existing collaborations in place in the context of the EGEE-II work referred to above. WP3 personnel will contribute to the development of the online tools set up by WP2, and later will expand the interactive **knowledge base** to include a rationalized overview of the European e-Infrastructure projects and their relation to the **function definitions being built**.

While WP2 will concentrate on NGIs, WP3 itself will perform an analysis of the current functions present in the major e-Infrastructure projects like EGEE-II, OMII-Europe, DEISA, ETICS, and those aimed at expanding Europe's e-Infrastructure at the geographical level and in terms of user communities. In particular, WP3 will build on the unique and successful practical experience of the EGEE/EGEE-II project which already operates a leading edge e-Infrastructure with more than 200 sites serving a large variety of user communities, and which has demonstrated the capacity to continue to develop new functionalities and service standards compliance while maintaining a high production quality. WP6 will also provide input concerning the expected relation of the EGI to business, standards bodies and other institutions.

WP3 will collect input and feedback from the **e-IRG** by means of (further) special meetings aiming at evaluating the results of the process of identifying, describing, and allocating functions.

The output of the work package will be a report defining the structure and processes of the proposed EGI as an institution (or possibly more than one if required), with details of dependencies between those actions required to create it, the definition of the initial functions attributed to it, the working model with NGI and its evolution as it becomes more mature. WP4 and WP5 will use this report as the basis for the creation of the EGI formal organization and its prototype implementation.

The range of functions under consideration by WP3 includes:

1. Operation of a reliable Grid infrastructure
2. Coordination of middleware development and standardization
3. Development and operation of build and test systems
4. Components selection, validation, integration and deployment
5. Mechanisms for resource provisioning to Virtual Organisations
6. Application support
7. Training efforts

8. Outreach and dissemination
9. Contribution to the Open Grid Forum (OGF) and other standardization bodies
10. Policy and representation of NGIs; international cooperation, e-IRG and ESFRI

For each (potential) function identified, WP3 will perform an analysis of the set of related issues and case studies, and present a function description, responsibility attribution, and functional rationale (*raison d'être*) to the interested parties (NGIs and other stakeholders). The latter will consist of options for resolving or managing the related issues, and criteria for choosing among the options, which will be articulated according to dependencies, resources, and optimality of operations (among other factors). This process requires regular and efficient communication with the NGIs; thus WP3 will exploit the one-on-one **communication channels** established by WP2, and present general results during the planned **workshops** in order to collect feedback and suggestions.

In particular, WP3 will investigate possible funding scenarios for the EGI/NGI model (see point 5 above).

In current projects such as EGEE and DEISA, the individual national institutions provide the hardware resources and the manpower for their operations, while the European Commission (EC) provides funding for the operation of the middleware services at the European and international levels, for the consolidation, maintenance, and further development of these services in accordance with user requirements, and for the related user and VO support.

A straightforward extrapolation of this, following the successful model of the NRENs, DANTE and GEANT, would contemplate in first approximation a similar two-tiered approach, with:

(a) the creation of National Grid Initiatives responsible for the provision, integration and operation of resources at the National level, together with users and National VO support

(b) EGI constituted of :

- a "special project", perhaps under a reserved-call funding model similar to the GEANT one, which could ensure continuity and competitiveness of the development of the grid layer of the pan-European Research e-Infrastructure, and provide a general framework for all the EU initiatives aiming at carrying out the Research aspects of middleware service innovation, and
- a possible central European body with the aim of providing a general coordination of the operation activities of the integrated EU e-Infrastructure and its integration and interoperation at the international level.

This model seems very attractive for its similarity with the recent success story of the European NRENs. However there are remarkable differences between the grid layer and the networking layer in terms of ownership and usage of the resources by the scientific communities, as they appear in current major EU projects, and in terms of a clear agreed identification of non-questionable central services as the operation of a common pan-European backbone connecting the national networking infrastructures. WP3 needs to carefully examine and fully understand the specificity of the grid layer while designing a future sustainable functional model and the best related European organization to support it.

Mechanisms to provide resources to newly created European VOs, which might not exist at the National level, need to be studied and defined (see point 5). Such mechanisms might include the provision by NGIs of a special pool reserved/dedicated to new VOs, and/or possible alternatives e.g. along the lines of the TeraGrid model, where a pool of resources is funded centrally (at EU level) and assigned via peer review to the requesting VOs.

Due to the central role of this work package, **all partners in this Design Study will participate in WP3**. Together, the partners have top level expertise in building and supporting national and

European e-Infrastructures for a large variety of applications and user communities. The partners are already representatives of all possible scenarios of the development of e-infrastructures in the different countries, and can in any case guarantee an efficient and clear exchange of information with the other NGIs represented in the Advisory Board.

INFN, the work package leader, has a proven track record in managing a large, complex, and fully functional production grid, and has a deep understanding of the technical complexities of maintaining a stable grid infrastructure and in extending it both geographically and thematically. Currently the Italian Grid supports more than 20 Virtual Organizations, including a variety of natural sciences and finance as an example of a social science.

GRNET brings the South East Europe perspective, being a key participant in the SEE-GRID project. As WP2 leader, GRNET will provide input on the effectiveness of the proposed EGI functions in **fulfilling the requirements** gathered under Objective 1.

CSC represents the North European grid, being active in the Nordugrid ARC project. As WP6 leader, CSC will monitor the outreach value of the proposed functions, with an emphasis on the **visibility** of the initiative as a central point of reference for the wider community.

STFC will contribute expertise on i) middleware, ii) operational security, iii) training and education for both users and service providers. Their experience of operational activity in EGEE, running the UK National Grid Service, co-ordinating OGF security, and their role in the UK e-science programme with its **broad range of user disciplines** will be drawn on in this role.

CESNET has many years of experience in operating a national grid infrastructure, contributing to grid middleware development, and has a long term track of participation in grid related projects. CESNET has also deep knowledge and experience of **coordinating grid infrastructures among smaller countries**, being an EGEE PMB representative for Central Europe federation.

CNRS is the leading French research organization and the largest in Europe. As WP4 leader, CNRS will be active in WP3 in examining the **legal feasibility** and possible implementations of the proposed functions, in preparation for its own activity.

CERN coordinates the operation of EGEE and leads the EGEE workpackage on testing and certification, a combination of expertise required in support of Objective 2. As WP5 leader, CERN will monitor the **technical and practical feasibility** of the proposed functions in preparation for its own activity.

DFN as representative of the German D-Grid, has developed a number of **use cases** for EGI, and is able to contribute to the work of WP3 based on the experience in D-Grid.

The functional analysis and identification of functional options carried out by WP3 will thus profit from the partners' **unparalleled** and ideally **complementary** global top-level skill set. The constant collaboration with WP4 and WP5 will guarantee a continuous feedback loop concerning legal and practical implementation, which in turn will allow WP3 to fine tune and **optimize its definitions**. For a more complete work package description of WP3 please see Table 1.3c.

Objective 3: To establish a legal, financial and organisational basis for the EGI to undertake these functions that has support from the member states.

This objective will be achieved in WP4.

The successful set up of an EGI requires a firm legal, financial, economical and administrative basis. Such a pan-European organization will have to deal with around 30 NGIs, each with a different organization. These relationships may include regular money transfers, staff exchange, accounting, reporting. The very dynamic nature of the Grid will require an agile yet efficient

organization, able to adapt and to anticipate. Likewise, the governance of such a complex system, the grid economic model must be studied well before they are implemented in order not to hamper a harmonious Grid development. All these tasks will be undertaken in the WP4 workpackage. Requirements collected by WP2 and EGI functions definition from WP3 will form the initial basis for WP4, in addition to relations of the EGI to business, standards bodies (e.g. Open Grid Forum) and other institutions (e.g. e-IRG) that will be provided by WP6. WP4 will of course rely heavily on the very accumulated experience of the numerous pan-European research organisations already in place and the various workshops devoted to that subject in the ESFRI process. However, it must be noted that such models may not apply fully to EGI, given the special nature of its infrastructure. In contrast to a large scientific instrument such as telescope or a particle accelerator, the grid is much more decentralized, its operation is basically provided by all partners, the user community is not so well defined, the EGI core team may not be co-localized in a single site, etc. Other specific adaptations might also be required by the specific nature of the computing resources that are lost if not used, which costs decrease with time, etc. It is thus obvious that already existing models can not be used a priori without detailed examination.

The main activity of WP4 takes the form of an options analysis. The options analysis identifies issues, several potential solutions to these issues, criteria to select among the solutions, and resolution processes to pick up a solution. The process of identifying options and criteria will require consultation with stakeholders and experts—technical, legal and financial. The resolution process will include consultation with the NGI representatives. Very good knowledge of the Grid general capabilities, present and future users' communities, potential industrial partners are key to this endeavour. It will not be easy to reach immediately an economic model providing the needed level of sustainability because Grids have not yet reached a fully mature state of development. This will limit the usefulness of professional external consultancy; however, this auditing process will be necessary to provide independent analysis of the proposed schemes and a small fraction of WP4 budget has been set aside for this purpose.

The output of the workpackage will be a report defining the structure and processes of the proposed EGI as an entity, with details of dependencies between those actions required to create it. WP5 will use this as the basis of the creation of the EGI.

One important WP4 additional deliverable will be the "NGI guidelines" document. This document will not try to define the best way to set up an NGI, but will list all functions that a NGI must fulfil in order to be reliably EGI-compliant. It is our belief that this document will ease considerably the formation of the various NGIs, allowing them to have as many variants as the various countries will require but possessing all the same interfaces to EGI.
WP4 will also devote a lot of attention to the grid economic model. Even if a commercial exploitation of the EGI grid is not foreseen for the moment, a very efficient economic model has to be put in place in order that all parties investing hardware resources in the grid find it interesting for them to do so. WP4 will liaise with various teams in Europe performing detailed analytical modelling or computer simulations of the Grid economic models, in the FP6 framework.

Detailed attention will have to be devoted to staffing issues, since the creation (or not) of a new entity with its own personnel and personnel regulations is obviously a very sensitive issue. The factors to be considered in determining the staffing will include the liability of the organisation, the availability of staff when required, and the continuity of staffing. Another important aspect is the question of the staff national balance. Mechanisms to promote fair treatment as well as mobility should be examined.

Although a very exhaustive list of options will be proposed, and great care will be taken in the selection process to involve all parties in order to make the best recommendations, including external reviews, a phase of practical experimentation and adjustments is required before the full-fledged implementation of EGI. This is why the WP4 and WP5 workpackages will very closely collaborate to set up as soon as possible an EGI-like structure following the blueprint guidelines and will evaluate its efficiency and propose evolutions if needed.

WP4 is build around a strong team of partners possessing each a special expertise that will be efficiently used in the project. DFN, which is a key member in the GEANT and DANTE organisations, will import their knowledge into WP4 in order to make use of the best practices of the computer network community, which is *a priori* a very good template for EGI. CERN will provide its invaluable experience of an intergovernmental European organisation and its very competent legal services. GRNET, another member of the GEANT community, will bring its expertise of the various issues important for smaller countries, as the leader of the South East federations in EGEE. SFTC will be an important CNRS partner to provide another viewpoint of the proposed options, viewed from a country with quite different legal system. CNRS, with its unique expertise of large European and international partnerships, will form the strong core team of managerial and legal expertise to coordinate the various actions and ensure the prompt delivery of the important milestones for EGI_DS.

Objective 4: To establish the EGI and manage the transition from the existing project based grid support to a sustainable production service.

This objective will be achieved in WP5.

The establishment of EGI is guided by two basic principles:

- Build on the experience and successful operation of EGEE and related projects
- Make EGI operational before a possible follow-up project of EGEE-II ends

These principles guide the implementation choices and the timeline. The EGI Design Project timing foresees a “final draft” or “blueprint” describing EGI to be available during the second quarter of 2008. Although WP5 will only start in January 2008, preparatory work will be done already upfront to allow for a timely availability of complete proposal to be discussed and agreed with the NGIs and the European Commission during the first half of 2008. Our present understanding assumes that a possible follow-up project of EGEE-II is the last phase of the EGEE project series providing both operations and development. The EGI implementation is therefore timed to match this assumption.

WP5 will be based on the results from WP2, WP3 and WP4 and, if needed, direct investigations. It is vital that the process for establishing EGI completes successfully at least 3 months before the end of of a possible follow-up project of EGEE-II, anticipated to be March 2010. WP5 will therefore span 24 months starting in January 2008, not counting preparatory work during 2007.

The main tasks will be

- Establish the convention of the organisation
- Get the convention agreed by a majority of European NGIs
- Maintain the relationship with the European Commission in view of supporting EGI
- Initiate and complete the ratification process with the NGIs willing to join EGI
- Incorporate the organisation
- Initiate and complete the hand-over from major RI-project (e.g. EGEE) operations

The programme of work may need to be adjusted depending upon the outcome of related work packages.

A mandatory requirement for the WP5 is to ensure consistency in the approach to the proposed solution between WP2, WP3 and WP4. CERN, the package leader of WP5, participates also in WP3 and WP4 to ensure right from the beginning this consistency. Moreover, the extended experience gained since 2001 as project leader of EDG and throughout all phases of EGEE is an excellent basis to establish the long-term solution. The EGI_DS will continuously involve experts from the EGEE community and other infrastructure projects to arrive at the best possible solution addressing the needs of many scientific communities. Handing over the operations role to the new organisation will be helped by the fact that the EGEE operations are coordinated by CERN.

CERN has already established relations in the Grid domain with many European and non-European countries, both as coordinator of EGEE and as an institute. Through its intergovernmental status, CERN has formally established contacts with the Governments of its 20 European Member States and maintains high-level relations with a large number of countries all over the world, some of them having the privileged status of 'observer'.

Following the endorsement by the stake holders of organisation recommended by WP4, WP5 will start the process of incorporating such an organisation. Previous experience gained at CERN in incubating the European Southern Observatory (ESO) and the experience gained by the NRENs establishing Géant/Dante will ease the task.

Together with our WP5 partners we will organise local meetings, either individually per country or by grouping countries in regions, to ensure close relations during the establishment of the final proposal and for the ratification process.

Objective 5: To ensure that all stakeholders within the member states, international standards bodies, research grid services in other countries, etc are aware of the EGI and have manageable relationships with it.

This objective will be achieved in WP6.

The objective will be reached by dissemination and outreach activities, intense communication with decision makers and funding bodies in the relevant fields and interaction with industry partners.

The work package will be subdivided to two tasks:

- Dissemination and outreach
- Industry collaboration

The target for WP6 is to ensure sufficient EGI visibility and communication towards NGIs and other relevant stakeholders, such as grid projects and research infrastructures, national funding bodies, international standard bodies, potential new users from research or industry etc. The goals can be achieved through multiple different methods ranging from providing dissemination material to organizing workshops and meetings.

Wide coverage of dissemination activities is required to spread EGI information to the European grid users and different organisations. Participation in international conferences with a presentation or booth is used as a tool for targeting the relevant audience for EGI. In order to benefit from potential collaboration opportunities, in-depth meetings with the most relevant user groups and research infrastructures will be held.

The outreach part of this work package is forming base for creating collaboration with various groups, such as:

- National and regional grid activities
- European scientific and research communities (ESF, ERC, ESFRI …)
- European research organizations (EBI, ECMWF, CERN, …)
- New European grid and e-infrastructure projects (PACE, ESFRI Roadmap preparatory projects …)
- Links to other institutions, such as infrastructure policy bodies (e-IRG, EIROForum, OECD, …)
- Links to European and global forums and standardization bodies (OGF, PRAGMA, EGEE User Forum, OMII, TERENA…)

It is seen that active dissemination and outreach work can expand the synergy in IT services between the different user communities and research infrastructures. Some of the major targets for

outreach are the user communities working with the various new infrastructures listed in ESFRI Roadmap.

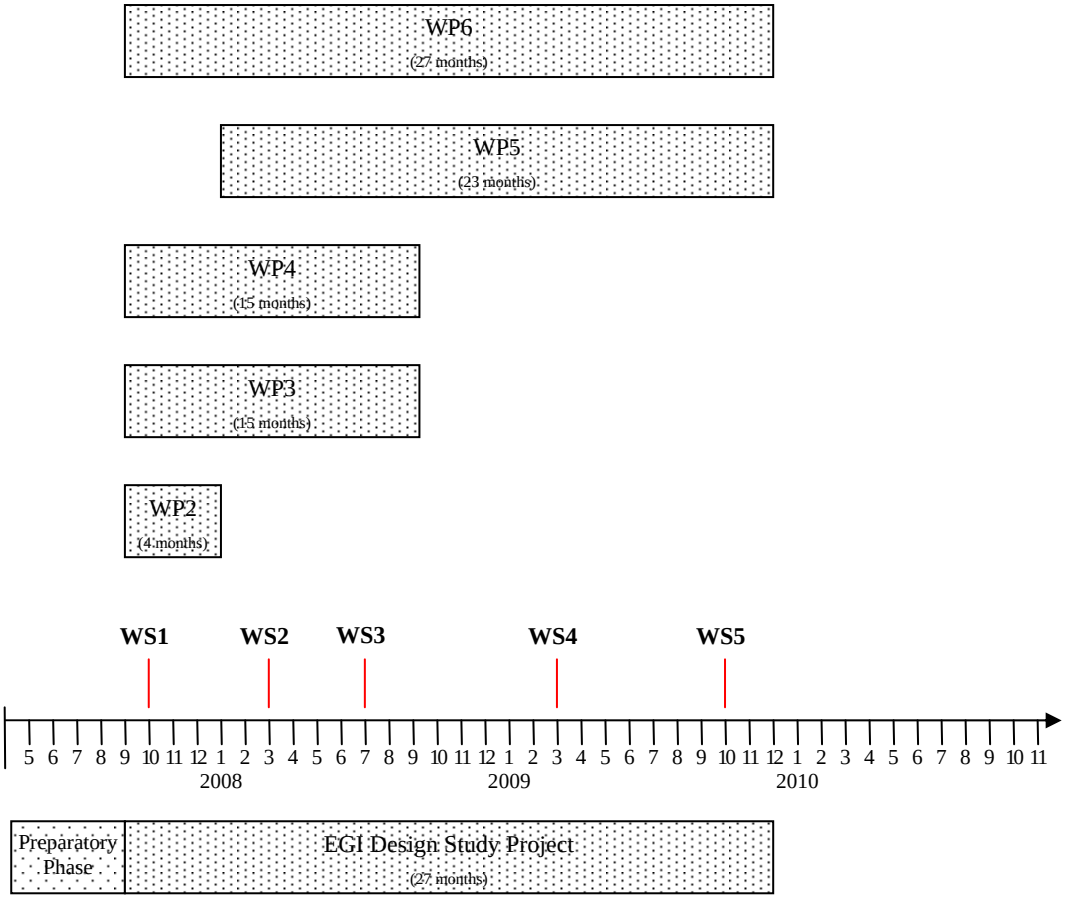
One of the key target groups for EGI outreach is industrial users for grid computing and technology. The interaction with the industry is carried out through collaboration with selected industry partners with a target to attract new users and increase visibility among companies potentially interested in grid activities. User needs and legal issues need to be cleared to enable the usage of the e-Infrastructure of the European Research Area. Common activities with industry can influence positively the decision making authorities and increase understanding of grid economics. In addition to the industry users, computer vendors have considerable interest for grid activities. Collaboration possibilities with IT industry will be explored and exploited during the project.

The project will actively participate in concertation initiatives and meetings related to the e-Infrastructures and other related areas including the participation and contribution in relevant working groups established under the above initiative. The objective of the concertation activity is to optimise synergies between projects and the collective impact and value of the programme.

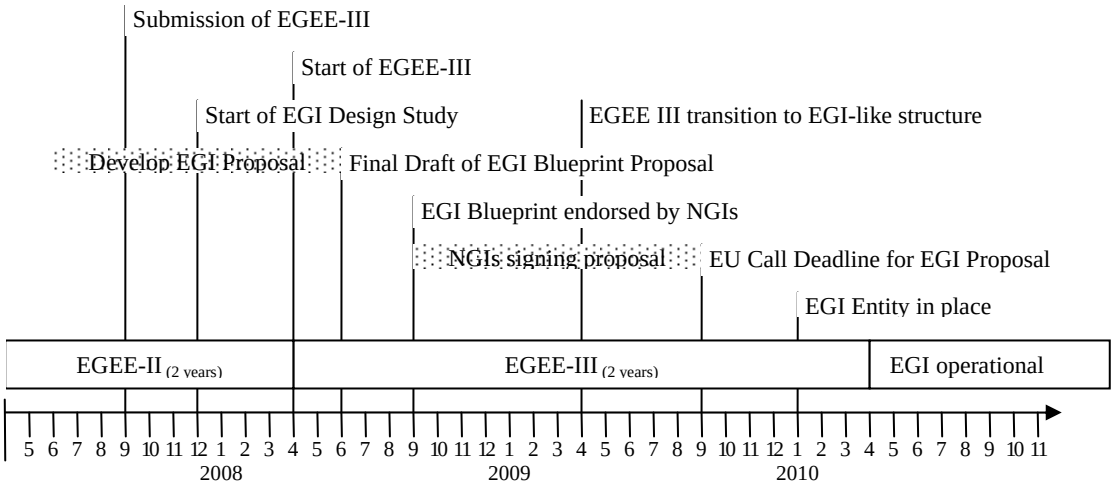
The work for WP6 lasts essentially during the whole project and WP6 is an essential tool in the project management.

B.1.2.2 Timing of work packages and their components

The following figure describes the timeline of the individual work packages and their relation to the expected development of the EGEE grid infrastructure.



Workshops:
WS1: Requirements Consolidation and Use Case Definition
WS2: Discussion of Interim Papers of WP3, 4, 5
WS3: Draft final Papers on EGI Structure
WS4: Transition of EGEE III to EGI like Structure
WS5: EGI Launch Workshop



B.1.2.3 Work package list/overview

Work package list

Work package No[1]	Work package title	Type of activity[2]	Lead beneficiary No[3]	Person-months[4]	Start month[5]	End month
WP 1	Project management	MGT	1		1	27
WP 2	EGI Requirements Consolidation	SUPP	2		1	4
WP 3	EGI functions definition	SUPP	3		1	15
WP 4	Design study of EGI legal and organisational options	SUPP	9		1	15
WP 5	Establishment of EGI	SUPP	6		5	27
WP 6	EGI Promotion and links with other Initiatives	SUPP	4		1	27
	TOTAL					

1 Workpackage number: WP 1 – WP n.
2 Please indicate one activity per work package:
SUPP = Support activities; MGT = Management of the consortium.
3 Number of the participant leading the work in this work package.
4 The total number of person-months allocated to each work package.
5 Measured in months from the project start date (month 1).

B.1.2.4 Deliverables list

List of Deliverables – to be submitted for review to EC

Del. no.[6]	Deliverable name	WP no.	Lead beneficiary	*Estimated indicative person-months*	*Nature*[7]	Dissemi-nation level [8]	Delivery date[9] (proj. month)
D1.1	Quality assurance plan and risk assessment	1	GUP		R	CO	M2
D4.1	Preliminary work for the establishment of EGI	4	CNRS		R	PU	M3
D6.1	Dissemination plan	6	CSC		R	PP	M3
D2.1	EGI consolidated requirements and use cases	2	GRNET		R	PU	M4
D2.2	EGI Knowledge Base (first snapshot)	2	INFN		P	PU	M5
D6.2	Dissemination package and web-pages available	6	CSC		O	PU	M5
D4.2	Options analysis of different legal structures	4	CNRS		R	PU	M6
D5.1	Draft definition of EGI organisation	5	CERN		R	PU	M7
D5.2	Draft convention of new EGI organisation	5	CERN		R	PU	M7
D4.3	Guidelines for NGIs	4	CNRS		R	PU	M8
D3.1	First EGI functions definition	3	INFN		R	PU	M9

6 Deliverable numbers in order of delivery dates. Please use the numbering convention <WP number>.<number of deliverable within that WP>. For example, deliverable 4.2 would be the second deliverable from work package 4.

7 Please indicate the nature of the deliverable using one of the following codes:
R = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other

8 Please indicate the dissemination level using one of the following codes:
PU = Public
PP = Restricted to other programme participants (including the Commission Services).
RE = Restricted to a group specified by the consortium (including the Commission Services).
CO = Confidential, only for members of the consortium (including the Commission Services).

9 Measured in months from the project start date (month 1).

D4.4	Final draft of EGI blueprint proposal	4	CNRS		R	PU	M10
D1.2	Activity and management report	1	GUP		R	CO	M12
D6.3	Interim dissemination and outreach report	6	CSC		R	PU	M12
D5.3	Agreements on the convention	5	CERN		R	PU	M14
D3.2	Final EGI functions definition	3	INFN		R	PU	M15
D3.3	EGI Knowledge Base (second snapshot)	3	INFN		P	PU	M15
D5.4	Transition Scenario from EGEE to EGI	5	CERN		R	PU	M15
D1.3	Activity and management report	1	GUP		R	CO	M24
D6.4	Report from industrial workshops	6	CSC		R	PP	M25
D6.5	Final dissemination and outreach report, including final plan for the use and dissemination of foreground	6	CSC		R	PU	M26
D1.4	Final activity and management report	1	GUP		R	CO	M27
D5.5	Organisation incorporated	5	CERN		O	PU	M27

B.1.2.5 Work package descriptions

WP1: Project Management

Work package number	1	**Start date or starting event:**				September 2007 (M1)	
Work package title	PROJECT MANAGEMENT						
Activity Type[10]	MGT						
Participant id	1						
Person-months per beneficiary:							

Objectives The objective of WP1 is to establish and perform an efficient management of the project, justified by the size of the consortium and the tasks at hand and focusing on two managerial aspects: administrative and financial management and operational coordination of the work plan together with the respective quality assurance. Corresponding mechanisms will be put in place to take decisions affecting the project's outcome as well as for the administrative and technical coordination of the project. Additionally, the project management defines the means of communication within and outside the project, and represents the sole interface to the EC project officer.

Description of work (possibly broken down into tasks), and role of participants

The responsibility for WP1 is taken by the Project Director (PD), who chairs the Management Board (MB) and carries out the following tasks with respect to administrative and financial management of the project:

- management of the consortium's financial resources including funds distribution;
- constant monitoring of resource usage and contractual terms;
- organisation of project internal meetings and external and internal reviews;
- co-operation and consultation with the EC on contractual and financial matters;
- ensuring that legal and ethical issues are properly dealt with;
- and other strictly administrative activities.

In addition, the PD takes care of the direction and coordination of the operational activities within the project. This activity encompasses the management and coordination of work and information flow among other activities, as well as monitoring of the project's progress with respect to project schedules. Operational management is also responsible for the organisation of periodic project internal meetings, and the provisioning of the tools used for the project's internal operations. This includes a project portal (developed in cooperation with WP6), which provides a collaborative working environment, including mailing lists and archives, workflow and document management tools, and other administrative tools, that will be used by all work packages. Another important issue for efficient collaboration between partners is the arbitration of arising conflicts (if any).

Deliverables (brief description and month of delivery)

D1.1 (Month 2): Quality assurance plan and risk assessment – Provides a plan of quality control and analysis of potential risks, which may arise during the project implementation.

D1.2 (Month 12): Activity and management report – Regular administrative report including short description of the overall implementation within each activity and resource usage, financial report.

[10] Please indicate one activity per work package:
SUPP = Support activities; MGT = Management of the consortium.

D1.3 (Month 24): Activity and management report – Updated report D1.2

D1.4 (Month 27): Final activity and management report – Final report of the technical achievements, administration, financial issues, resource usage and updated plan for using and disseminating knowledge

WP2: EGI Requirements Consolidation

Work package number	2	**Start date or starting event:**				September 2007 (M1)	
Work package title	EGI REQUIREMENTS CONSOLIDATION						
Activity Type[11]	SUPP						
Participant id	1	**2**	3	4	5		
Person-months per beneficiary:							

Objectives The main objective of WP2 is to ensure that the future EGI organisation takes into account in a prioritised way the requirements posed by the different actors, in particular the NGIs and other related stakeholders including the application communities and related projects such as EGEE. EGEE has been running a production infrastructure for more than 3 years and has a reasonable understanding of the requirements; WP2 will take into account such experience and go one step further, updating, adapting and consolidating the existing requirements in the new foreseen environment, i.e. of a central EGI organisation and national bodies in each country (NGIs). WP2 will continue the preparatory work that EGEE NA5 has been doing in this area and will pass those requirements to WP3, which will define the functionality of the EGI central organisation.

The main tasks that were agreed among the NGIs during the EGI workshop in Munich were the following:

- Update, extend and consolidate existing preparatory work (e.g. EGEE NA5 work)
- Consult with major stakeholders, in particular the NGIs
- Build a knowledge base for NGIs and EGI
- Collect use cases for EGI
- Reflect on the results of the above tasks and incorporate potential feedback

Description of work

WP2 will build on the experience accumulated by today's operational infrastructures, in particular the EGEE project. It will also take into account the recommendation elaborated by the e-Infrastructure Reflection Group (e-IRG). It will also profit from the work already done within EGEE collecting feedback from the NGIs in Europe and their views on creating a sustainable e-infrastructure. This information will need to be continuously kept up-to-date in a knowledge base.

Besides the work on NGI status and views, WP2 should also focus on the requirements of the different actors for the construction of a central organisation, currently referred to as EGI, which will be responsible for the coordination of the operation of the European Grid Research Infrastructure. WP2 has to identify all the actors that can interact with the EGI organization, and an initial list includes the NGIs, the application communities, and the projects that have been working in this direction, such as the EGEE project. WP2 will work on top of previously published work and experience, such as the EGEE-II NA5 deliverable on the EGI road-map consolidating EGEE views, as well as e-IRG related work. This will be followed by continuous consultation with NGIs, application communities, NRENs, and big infrastructure projects like EGEE, DEISA and GEANT, in order to further collect and prioritise requirements for EGI. In particular, the EGEE project that has been running the different technical and non-technical activities for more than three years will provide its understanding and experience to WP2. Since the possible next phase of the EGEE project (EGEE-III) will be operating on a similar to the EGI/NGI environment, i.e. with one national

[11] Please indicate one activity per work package:
SUPP = Support activities; MGT = Management of the consortium.

partner per country, open and direct channels should be maintained bringing the EGEE views into the EGI consortium. The experience of the NRENs and DANTE will be also taken into account through the NRENs of the EGI design project consortium, while links with the PACE/HET design proposal of the corresponding ESFRI roadmap and DEISA will be established to agree on an overall high performance computing strategy and vision for Europe. All the afore-mentioned actors or stakeholders will be used to collect a set of use cases for EGI, which will form the main body of the EGI requirements. The requirements and maturity plans of EGI will be also recorded in the knowledge base.

The main tasks of WP2 can be summarised as follows:

T2.1 – Establishment of official NGI and other related contact points (application communities, big infrastructure projects, NRENs/DANTE) – Lead institute: GUP

T2.2 – Development of an NGI knowledge base – Lead institute: INFN

T2.3 – Prioritised requirements and use cases – Lead institute: CESNET

GRNET will be leading this workpackage and continue the EGEE NA5 preparatory work, coordinating all partners and editing the related deliverable D2.1. GRNET will take input from the corresponding task leaders i.e. for NGI contact persons (GUP), for the knowledge base (INFN) and for the use cases (CESNET). GUP will develop the NGI contact database and run the appropriate mailing lists. INFN will develop and populate the knowledge base and transfer all EGEE related work that INFN has been carrying out. In addition, INFN will be responsible for deliverable D2.2. CESNET will be the overall responsible for the EGI use cases, after identifying the different actors and analysing its requirements. GRNET and CSC will also manage the first policy workshop (WS1) that will be organised during the EGEE ’07 conference in Budapest. CSC will prepare the ground for the workshop in terms of appropriate material (questionnaire, interviews with NGIs) and will be analysing and documenting the workshop results.

Deliverables (brief description and month of delivery)

D2.1 (Month 4): EGI consolidated requirements and use cases

The final set of EGI requirements and use cases will be published in a deliverable form, and used as input for the rest of the project. The deliverable will provide the summary of all the following:

- The establishment of a comprehensive network of links between the EGI_DS and the other parties involved. These liaisons will be kept updated throughout the duration of the project. Official interface and representatives will be made available to all the afore-mentioned stakeholders.
- The knowledge base—Set up of the supporting infrastructure where the WP2 working material will be published. The knowledge base will allow interested parties to comment on the material—the documents describing the status and evolution of NGIs and EGI, list of contact points etc.—so that WP2 will be able to use it as the main source for continuous update of its material. Technologies like Wikis or Google will be deployed to facilitate this task.
- The actual use cases and EGI requirements.

D2.2 (Month 5): EGI Knowledge Base (first snapshot)

The knowledge base will constitute a “living” prototype deliverable, containing information about both NGIs status and perspectives, along their views on EGI, as well as the actual EGI requirements and use cases. The knowledge base will be implemented with Wiki tools such as MediaWiki, and a snapshot of the knowledge base will be taken one month after the end of the WP2 (month 5) in order to consolidate all the data (especially from NGIs). WP2 will handover the knowledge base to WP3, which will take it up for further development and updates, focusing on the EGI functionality.

Milestones:

M2.1 (Month 2): – Workshop WS1: EGI Requirements Consolidation and Use Case Definition (NGI evolution and the road towards EGI). The workshop will bring together representatives of the involved parties to assess the status of NGIs and the progress towards the establishment of EGI. Moreover, the initial set of use cases will be presented and input and comments will be solicited. (October 2007 during the EGEE'07 conference)

WP3: EGI functionality definition

Work package number	3		**Start date or starting event:**				September 2007 (M1)		
Work package title	EGI FUNCTIONALITY DEFINITION								
Activity Type[12]	SUPP								
Participant id	1	2	**3**	4	5	6	7	8	9
Person-months per beneficiary:									

Objectives

The main goal of WP3 is the definition of the functions to be attributed to EGI (considered here as an example of a European Organization having the NGIs as stakeholders) and the elaboration of a working model between EGI and NGI with its evolution in time, to ensure the future sustainability of the EU e-Infrastructure.

Description of work (possibly broken down into tasks), and role of participants

The main activity of WP3 takes the form of an analysis of the different functions required to continue the successful evolution and operation of the current leading edge European e-Infrastructure. From this analysis WP3 will identify in terms of possible options those functions which will be carried out by the EGI vs. those to be delegated in part or in total to other bodies, such as the NGIs or EU R&D projects. The range of functions under consideration includes:

1. Operation of a reliable Grid infrastructure
2. Coordination of middleware development and standardization
3. Development and operation of build and test systems
4. Components selection, validation, integration and deployment
5. Mechanisms for resource provisioning to Virtual Organisations
6. Application support
7. Training efforts
8. Outreach and dissemination
9. Contribution to the Open Grid Forum (OGF) and other standardization bodies
10. Policy and representation of NGIs; international cooperation, e-IRG and ESFRI

The options analysis identifies issues, evaluates the options as solutions to the issues and establishes selection criteria for these options, and then applies a resolution process to select the options which best resolve the issues in light of the criteria identified.

The main input to this work package is the set of requirements and use cases on the EGI from WP2, while WP3 itself will perform an analysis of the current functions present in the major e-Infrastructure projects like EGEE, OMII-Europe, DEISA, ETICS, and those aimed at expanding the EU e-Infrastructure at the geographical level and in terms of user communities. In particular, the EGEE/EGEE-II project already operates a leading edge e-Infrastructure with more than 200 sites serving a large variety of user communities, and has continued to develop new functionalities and service standards compliance while maintaining a high production quality. WP3 will also take input from WP6 covering the expected relation of the EGI to the business community, and provide an analysis of EGI's potential role in relation to this sector.

Thus the WP3 partners will carry out the following activity lines:

- Analyze and subsequently provide a synthesis of the structural and working relations

[12] Please indicate one activity per work package:
SUPP = Support activities; MGT = Management of the consortium.

between EGI, the NGIs and EU Infrastructure related projects, delineated according to an effective attribution of functional responsibilities.
- Establish an operational model for the technical governance of the EU e-Infrastructure including the contribution of the different functional responsibilities to the decision making process and encompassing in the synthesis the large range of functions mentioned above which may require different solutions
- Determine the optimum level of staffing required to exercise each function and functional responsibility
- Consult with WP4 on the legal implementation of the proposed EGI functions
- Define an evolution model for the functions and scope of the EGI
- Present the resulting functional schema for EGI to the NGI communities, get their feedback for modifications and further revisions

The work will be carried out through a regular exchange of documents, phone conferences and monthly meetings. The WP3 partners have top level expertise in building and supporting national and European e-Infrastructures and will guarantee an efficient exchange of information with the other NGIs represented in the Advisory Board.

The following supporting technical activities are foreseen to facilitate the sharing of knowledge and to prepare for the regular discussions between the WP members and external organizations and projects:
- Organize and support a collaborative Web space
- Establish mailing lists of external technical experts to be consulted for the different tasks
- Prepare material and background documents to be distributed in preparation of the project workshops or other dissemination events
- Keep the NGIs informed of the work package progress through regular distribution of informational material

The output of the work package will be a report defining the structure and processes of the proposed EGI as an institution, with details of dependencies between those actions required to create it. WP5 will use this as the basis of the creation of the EGI.

The aforementioned work will be split and carried out in parallel into three main tasks focused on the relative role of EGI and NGIs on the consolidation of the Open Source Middleware Services, on the operation of the e-Infrastructure with service quality definition and on the Dissemination, Outreach and the e-Infrastructure representation on various international bodies. The effort dedicated by each partner to the different tasks is defined below

T3.0 WP3 Coordination (INFN)

T3.1 Middleware Development, Building and Testing, Standard Compliance and Interoperability
Task leader: INFN, Participants: CERN, CESNET, SFTC.

T3.2 Components selection, validation, integration, deployment , e-Infrastructure operation, Service quality definition for NGIs and EGI
Task leader: CERN, Participants: INFN, SFTC, DFN, CESNET, CNRS, GRNET

T3.3 Outreach, Dissemination and Training, Industry take up, Contribution to the Open Grid Forum (OGF) and other standards bodies, Policy and representation of NGIs; international cooperation, eIRG and ESFRI
Task leader: INFN, Participants: CESNET, GUP, GRNET, CSC, SFTC

Each partner will be assigned to a specific activity within each of the three above tasks in the workplan available.

Deliverables (brief description and month of delivery)

D3.1 (Month 9): First EGI Functions Definition—Functions, success models, relationship between EGI and NGI, need for new projects

This deliverable consists of three parts.

D3.1.1 – European and National Projects

Here the study will include the best practices from European projects such as EGEE, OMIIs, ETICS, etc., but also the international e-Infrastructure ones in which the European countries are involved (e.g. EUMed, EUChina, EUIndia, EELA), those aiming at extending the usage of the European Infrastructure to new research communities and those carried out at a national level such as INFN Grid in Italy, OMII or GridPP in UK, D-Grid in Germany, Nordugrid in the Northern European countries. The aim of this study is to extract a detailed overview of the functions exercised and the use cases already satisfied by these projects.

D3.1.2 – Handover from WP2 and WP6

A WP2 deliverable will provide a more general list of use cases and functions exercised by NGIs together with an evaluation of NGI typologies through a close interactive process. Not all NGI exercise the same functions and not all functions might be applicable in the same manner to all of them. However this should not entail that some functions, which are not universal, should not exist for EGI. E.g., representation functions can be universally applied, but coordination of middleware development and/or interoperability may not apply for countries who simply adopt “ready made” middleware; assistance in establishing an NGI (if this function is needed) will not apply to NGIs that are already established, or that have a clear plan and are making progress on their own.

In addition a WP6 deliverable will provide a list of use cases and requirements coming from potential external users and providers from science and industry which will be examined in order to extract further functions required for EGI and NGIs.

D3.1.3 – First Schema of EGI Functions

The deliverable will examine the list of functions and desiderata obtained from deliverable 2.1 and 6.1 and from the above study of grid projects, will get a preliminary input from WP4 on possible legal implementations of EGI and will define a first schema of functions to be exercised by EGI, those that will remain to NGIs and those which will need further project development together with a first schema for the governance system and the financial model for long term sustainability.

D3.2 (Month 15): Final EGI Functions Definition

Same scope as D3.1 but refined according to NGI feedback and with further input from WP4, WP5 and WP6.

Define a maturity model and roadmap for the EGI set up and evolution including function delegation from NGIs and a framework for EGI related projects. This will include financial, operational, and logistical requirements for EGI at startup, and their planned evolution over a certain time frame.

Delineate functions exercised by and responsibilities of each NGI towards other NGIs and EGI.

Define domains, topics where further R&D needs to be carried out and a reference framework for new EU projects reserved to NGIs.

D3.3 (Month 15): EGI Knowledge Base (second snapshot)

This living deliverable evolves from D2.2 and describes the EGI Knowledge Base at wiki.eu-egi.org.

Milestones:

M3.1 (Month 7): Workshop WS2: Discussion of Interim papers from WP3, WP4, and WP5

Presentation of the First Schema of EGI Functions, options analysis and the draft Convention to NGIs

WP4: Design Study of the EGI legal and organisational options

Work package number	4	**Start date or starting event:**				September 2007 (M1)	
Work package title	DESIGN STUDY OF THE EGI LEGAL AND ORGANISATIONAL OPTIONS						
Activity Type[13]	SUPP						
Participant id	1	2	6	7	8	**9**	
Person-months per beneficiary:							

Objectives

The purpose of WP4 is to define a working methodology to identify the best legal and organisational options for a European grid infrastructure.

Description of work (possibly broken down into tasks), and role of participants

T4.1 Preliminary work

The preliminary work will enable us to apprehend the environment, the objectives, the necessary means and the organisation of the EGI. It will benefit from the input of WP2 (GRNET) and WP3 (INFN).

The partners and the goals of the EGI will have to be defined. The partners of the project will involve public, private, European and non-European laboratories as well as NGIs in each partner country. According to the number of partners, the necessary means of the project will also have to be defined, as well as the duration and location of the project. This study will help Task 4.2 define the type of legal structure to be put in place.

T4.2 Type of legal structure

This second stage of WP4 will be based on the conclusions of Task 4.1 and will focus on the best structure to adopt, according to the needs of the EGI. A detailed work plan will have to be defined to write the final report of this task.

The structure of the EGI will have to be defined between a collaborative structure and a legal entity. The advantages and drawbacks of both will be carefully studied. This study will be based on the "Report of the Workshop on the legal forms of research infrastructures of pan-European interests" of the ESFRI. Several options will then have to be considered, taking into account the peculiar features of the EGI infrastructure.

T4.3 Guidelines for NGI

Many countries have launched National Grid Initiatives to establish National Grid Infrastructures. They all aim at providing in the long-term a common e-Science Infrastructure in support of all sciences, but with wide expected variations in maturity level and in implementation schemes. The detailed EGI design will require precise functional, organizational and may be legal interfaces with NGIs, impacting on their own design. NGI guidelines will be therefore issued, to ensure maximum flexibility at the NGI level and maximum efficiency at the EGI level. This study will be done is conjunction with DFN and SFTC.

T4.4 Operational matters

The issue of financial reserves needs to be addressed in order to meet the auditing requirements of the legal status of the EGI in the country where it is localised. A detailed transition plan from the

[13] Please indicate one activity per work package:
SUPP = Support activities; MGT = Management of the consortium.

present share of national and European funding to a sustainable long-term funding will be worked out.

A governance model of the EGI needs to be established including the structure of internal decision making and conflict resolution. Policies also need to be established for the relation of the EGI to other bodies, and the authority of representation.

The model of staffing of the EGI must be defined. The factors to be considered will include the liability of the organisation, the availability of staff when required, and the continuity of staffing. Another important aspect is the question of the staff national balance. Mechanisms to promote fair treatment as well as mobility should be examined.

Other issues include exploitation of the results obtained in the project and names and branding which will mostly depend on the legal identity of the infrastructure. This study will be done in conjunction with CERN.

Deliverables (brief description and month of delivery)

D4.1 (Month 3): Preliminary work for the legal establishment of the EGI

D4.2 (Month 6): Options analysis of different legal structures

D4.3 (Month 8): Guidelines for NGIs

D4.4 (Month 10): Final draft of EGI blueprint proposal

Milestones:

M4.1 (Month 10): Blueprint publication

WP5: Establishment of the EGI

Work package number	5		**Start date or starting event:**				January 2008 (M4)	
Work package title	ESTABLISHMENT OF THE EGI							
Activity Type[14]	SUPP							
Participant id	1	2	3	4	5	**6**	7	9
Person-months per beneficiary:								

Objectives

- Generate with WP3 and WP4 the "blueprint" which will serve to establish EGI
- Get the Organization and its Conventions ratified by a significant majority of European States
- Prepare and start the transition from EGEE to EGI

Description of work (possibly broken down into tasks), and role of participants

WP5 will be based on the results from WP2, WP3 and WP4 and, if needed, direct investigations. It is vital that the process for establishing EGI completes successfully at least 3 months before the end of EGEE-III, anticipated to be March 2010. WP5 will therefore span 23 months starting in January 2008, not counting preparatory work done outside the project.

The main tasks will be

- Establish the convention of the organisation (CERN)
- Get the convention agreed by a majority of European NGIs (all)
- Maintain the relationship with the EC in view of supporting EGI (CERN and GUP)
- Initiate and complete the ratification process with the NGIs willing to join EGI (all)
- Incorporate the organisation (CERN)
- Initiate and complete the hand-over from major RI-project (e.g. EGEE) operations (all)

The preparation work will be done mostly by the lead partner CERN, but almost all partners will contribute to obtain the agreement from the NGIs and during the ratification process.

Deliverables (brief description and month of delivery)

D 5.1 (Month 7): Draft Definition of EGI organisation [starts in parallel with WP3 and WP4]

- Overall mission and scope of the organisation and relationship with the NGIs (WP2, WP6)
- Initial functions and services to be provided (WP3)
- The relationships with the NGIs (WP3, WP4)
- The relationship with large global communities and resource centres (WP6)
- The resources required to execute the functions (WP3)
- Propose the initial Medium Term Plan and the yearly budget
- Initial definition of the transition process from the major RI-project (e.g. EGEE) based infrastructure and operations to the EGI/NGI based infrastructure

[14] Please indicate one activity per work package:
SUPP = Support activities; MGT = Management of the consortium.

D 5.2 (Month 7): Draft Convention of the new Organisation

A comprehensive document will be delivered describing the vision, the mission, the functions and the governance of the new organisation including, but not limited to,

- Governance and accompanying rules based on input from WP4
- Membership rules for joining and leaving the organisation, both as founding partners and for joining later
- Definition of the governing bodies
- Size of the organisation and initial funding, based on input from WP3
- Send the "final draft" version to all interested countries
- Maintain the relationship with the European Commission in view of supporting EGI
- Harmonize the EGI calendar with the FP7 calls, provide early feedback to the Commission in case of incompatibilities

D 5.3 (Month 14): Obtain agreements on the Convention

Through regular contacts and outreach activities in WP6 the project will keep the NGI informed such that a final agreement can be obtained in a relatively short time (3 to 6 months). Therefore the information campaign will be started as part of the EGEE activity well before the start of the project.

- Obtain feedback on the "final draft", incorporate changes, resolve conflicts
- Produce the "blueprint", agreed by a significant majority of European countries, distribute it to all interested countries
- Identify via the NGIs for each country the authority that will sign the convention
- Establish a formal relationship with these authorities
- Agree with each country the ratification process

D 5.4 (Month 15): Document defining the **transition scenario from EGEE to EGI**

- Based on the final blueprint, define the hand-over sequence and calendar

D 5.5 (Month 27): Organisation incorporated

- Presented the signed Convention document
- Governing bodies established, organistion registered
- Inaugural session organized where the management is appointed and the MTP and the budget of year 1 approved
- Authority handed over to the new organization

Milestones:

M5.1 (Month 11): 3rd EGI workshop: Presentation of the draft final paperson the EGI structure

M5.2 (Month14): Convention endorsed

M5.3 (Month 19): 4th EGI workshop: Transition of a possible follow-up project of EGEE-II to EGI like Structure

M5.4 (Month 26): 5th EGI workshop: EGI Launch

- Will present the signed Convention document

M5.5 (Month 27): Incorporate the organisation

- Establish the governing bodies, register the Organisation
- Organise the inaugural session which appoints the management and approves the MTP and the budget of year 1
- Hand over the authority to the new organisation

WP6: EGI Promotion and links with other Initiatives

Work package number	6	**Start date or starting event:**				September 2007 M1	
Work package title	EGI PROMOTION AND LINKS WITH OTHER INITIATIVES						
Activity Type[15]	SUPP						
Participant id	1	2	**4**	8			
Person-months per beneficiary:							

Objectives

The main objective of this work package is to support EGI by increasing visibility through dissemination activities, attracting new collaborators through outreach activities and increasing European synergy through efficient links between different initiatives and competent employment of success stories in using the grid infrastructure.

Description of work (possibly broken down into tasks), and role of participants

The objectives will be reached by dissemination and outreach activities, intense communication with decision makers and funding bodies in the relevant fields and interaction with industry partners. The work package has two tasks:

6.1 Dissemination and outreach
6.2 Industry collaboration

The project will (also) provide input for relevant European Commission initiated dissemination activities (e.g. press releases, news bulletins, brochures, success stories, posters, web-based publications, multimedia material etc). In this context the project's dissemination-messages will also reflect its broader societal and economic impact.

The project's dissemination material in relation to the above goal will be regularly updated to provide the latest version of its status and achievements. This will be reflected in deliverable D6.2 (to be updated every 6 months).

T6.1 Dissemination and outreach

The goals for the dissemination and outreach will be met through a variety of sources and media. The following efforts are aiming at reaching individuals, organizations and collaborative partners having useful knowledge to share:

- Organize and support a collaborative Web space enabling the knowledge transfer in both directions (pull and push)
- Prepare communication material but extend the coverage employing the possibilities of digital media
- Reach a maximal coverage by participation or installing an information booth in selected range of conferences (for example ISC'08, SC'08, EGEE conferences, OGF, UK AH etc.)
- Organize EGI-related events
- Reach the community through regular public information and press releases

The outreach part of this work package is forming base for creating collaboration between EGI and

[15] Please indicate one activity per work package:
SUPP = Support activities; MGT = Management of the consortium.

other infrastructure efforts:

- National and regional grid activities
- Research infrastructure projects that are identified in the ESFRI Roadmap
- European scientific and research communities (ESF, ERC, ESFRI …)
- European research organizations (EBI, ECMWF, CERN, …)
- New European grid and e-infrastructure projects (PACE, ESFRI Roadmap preparatory projects …)
- Links to other institutions, such as infrastructure policy bodies (e-IRG, EIROForum, OECD, …)
- Links to European and global forums and standardization bodies (OGF, PRAGMA, EGEE User Forum, OMII, TERENA…)

To be able to create a sustainable infrastructure it is of uttermost importance to create a mesh of trust. Outreach and dissemination towards decision makers and funding bodies is an imperative vehicle in this process. This process is built upon outreach activities targeting these stakeholders:

- Increase the visibility of grid computing for national decision makers and funding bodies
- Look for dissemination synergies with events organized by the EU Presidency to reach for maximal policy impact
- Provide EGI material, such as success stories, for supporting decision making
- Actively inform and interact with EU, European policy groups and other related organizations about EGI progress
- Focus on success stories where scientific understanding has been enabled or accelerated through the use of grid infrastructure.

In particular, EGI_DS will engage at an early stage with the authorities of the country(-ies) that are expected to hold the EU Presidency at the time of the launching of the EGI organization in an effort to achieve the maximum possible political support and visibility concerning EGI. The Commission Services could also provide their assistance in this context. Relevant policy level written material will be for this purpose (and similar ones) developed and will appear in Deliverable D6.2.

T6.2 Industry collaboration

The interaction with the industry is carried out through the collaboration, outreach and dissemination with selected industry partners with a target to attract new users and increase visibility among companies potentially interested in grid activities. The purpose is in collaboration with WP3 to explore, through use cases, the needs and expectations from the industry. The long term goal of the industry collaboration is to provide the smooth path to attract the industry to use the sustained EGI infrastructure in the daily work In this context industry has to be seen as both a potential user and a major partner for service provision. As there currently do not exist a clear policy framework for industry involvement in the employment of the e-Infrastructure of the European Research Area a clear effort has to be directed towards better understanding of the industry needs and the collaboration opportunities.

- Recognizing promising industrial users, capable of employing grid infrastructures
- Approaching grid computing and HPC related vendors to build collaboration
- Including business partners specialized in grid economics and other related areas (BEinGRID, …)

Deliverables (brief description and month of delivery)

D6.1 (Month 3): Dissemination plan

D6.2 (Month 5): Dissemination package and webpages available—communication material

D6.3 (Month 12): Interim dissemination and outreach report

D6.4 (Month 25): Report from industrial workshops
D6.5 (Month 26): Final dissemination and outreach report

B.1.2.6 Efforts for the full duration of the project

Project number (acronym): 211693 (EGI_DS)

WP leaders are indicated by showing the relevant person-month figure in bold.

Workpackage	**WP1**	**WP2**	**WP3**	**WP4**	**WP5**	**WP6**	**TOTAL per Beneficiary**
1. GUP	**X**	X	X	X	X	X	
2. GRNET		**X**	X	X	X	X	
3. INFN		X	**X**		X		
4. CSC		X	X		X	**X**	
5. CESNET		X	X		X		
6. CERN			X	X	**X**		
7. DFN			X	X	X		
8. STFC			X	X		X	
9. CNRS			X	**X**	X		
TOTAL							

B.1.2.7 List of milestones and planning of reviews

List and schedule of milestones

Milestone no.	Milestone name	WPs no's.	Lead beneficiary	Delivery date from Annex I [16]	*Comments*
M2.1	1st EGI Workshop	2	GRNET	Month 2	Workshop held
M3.1	2nd EGI Workshop	3	INFN	Month 7	Workshop held, Existence of improved List of EGI Functions and working model functions
M4.1	Blueprint publication	4	CNRS	Month 10	Existence of document
M5.1	3rd EGI Workshop	5	CERN	Month 11	Workshop held, Existence of all draft final papers on EGI structure
M5.2	EGI Convention endorsed by NGIs	5	CERN	Month14	Endorsement of document by the NGIs
M5.3	4th EGI Workshop	5	CERN	Month 19	Workshop held
M5.4	5th EGI Workshop	5	CERN	Month 26	Workshop held, Signed agreement
M5.5	Incorporate the EGI organization	5	CERN	Month 27	The EGI organization takes over

[16] Measured in months from the project start date (month 1).

Tentative schedule of project reviews

Review no.	Tentative timing, i.e. after month X = end of a reporting period[17]	*planned venue of review*	*Comments, if any*
1	Month 12 – End of reporting period 1	*TBC*	
2	Month 24 – End of reporting period 2	*TBC*	
3	Month 27 – End of reporting period 3	*TBC*	*if needed*

[17] Month after which the review will take place. Month 1 marking the start date of the project, and all dates being relative to this start date.

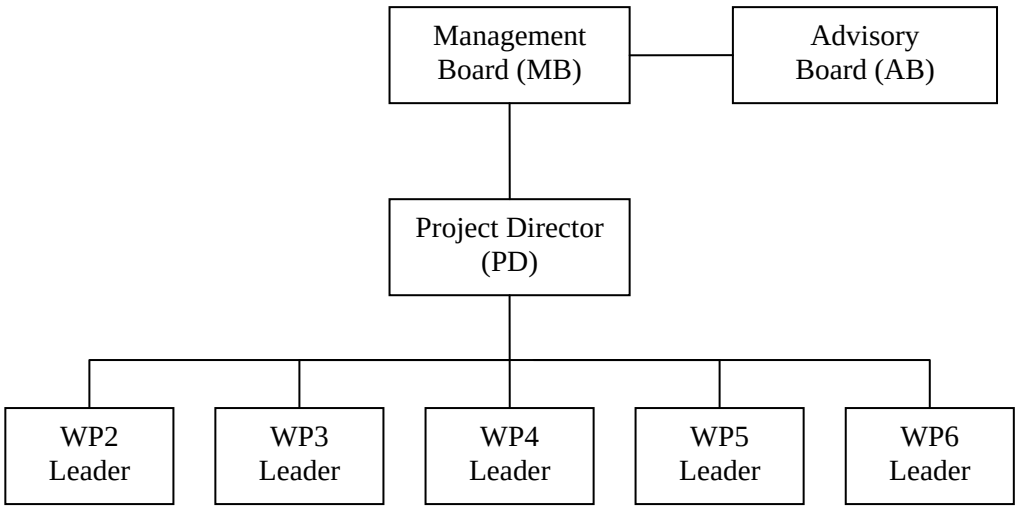
B2. Implementation

B.2.1 Management structure and procedures

The main goal of a good project management is to ensure that the project goals are achieved. The project management architecture adopted in EGI_DS defines a lean structure and set of procedures which are auxiliary but important and indispensable for ensuring effective and successful execution of the project and subsequent generation of results. This goal is achieved by establishing efficient management procedures for two managerial aspects: administrative and financial management as well as operational management together with quality assurance. Corresponding mechanisms will be provided to take decisions affecting the project's outcome as well as for the administrative and operational coordination of the project. Additionally, the project management defines the means of communication within and outside the project, and represents the sole interface to the European Commission (EC) Project Officer.

Owing to the size of the consortium resulting from the nature of the CSA project, a relatively small managerial structure for EGI_DS is proposed, consisting of the following core bodies (see fig. 1):

- Management Board (MB)
- Project Director (PD)
- Work-package Leaders (WL)
- Advisory Board (AB) consisting of NGI Representatives



The **Management Board (MB)** represents the highest authority of the consortium with ultimate responsibility for all aspects of the project. It consists of representatives from each project participant with one vote per partner and is chaired by the Project Director (PD). The MB is the only managerial body that can approve major changes in the project plans, if required for successful accomplishment of project objectives, including changes to partner budgets as well as termination and addition of partners.

The MB responsibility encompasses monitoring of the overall project progress as well as reviewing and approving project deliverables and quarterly reports before submission to the EC. In order to ensure a sufficient degree of information flow between MB members, monthly teleconferences and quarterly in-person meetings will be organized.

The management of EGI_DS is expected to benefit from direct involvement of the flagship e-infrastructure projects. At this point in time, and due to the connection to EGEE as the major European grid infrastructure, the EGEE Project Director is invited as a permanent observer to the

MB. The project will actively engage in discussion with other existing and future flagship e-infrastructure projects such as GEANT, DEISA and after successful negotiations PACE to invite further observers depending on the needs of the project.

The **Project Director (PD)**, representing the coordinating partner (GUP) leads WP1. The PD's responsibility with respect to administrative and financial management of EGI_DS includes the following tasks:

- management of the consortium's financial resources including funds distribution;
- constant monitoring of resource usage and contractual terms;
- organisation of project internal meetings and external and internal reviews;
- co-operation and consultation with the EC on contractual and financial matters;
- ensuring that legal and ethical issues are properly dealt with;
- and other strictly administrative activities;

Based on the input from the WLs, the PD may recommend and request changes in the project plan (if necessary), respond to any situations that might pose a threat to the project success, recommend the solutions for problem solving, identify measurable success indicators for all activities, and define the structure of deliverables and the preparation of final project reports.

In addition, the direction and coordination of the operational activities within the project, which are essential for the project's success, will be undertaken by the PD. This activity encompasses the management and coordination of work and information flow among other activities, as well as monitoring of the project's progress with respect to project schedules. Operational management is also responsible for the organisation of periodical project internal meetings, and the provisioning of the tools used for the project's internal operations. This includes a project portal, which provides a collaborative working environment, including mailing lists and archives, workflow and document management tools, and other administrative tools. Another important issue for efficient collaboration between partners is the arbitration of arising conflicts (if any).

The **Work-package Leaders (WL)** perform the primary role in ensuring efficient collaboration between partners within each work-package. Their responsibility includes successful execution of work-package tasks, reporting to the PD and providing the PD with detailed plans for the work-package, implementation of plans approved by the PD, monitoring progress within each activity, and supervision of the preparation of deliverables and final reports. Another important task of the WL is the arbitration of arising local conflicts (if any). In addition, WLs may request changes of activity schedules or objectives if this is necessary for successful project execution. All WLs are represented in the MB through their corresponding institution.

The **Advisory Board (AB)** consists of representatives from the National Grid Initiatives (NGIs) of the EU27 and other eligible countries—one NGI/representative per country. In addition, the project will propose to the AB members to include representatives from international organizations (e.g. the members of EIROFORUM: CERN, EFDA, EMBL, ESA, ESO, ESRF, ILL) as observers in the AB, since their expertise and knowledge in setting up an international organization is expected to be helpful.

In the initial setup, the AB is the formal forum for the NGIs to provide guidance to EGI_DS. At the same time, EGI_DS will offer support in the operation and evolution of the AB. A proposal for the initial setup will be presented to the AB during the first EGI Workshop (month 2). This includes the election and appointment of a chairperson for the AB, and possible other actions required for this function.

In addition to the NGI representatives, it will be necessary to include further stakeholders in, and beneficiaries of grid infrastructures in the discussion and decision finding process. For this reason, EGI_DS will propose a mechanism to initiate and integrate AB Expert Groups, which would contain

of relevant experts in the area for specific questions addressed by the AB. Corresponding mechanisms, e.g. from ESFRI and e-IRG, will be reviewed and presented to the AB members.

This Board and the involvement of the NGIs are essential for the project, since the outcome of EGI_DS, the proposed EGI organization, must be established and governed by the NGIs. This requires that the AB evolves into a formal body such as the EGI Council, with the appropriate mechanisms for taking decisions on behalf of the future EGI organization. For the long-term future, it is anticipated that this committee may evolve into an independent committee of NGI-representatives, which could highly benefit the EGI/NGI related efforts in Europe

The work of the EGI_DS project is therefore dedicated to this goal and as much as possible consensus with AB members has to be achieved in all steps necessary to design and later establish the EGI organization.

The AB is created before the start of the project to accompany the preparation of EGI Design, providing information, feedback and advice for the achievement of the overall project goals. Participating NGIs formally appoint their representatives in the EGI Design Project AB as soon as possible[18]. The project will organize a series of at least four workshops[19], where interaction between the AB and the project partners will be enabled. A mailing list for internal AB communication will be set up and all relevant material on the project will be available on the EGI web page (www.eu-egi.org), thus allowing contributions from the NGI representatives.

B.2.1.1 Quality assurance

The operational co-ordination also defines quality standards for the output of the project. The quality assurance process includes a cyclical process for checking all deliverables, i.e. results of the project. These results include:

- periodic activity and management reports (M3, M9, M15, and M21), and the final report of activities from WP1 (M27)
- technical reports (deliverables) of WP2, WP3, WP4, WP5 and WP6
- dissemination results from WP6
- contributions to other relevant parties, e.g. eIRG (e-Infrastructures Reflection Group)
- information available on the project web site (http://www.eu-egi.org)
- brochures
- presentations at general conferences, exhibitions, workshops and other meetings of relevant parties

As EGI_DS is relatively small, an appropriate quality assurance has to be defined without increasing substantial management overheads, while at the same time maintaining the required level of quality. The approval of final results is confirmed by the PD once initial approval has been given by the WL. The WL continuously checks the results of the corresponding WP. Each deliverable will be checked by an independent group of experts before being released. Due to financial limitations, we propose that this group of independent experts consists from partners from the project consortium, not directly engaged in the development process.

Quality checking and cross-reading is a process which helps the WL to release the deliverable. If necessary, any deliverable can be returned and postponed to the WP for further improvements. Contribution to other relevant parties, joint publications, and information available on the website will be sent for comments and approval to the MB.

B.2.1.2 Conflict management and problem escalation

[18] At proposal submission, 31 NGIs from Europe (including 25 of the EU27 and 6 others) have provided feedback to the proposal, expressed their support for the EGI Vision, and subsequently nominated their representative in the AB. See Table 1.3f for details.

[19] At present, 5 workshops are planned

EGI_DS will be carried out by a mid-size consortium, which allows simplifying management issues. However, as a precaution considered relevant, a procedure for conflict management is implemented as guidance for the MB. The responsibility for conflict management lies with the PD. The PD establishes responsibility for conflict management by explicitly taking charge of resolving/managing the conflict. However, it is the responsibility of all partners to report to the PD any identified issues as soon as possible, preferably before the development of conflicts.

Conflict management strategy:
The project's conflict management strategy is achieved through these three key goals:

1) Discover and resolve issues before they become serious conflicts
2) Create a climate of trust where partners feel free to exchange any ideas
3) Encourage and engage partners to speak out their minds and without hidden agendas

The three key activities are as follows:

1) Review the current project progress at periodical meetings to be able to detect any possible problems before they arise
2) Create a list of activities (list of issues to be solved) where project issues are captured and their status (open, under investigation, deferred, fixed etc) is remembered
3) Monitor issues through an issue management process, consisting of: detection, recording, analysing, prioritising and allocating ownership of issues.

The following problem escalation path (to be solved on the lowest level, if possible) is defined:

WP Partner ➔ WP Leader ➔ Project Director ➔ Management Board.

A Consortium Agreement (CA) will define the rights and duties of partners, PD and MB in case of conflict announcing, management and solving.

The project managerial bodies will be established before the kick-off of the project and accepted by the MB during the first project meeting.

The initial project meeting will be used to refine the cooperation rules and the adjustment of activity scheduling or objectives. The organisation of regular internal meetings is also planned for overall progress assessment and discussion of changes in the activity time-plan or goals (if necessary, for successful project execution). The managerial bodies will be continuously active during the whole project lifetime, preparing activity and managerial reports, providing administrative support for the project, monitoring the overall progress of the project and quality of results, coordinating the work and information flow among the WPs, interfacing with the EC and solving arising local conflicts (if any).

B.2.1.3 Quality of the Management

The proposed persons for leading WP activities have extensive experience from national and international collaborative projects. High quality candidates for several of the leading positions are described in the list of key personnel.

The MB will hold an in-person meeting at the project start and after successful conclusion of contract negotiations. For this meeting detailed plans will be worked out by WP leaders for the first six months of the project and a coordinated detailed plan. Based on this plan the project will release a risk assessment report and quality assurance plan.

The MB will meet within a week after the detailed 6-month plan has been produced for its review and approval (planned during the kick-off meeting).

A project web site is maintained (in collaboration with WP6) for project management and internal communication as well as external communication.

B.2.1.4 Risk Analysis

Here we consider rather high level risks. A more detailed risk analysis can only be made after the full management structure is in place and the work packages have defined their plans. This should be achieved a few weeks after the EGI workshop (month 2).

- Risk 1: The project fails to produce the "conceptual design report". The requirements from the national member states, the national grid initiatives and the virtual organizations cannot be consolidated and a common blueprint is not endorsed by a majority.

  This high-level project risk is mitigated by the institution of a management structure coordinating the work and ensuring the proper information flow between the work packages inside the project and interested parties outside (National Grid Initiatives, Virtual Organizations, and funding bodies). Regular activity and management reports to the Management Board ensure proper monitoring of progress. Furthermore, the participants have long standing experience working on national grid initiatives, with current EU grid projects such as EGEE, or using the grid as members of virtual organizations.

- Risk 2: The implementation of the legal structure and the ratification process extend beyond the duration of EGI-DS.

  The situation and likelihood of this risk will be continuously monitored. If necessary, an interim EGI structure should be foreseen. From experience it is known that the full ratification process with a large number of participants will take a very long time. It should be possible to proceed with the establishment of EGI in parallel with the completion of ratification.

- Risk 3: The EGI organization cannot be put in place by the time when a possible follow-up project of EGEE-II finishes.

  In this case, continuity of the existing operational structure would be broken. Until the establishment of an (intermediate) EGI organization, the extension of EGEE would be required in order to preserve the investments and expertise already accumulated.

B.2.2 Beneficiaries

Descriptions of the individual participating organisations and key staff are provided below:

B.2.2.1 GUP

Participant Full Name: Institut fuer Graphische und Parallele Datenverarbeitung der Johannes Kepler Universitaet Linz

GUP (www.gup.jku.at) is the leading partner and coordinator of the Austrian Grid initiative, a nationally funded project for the establishment of a permanent Grid infrastructure in Austria, which consists of all aspects from the hardware resources, the Grid middleware, and the Grid applications in Austria and related partner countries. Besides its role as Austrian Grid coordinator, GUP is heavily involved in the setup and operation of the main Grid hardware nodes, the deployment of the software at all sites, and the development of middleware extensions for specific application requirements. For the latter, GUP concentrates on user interfaces and interactive visualization on the grid, while supporting Grid applications from astrophysics, biomedicine, and numerical computing among others. In addition, GUP is also the coordinating partner of Austrian in the EU EGEE and EGEE-II Project as well as in the Central European Grid Consortium. Appointed

by the Austrian federal ministry of education, science, and arts (BMBWK), GUP provides Dieter Kranzlmüller as the scientific delegate of Austria in the EU e-Infrastructures Reflection Group (eIRG). The institute itself is located on the campus of the Johannes Kepler University (JKU), which is a traditional leader of supercomputing, cluster computing and grid computing in Austria. The JKU hosts a major academic high-performance computing and networking centre (with Austria's fastest supercomputer), as well as the leading Austrian Virtual Reality Centre VRC@JKU.

Key staff – Dieter Kranzlmüller
Role in EGI_DS: Project Director, Chairman of Management Board, and WP1 Leader
Dedication: 75%

ao.Univ.-Prof. Dr. Dieter Kranzlmüller is professor of computer science at GUP, who has worked in parallel computing and computer graphics since 1993, with a special focus on parallel programming and debugging and cluster and grid computing. He has participated in several national and international research projects and has co-authored more than 150 scientific papers in journals, and conference proceedings. He is deputy head of the institute, appointed national representative of Austria in the EU e-Infrastructures Reflection Group (eIRG), Area Director Applications of the Open Grid Forum (OGF), and a member of the Austrian Grid Executive Board. Before EGI, he served as the Deputy Project Director of the EU Project EGEE at CERN.

For EGI_DS, Dieter Kranzlmüller is designated as Project Director (PD), with an appointment to dedicate 75% of his working time to the project. Consequently, he is relieved from other activities at the Johannes Kepler University with the exception 25% of his time, which are mandatory for administrative work at JKU and for teaching duties. His workforce will concentrate on the management of the project, but will also require his involvement in all workpackages of the project. He is supported by his own administrative staff at the GUP.

B.2.2.2 GRNET

The Greek Research and Technology Network (GRNET S.A. www.grnet.gr) is a state-owned company operating under the auspices of the Greek Ministry of Development - General Secretariat for Research and Technology. GRNET sources of funding are both national and through European Commission projects. National funds are secured through both the Ministry of Economy and Finance and its Operational Programme of the Information Society and by the Ministry of Development, General Secretariat for Research and Technology, which is the mother institute of GRNET. GRNET has the mandate from the ministry to participate to the PACE proposal and as a direct company of the ministry to commit to the project requirements.

GRNET mission is to provide advanced, high-quality electronic infrastructure services to the Academic, Research and Educational community of Greece and to disseminate Information & Communications Technologies to the general public. The main services that GRNET currently provides are national research and education networking (NREN) and high performance computing services. GRNET currently operates an advanced gigabit Internet backbone in Greece, which is interconnected with GÉANT with 20Gbps, while its next generation hybrid network based on 6500km of own dark is being developed.

Under the HellasGrid National Grid Initiative (www.hellasgrid.gr) GRNET has signed cooperation agreements with 20 leading research and academic institutes, which have shown significant experience in the area of high performance computing. GRNET, through the HellasGrid project and its partners, offers a high performance computing and storage infrastructure with around 1000 CPUs in 6 clusters and 100 TBs of storage (30 in disks and 60 in tapes). GRNET is a major partner in the pan-European Grid project EGEE-II, in which it is leading the policy and international cooperation activity (NA5) which among others deals with the sustainability issues and the European Grid Initiative (EGI). GRNET coordinates the SEE-GRID-2 regional project and participates in other infrastructure or Grid research projects such as EumedGrid and EuChinaGrid

(regional), e-IRGSP (policy support), GRIDCC (real time middleware research) and RINGrid (study on requirements for integrating scientific instruments in the grid).

GRNET has extensive experience in the policy area and has been leading the related effort in the EGEE project (EGEE NA5 activity on Policy and International Cooperation). GRNET intends to contribute to all EGI Work Packages as follows: In WP2, GRNET will continue the EGEE NA5 preparatory work leading the overall workpackage and editing the related deliverable D2.1 taking input from the corresponding task leaders i.e. NGI contact persons (GUP), knowledge base (INFN) and use cases (CESNET). GRNET will also managing the policy workshop (WS1) that will be organised during the EGEE '07 conference in Budapest in cooperation with CSC. In WP3, with regards to the design of the EGI functionality, GRNET will contribute its EGEE experience of running a distributed regional operations centre with 7 countries in the area of operations, as well as provide similar experience in the areas of policies, standards, training, disseimation and applications support. In WP4 GRNET will provide the experience gained from the Networking community and participation to GEANT - DANTE, and can contribute to the definition of the legal form and the governance structure. In WP5 GRNET will also contribute to the establishment of the EGI linking with the partners of the South Eastern Europe. GRNET has significant experience in the areas of dissemination and international cooperation from projects and fora like EGEE, SEE-GRID, e-IRG, OGF and others. In WP6 GRNET will provide links with the ecosystem, linking with EGEE and PACE, as well as the regional efforts such as EuMedGrid, EuChinaGrid and SEE-GRID. GRNET can disseminate the project results into the wider South Eastern European region with relevant actions, such as material preparation and delivery of events targeting different communities, and finally through the GRNET booth and staff at the Supercomputing events.

Key staff – Fotis Karayannis
Role in EGI_DS: WP2 Leader
Dedication: 50%

Dr. Fotis Karayannis received his PhD (1998) in the fields of Integrated Communications and Management of Broadband Networks from the National Technical University of Athens, while working as a research-associate in European research projects (1994-1999). From 1999 to 2003 he worked as an external consultant for OTE-Consulting, a subsidiary company of the incumbent telecom operator. From 9/2000 he is working as the Infrastructure Planning and Development Manager for GRNET. He acted also as a consultant for CERN in the areas of Grid computing policies. Since 2002 he is a member of the EGEE Executive Committee and he is coordinating the Hellasgrid national project. He is an e-IRG member for Greece and FP7 national representative in the area of Research Infrastructures.

Key staff – Panagiotis Louridas

Panagiotis (Panos) Louridas (1971) received the Diploma of Informatics Degree from the Department of Informatics, University of Athens, Greece, in 1994. He received his MSc by research in 1995 from the Department of Computation, University of Manchester Institute of Science and Technology (UMIST), and his PhD, also from UMIST, in 2000. He has worked as a consultant in a number of European research projects during the period 1995–2000. He was head of development at the Investment Bank S.A., Athens, Greece, from 2001 to 2004, where he was responsible for all software project design and development. From March 2005 up to September 2005 he worked as IT coordinator at the Collections department of the Emporiki Bank S.A., Athens Greece. Dr. Louridas joined GRNET S.A. in 2005, where he has worked in numerous European and national research projects, both in management and technical posts, mainly dealing with the Grid projects. He has worked in the e-IRG Support Programme project and is the current EGEE NA5 activity leader on policy and international cooperation.

B.2.2.3 INFN

INFN (http://www.infn.it/), is a public governmental research organization, which promotes, co-ordinates and funds nuclear and high-energy physics related researches. It is organized in 4 National Laboratories, 19 Departments (called Sections located in major Universities) and 11 Local Groups (see http://www.infn.it/mappa.php). INFN staff research personnel amounts to more than 1500 peoples with an equivalent number of associates from University and other Scientific National Institutes. INFN has a considerable experience on high performance distributed computing. Already in 1998 INFN deployed a Wide Area CONDOR Pool distributed all over Italy (see http://www.infn.it/condor); at the end of 1999 INFN launched the INFN-GRID project (http://www.infn.it/grid), to evaluate/develop the use of GRID technologies in facing the stringent computing requirements of the High Energy incoming LHC experiments at CERN. Since 2001 INFN has played a major role in the EU DataGrid and DataTAG projects, the CERN based LCG and WLCG projects, the National Grid Projects GRID.IT (http://server11.infn.it/firb-grid) and LIBI, and more recently the EGEE and EGEE-II and the grid infrastructure extension projects like EUmedGRID, EUChinaGRID, EU-IndiaGrid and EELA, GridCC and BioinfoGRID The INFN contribution to these projects comprises the setup of the INFN Production GRID, with more then 3000 CPU's deployed in more than 20 sites, the development and reengineering of the grid Middleware, in particular of the Workload Management service, the Virtual Organization Membership Service (VOMS), the Glue Schema, the new Web Service CE implementation with CREAM and CEMON, the Grid Accounting service DGAS, the GRID Monitoring service GridICE, some new components related to grid policies GPBOX and the SRM interface to parallel file systems (Storm) together with the dissemination ad training activities.

INFN's main task in the EGI_DS will be the participation and coordination of the WP3 activities which have as main goal the definition of the functions to be attributed to EGI and the elaboration of a working model between EGI and NGI with its time evolution to achieve the future sustainability of the EU e-Infrastructure.

INFN will also take part in the WP2 activities bringing in this work-package the knowledge and the relations with NGIs derived from the ongoing EGEE-II work and in WP5 which aims at establishing EGI and the new working model in view of the future sustainability of the European e-Infrastructure.

Experience to carry out these tasks comes from the key role played in the various worldwide Grid projects quoted above. Moreover the experience coming from the coordination of the Italian Production Grid (INFN GRID and Grid.it) will be of utmost importance in running and coordinating the EGI DS WP3 activities. INFN has an important role in the development of Grid software, as the coordination of the middleware developments in the EGEE-II project has extensive knowledge of the problems related to testing and certification activities see e.g the ETICS and OMII EU contributions and in the definition and implementation of the Open Grid Forum Standards.

Key staff – Mirco Mazzucato

Present position: INFN Director of Research. CNAF (INFN Advanced Computing Centre) Director, since 2004. INFN Grid Project Project Manager since 2000. INFN delegate and member of the Management Board in the (W)LCG, World Computing Grid for LHC Computing Grid Project at CERN since 2002 (~ 6000 physics in Europe, USA and Asia) Member of the Project Management Board and coordinator of the Italian Federation in the FP6 European project EGEE (and its successor EGEE-II) MIUR Italian delegate in the e-Infrastructure Reflection Group.

Key staff – Antonia Ghiselli

Antonia Ghiselli currently heads research in distributed applications over high-speed networks at CNAF, the national centre for computing and networking of INFN. She took a major role in the setting up of the INFN and later of the Italian research network, GARR, and of the first European Research Network infrastructures. From 2000 up to 2004 she was teaching Distributed Computing at the Computer Science Department of the Ferrara University. She leads the Technical Board of

the INFN GRID project that coordinates the INFN participation to the national and European projects.

Key staff – Diana Cresti

Diana Cresti is a Technologist at INFN. She holds a PhD in Linguistics (1995) from the Massachusetts Institute of Technology (MIT) with a focus on Knowledge Representation, and has a background in Statistics from the University of Padova (Italy). Dr. Cresti's work in dissemination and international relations is strongly oriented towards the understanding of regional and thematic diversities, and the related issues of practical translation of technological know-how. Prior to her current position, Dr. Cresti has worked as Operations Analyst in the publishing sector, and as Assistant Professor of Linguistics at the University of Michigan, with visiting assignments at the University of Chicago, UCLA, and MIT.

Key staff – Laura Perini
Role in EGI_DS: WP3 Leader
Dedication: 50%

Laura Perini is Ordinary Professor (Nuclear and Subnuclear Physics) at the Physics Department of Milan University. She has contributed many HEP experiments at CERN and till 2004 she has been ATLAS Italian computing coordinator for more than 10 years; has lead the ATLAS-LCG-EGEE Task Force, representing ATLAS in the EGEE Task Coordination Group and in the LCG Grid Deployment Board (GDB), since the beginning of these bodies till September 2007. She was between the initiators of the INFN GRID Project, in 1999 and, since then, member of the Executive Board acting as Deputy Project Manager. She has provided key contributions to DATAGRID and DATATAG Projects, in addition to EGEE, leading the developments of the general frameworks supporting the exploitation of the grid by Atlas applications. She represents the INFN ATLAS Tier2 federation in WLCG. Laura Perini has been the chairperson of the CERN FOCUS Committee (Forum On Computing: Users and Services) from January 2002 for more than 2 years till the end of FOCUS. In 98-99 she had been the Project Leader of the MONARC Project, which was the precursor of the GRID oriented Computing models for the LHC experiments.

B.2.2.4 CSC

CSC, the Finnish Information Technology Center for Science (CSC Scientific Computing Ltd.), is one of the largest supercomputing centres in Northern Europe. CSC's activities include supercomputing and Grid computing, data management, scientific applications, Finnish University and Research Network (FUNET), information management, and training and education services. CSC has 150 employees and turnover without investments in 2006 was close to 16 MEUR. CSC is a non-profit company owned by Finnish State.

As part of the Finnish national research structure, CSC's mission is to develop and offer high quality information technology services. The grid and supercomputing infrastructure at CSC includes various systems, with a major upgrade of over 70 teraflop/s computing capacity to be installed in stages during 2007 - 2008 by Cray and capacity computing systems from HP with more than 10 teraflop/s performance. In addition, application servers from Sun Microsystems and a number of systems for data management services and networks are being used.

CSC invests considerable resources in scientific software development and scientific consultancy for high performance computing, and maintains a set of 200 scientific applications and 60 databases used by the researchers using the CSC computing environment.

In addition to management experience gained from developing and maintaining the national IT services for science, CSC has a proven track record in coordinating projects applying Grids. Also, the technical expertise is considerable through CSC's own Grid development and service provision. At the national level, CSC is steering the Finnish Grid working group, and maintains and

coordinates the first production quality Finnish Grid infrastructure - Material Science National Grid Infrastructure (M-Grid), which connects computing resources from CSC and eight universities all over Finland. CSC is active in the Nordugrid ARC middleware development and a partner in the Nordic Data Grid Facility (NDGF), which is the Nordic effort to build a Nordic grid.

At the European level, CSC participates in the major European Grid Infrastructure projects DEISA and EGEE-II, and the EMBRACE Network of Excellence providing a service Grid for bioinformatics. CSC has participated in a number of EU projects since the EU FP 4, namely HPCNTTN network (Finnova TTN coordinator), NedLib, REYNARD, 6NET, ENACTS etc. CSC is steering the operation of the HAKA federation, the identity federation of the Finnish higher education. HAKA federation runs Shibboleth as the federating software that is used to provide daily, mission-critical services for the students and the faculties of universities, polytechnics and research institutions in Finland.

Key staff – Kimmo Koski

Kimmo Koski started in his current position as Managing Director of the Finnish IT center for science, CSC, in August 2004. Prior to his present position, Koski spent 4.5 years at the Nokia Research Center and Nokia Technology Platform, where he was responsible for various management tasks for both the Center's and the Platform's global IT services. Earlier work experience includes 10 years at CSC in various positions, most of the time as the manager of the operational computing environment, and a one-year visiting period in CERN in Switzerland.

Koski received his doctorate from Helsinki University of Technology in January 1996. His dissertation was on Metacomputing Technology.

During the recent years Koski has been involved in European collaboration in high-performance computing (HPC) and grid activities. In 2006 he has chaired a few international groups, HPC in Europe Taskforce and Nordic Data Grid Facility, and participated in Norwegian e-infrastructure advisory group and Nordic e-Science strategy group. Koski was also involved in composing the Finnish grid strategy during 2005-2006.

Key staff – Leif Laaksonen

Leif Laaksonen is a Development Director at the Finnish IT center for science, CSC. Laaksonen is in charge of the international affairs and project preparations at CSC. He has a broad experience in computational sciences, e-Science and e-Infrastructure matters. Currently he is the chair of the e-Infrastructure Reflection Group (e-IRG). Leif Laaksonen received his Doctor of Science (Technology) in computational chemistry, Åbo Akademi, Finland 1983.

Key staff – Katja Rauhansalo

Katja Rauhansalo is a Project Coordinator at the Finnish IT center for science, CSC. Rauhansalo has a long experience in EU issues. She worked several years for paper industry, tourism and marketing in France before returning to Finland in 2007. Rauhansalo has a master degree in Social Sciences and she specialized in her studies in EU projects and communication.

Key staff – Per Öster
Role in EGI_DS: WP6 Leader
Dedication: 20%

Dr Per Öster is since October 2007 Director Application Services at CSC, Finland. Öster has been Associate Director of PDC the centre for Parallel Computers at KTH for more than a decade. Recent positions include Project Director of BalticGrid and EGEE Northern Europe Regional Operating Centre Manager as well as member of the EGEE Project Management Board. Öster has lead the participation of PDC in a number of projects concerning distributed computing,

collaborative work and grid technologies such as HPC TTN, ENSCUBE, JACO3 and European Data Grid. Before joining KTH and PDC in 1994 Öster was consultant in applied mathematics and expert on HPC technologies within the Volvo Corporation. Öster has his background in theoretical atomic physics with a PhD in 1990 at the Physics Department of Gothenburg University/Chalmers University of Technology. Per Öster is the WP6 leader.

B.2.2.5 CESNET

The **CESNET, Association of Legal Entities,** was established in 1996 by all the universities of the Czech Republic and the Academy of Science of the Czech Republic. It is a public non-profit organization whose main goals are research and development of advanced network technologies and applications, the dissemination of information about them and the operation and development of the backbone network that interconnects the networks of the Association members. CESNET responsibilities also cover the development and operation of the national Grid infrastructure. While between 1996 and 2000 CESNET operated two networks – the academic backbone and the one connecting commercial customers – since 2000 CESNET ceased to act as a commercial Internet provider and it is engaged solely in the operation of the academic network (NREN CR) and related activities. Since 1998 CESNET is involved in building a national capability computing infrastructure, which later became a basis of the national Grid infrastructure, still operated and developed by CESNET.

To serve national interests in network and distributed computing/data storage provision, CESNET is heavily involved in the research and development in information and communication technologies and their applications. It also targets the provision of education services within research and development, using the high-speed national research and education network. The infrastructure build and operated by CENET is opened to all the research institutions in the Czech Republic, both from academia and industry. It also connects public hospitals, libraries and other establishments, especially in their role as research and educational centers.
The financial stability of its activities is guaranteed through the long term Research Intent “National Optical Network and its Advanced Applications”, that runs till 2010. The yearly budget is around 12 million Euro, guaranteeing both the equipment and personnel financing at adequate levels.
CESNET is member of several international organization, including DANTE, TERENA, CEENet (Central and Eastern European Networking Association), and GLIF (Global Lambda Integrated Facility).

CESNET is also involved in many national and international projects, including GEANT and GEANT2, DataGRID, EGEE and EGEE-II, Phosphorus, Lobster (more information can be found on http://www.cesnet.cz). As on the national level, CENSET is involved both at the operation and research parts of the international activities (e.g., being a sole CE partner in EGEE to directly contribute to the middleware development). Jan Gruntorad, CESNET director, is currently one of the DANTE directors, Ludek Matyska is a CE Federation representative at the EGEE-II PMB and also served one term as an EGEE-II PMB chair.

Into the EGI_DS project CESNET will bring experience from close collaboration between network and Grid oriented teams, covering also both operational and research aspects of the infrastructure setup and management. Another important aspect of CESNET contribution is the experience of a small country and a representative of other small countries in much larger consortia (like DANTE and EGEE).

Key staff – Ludek Matyska

Ludek Matyska graduated in Biochemistry and Chemical Physics and is an associate professor at Masaryk University (MU) as well as senior researcher with CESNET. Since 1994 he has been a head of the Supercomputing Center at MU and also a vice director of the Institute of Computer Science there. Between 1998-2004 served as a dean of Faculty of Informatics. He works with CESNET since 1998, in 1998–2003 he has been a principal co-investigator of the research intent

"National Research Network and its advanced applications" and since 2004 he is principal co-investigator of its current continuation. He chairs the national grid infrastructure and has been involved in many national (e.g. METACentrum, DiDaS) and international projects (e.g. GridLab, CoreGRID, DataGrid, EGEE and EGEE-II), either as principal investigator or as a head of the CESNET or MU team. Ludek Matyska will bring into the EGI_DS project his long term experience both in active research (functional and operational requirements) and managerial positions (the EGI blueprint).

Key staff – Ales Krenek

Ales Krenek, PhD will be involved esp. in the WP3, where he will use his extensive expertise gained while working within and currently chairing the CZ middleware development cluster within the EGEE-II. He has broad experience from national and international projects, like GridLab, CoreGRID and EGEE family.

B.2.2.6 CERN

CERN, the European Organization for Nuclear Research, is funded by 20 European member states and has a yearly budget of approximately 1000 MCHF. CERN has 2600 permanent staff coming from the 20 member states.
CERN is currently constructing a new particle accelerator on the Swiss-French border near Geneva. The Large Hadron Collider (LHC) will be the world's most powerful accelerator providing research facilities for several thousand High Energy Physics (HEP) researchers from all over the world. The LHC start up is planned for 2008.
Four LHC experiments designed and constructed by large international collaborations (each with up to 2000 scientists and engineers coming from more than 250 institutes) will collect data over the next 10 years. These experiments will generate in the order of 15 Petabytes per year, to be shared with all the participating scientists looking for discoveries to understand the fundamental laws of nature.
The computing capacity required to analyse the data far exceeds the capacity needs of any comparable physics experiments today and needs the combined resources of some 200 computer centres world-wide. CERN has chosen Grid technology to address the huge data storage and analysis challenge of LHC.
CERN, "where the Web was born", has been at the forefront of computing for many years and now leads the world's largest Grid project "Enabling Grids for E-SciencE (EGEE)". CERN also has a long tradition of collaborating with IT industry, including via EU-supported research programmes. The IT Department currently has 280 staff, predominantly engineers, who operate one of Europe's largest Computer Centres supporting over 10,000 users.
CERN has prominently contributed to a number of EGEE-related Grid projects aiming at extending the EGEE production grid infrastructure to new geographical areas and to serve new applications domains (EuMedGrid, EuChinaGrid, EELA, BalticGrid, SEEGRID-2, Health-e-Child, DILIGENT). CERN also coordinates the ISSeG project, focussing on site security, and the ETICS project, that is currently providing the build and test system for EGEE and DILIGENT software.

Key staff – Wolfgang von Rüden

Wolfgang von Rüden holds a PhD in physics from Mainz University. He joined CERN in 1975 and worked during the first part of his career on real-time data acquisition systems. In 1990, he co-founded the software company IBEX Computing, and returned to CERN in 1992 where he introduced industrial control systems for physics experiments. From 1994 until 1998 he was Technical Director at GSI, a German National Research Institute in Heavy Ion Physics. He then became the Leader of the Physics Data Processing Group at CERN, before being appointed Head of the IT Department and member of CERN's Executive Board at the beginning of 2003.
Wolfgang oversaw various Grid projects (EDG, EGEE, EGEE-II) and continues to be the CERN member in the Project Management Board. In addition, he chairs the Review Panel of the Portuguese National Grid Initiative and represents CERN as an observer in the e-IRG.

Wolfgang wrote the position paper “Establishing an European Grid Organization (EGO)” in June 2005 which triggered the discussion leading to the present EGI_DS Proposal.

Key staff – Jürgen Knobloch
Role in EGI_DS: WP5 Leader
Dedication: 55%

Jürgen Knobloch holds a PHD in physics from Universität Hamburg for work on particle physics experiments at DESY. Since 1976 he works at CERN as physicist in the experiments CDHS, ALEPH and ATLAS. In ALEPH and ATLAS he was nominated Computing Coordinator overseeing the software development and the computing infrstructure. Since 2000 he leads groups in CERN’s IT-Department developing common software systems for the experiments at CERN including HEP applications of EGEE. In the LHC Computing Grid project he was the editor-in-chief of the LHC Computing Grid Technical Design Report published in 2005.

Key staff – Jamie Shiers

Jamie Shiers holds a PhD in elementary particle physics from the University of Liverpool.
Dr. Shiers has more than twenty years' experience in IT at CERN in a variety of positions related to database support and data management in general as well as application development and support and management of the systems offering the first Oracle service at CERN in the mid-1980s. He has led numerous projects, including the use of C++ for the implementation of scientific libraries as well as object and object-relational databases for handling multi-petabyte scale data stores.
From 2000 to 2004 he was leader of the Database Group and since then he is deputy group leader og the Grid Deployment Group leading the Service Coordination section. He was responsible for the LCG Service Challenges and now LCG Service Coordination, designed to ramp up Grid services and deployment to full production state for the initial exploitation phase of the LHC.

Key staff – Svetlomir Stavrev

Svetlomir Stavrev received his degree in Electrical Engineering from the Technical University of Varna (Bulgaria) in 1996. In 1997 he received a postgraduate Fellowship for the Doctoral School in Communication Systems of EPFL, the Swiss Federal Institute of Technology - Lausanne (Switzerland). In 1998 he joined the Laboratory of Nonlinear Systems at EPFL where he completed his Ph.D. in 2004, followed by a two-year post-doctoral assignment.
Dr. Stavrev joined CERN in 2006 as Coordination Officer of EU relations. His main tasks include the overview of all EU programmes of relevance to CERN, with main focus on the Framework Programmes for Research and Technological Development, advising the senior management and the departments on the appropriate Work Programmes and funding schemes for new EU projects, and providing general guidelines and assistance for the preparation of proposals for such projects. Dr. Stavrev is also in charge with the relations between CERN and the other six major European intergovernmental research organisations - EFDA, EMBL, ESA, ESO, ESRF, and ILL, and the interactions of CERN with the European Commission, Parliament, and Council.
Dr. Stavrev has participated in the preparation and management of several EU projects from the 5th and 6th Framework Programmes.

B.2.2.7 DFN

The DFN-Verein is an association under German law. Its membership comes exclusively from research and academic organisations (including industrial research) and comprises at present roughly 400 member institutions. Its main task is to provide for its constituency a data communication infrastructure with the best technical architecture available.

At present DFN-Verein offers a Petabit network (X-WiN) and complementary communications services like Videoconferencing and PKI. About 700 institutions from science, research and higher

education are connected directly. The total volume currently transferred over the network roughly 4 PByte per month.

Service operation is financed through cost sharing by charges paid by the participating institutions.

There has been start up money from the federal government for the first generations of the network; however currently there is no subsidy by the German government for the operation of the network.

X-WiN is connected to the European Network GN2.

DFN is tasked to represent the German „NGI“, the D-Grid project in EGI.

Key staff – Klaus Ullmann

Klaus Ullmann is the Technical Director of DFN and will represent DFN in EGI on management and commercial issues. He has been (and still is) Technical Director of DFN-Verein for more than twenty years. He has a degree in theoretical physics from the Technical University Berlin.

Klaus Ullmann has been actively involved in the creation of RARE (successor organisation: TERENA) and DANTE and is presently being involved in the management of the GN2 project.

- born 5 November 1948
- study of physics (1968-1974)
- Diploma in Physics (Theoretical Solid State Physics) (1975)
- Member of a network development team in the Hahn-Meitner-Institute (1975-1978)
- Project Leader of a regional network for the Berlin Universities and research establishments (1978 – 1982)
- Head of the Planning team for the German Research Network DFN (1982-1983)
- Managing Director of DFN (since 1984)
- Member of the Executive Committee of RARE (European umbrella organisation of NRENs) (1984-1986) and President of RARE (1986-1990)
- Chairman of the DANTE Board (1994-2002)
- Chairman of the GN2 Executive (2005-)
- Chairman of the DANTE Board (2005-)

B.2.2.8 STFC

The STFC is a non-profit UK public sector organisation whose role is to provide access to large scale scientific facilities for researchers in the UK. This is done both by providing facilities ourselves (e.g. ISIS Pulsed Neutron & Muon Source, Central Laser Facility, HPCx supercomputer, Chilbolton Observatory, James Clerk Maxwell Telescope, United Kingdom Infrared Telescope), and by negotiating access to international facilities (e.g. CERN, Diamond Synchrotron Light Source, ESA, ESO, ESRF, ILL).

The researchers who use these facilities require an advanced IT infrastructure to support them including massive data storage, high end supercomputing, vast network bandwidth, and interoperability with the IT infrastructure of the UK researchers & the international facilities. To meet its immediate requirements, the STFC operates several services including the UK National Grid Service. To meet the medium to long term requirements, the STFC operates a collaborative IT research programme at UK, European and international levels and works with commercial providers to ensure that our IT needs can be met. STFC is also active in IT standardisation (e.g. BSI, OGF, W3C, IETF, ISO) to ensure that our requirements are met by multiple interoperable suppliers. In particular, STFC hosts the W3C Office for the UK and Ireland in order to promote web standards in the UK, and encourage UK users and developers to become more involved in the standards definition in order to ensure that the needs of the UK are addressed.

STFC has an annual expenditure of about £500 million, and about 2500 staff based at seven locations: Head Office in Swindon, Rutherford Appleton Laboratory in Oxfordshire, Daresbury Laboratory in Cheshire, Chilbolton Observatory in Hampshire, UK Astronomy Technology Centre in Edinburgh, Joint Astronomy Centre in Hawaii, and the Isaac Newton Telescope in the Canary Islands.

STFC includes activities provided by CCLRC and PPARC before April 2007 and SERC before April 1994. STFC continues CCLRC activity at the European level in both research policy and research operations. At the policy level: Prof John Wood (CCLRC CEO) was chairman of the FP6 ESFRI responsible for producing the ESFRI Roadmap 2006, Prof Michael Wilson was a member of the FP6 IST Advisory Group (ISTAG), Prof Keith Jeffery (CCLRC Director IT) is president of European Research Consortium for Informatics and Mathematics (ERCIM) where STFC represent the UK, and Dr Neil Geddes (CCLRC Director e-Science) is one of the UK delegates to the e-IRG. At the research level, CCLRC was a member of many Esprit and IST projects from FP2 to FP6 in areas including grid security (CoreGrid, GRASP, Akogrimo, TrustCoM, GridTrust) and the international production infrastructure grid EGEE & EGEE-II as well as support actions (Question-How, Cistrana, IST-World, Beyond the Horizon, ECHOgrid, Challengers).

Key staff – Michael Wilson

Michael Wilson will be actively involved in the project to bring to bear the experience from the UK in e-science across a broad range of disciplines, the requirements and provision of scientific facilities for grid access, as well as his personal experience of creating and managing international scientific organisations including W3C where he is manager of the UK & Ireland office, and ERCIM where he is the UK delegate to the executive committee. He was co-ordinator for 5 years of the UK national research programme EPSRC Multimedia Networking Applications which was the precursor to the UK e-science programme. He was a member of the FP6 ISTAG, and has produced several policy reports for DG INFSO & Media as well as for parts of the UK government which experience will be drawn on in WP4. He is a Chartered Psychologist who is well known as a workshop facilitator, conference chairman and keynote speaker—he expects to bring those communication skills to bear in WP6.

B.2.2.9 CNRS

CNRS is the leading French research organization and the largest in Europe. It covers all scientific fields, from humanities to particle physics, chemistry, life sciences, etc. Its permanent staff comprises 12,000 full time researchers and a similar amount of technicians and engineers. Its annual budget is 2.5 G€. With such a wide spectrum of activities, CNRS is a member of almost all large pan-European research ventures and is therefore specially qualified to lead WP4.

The CNRS represents three units: the Headquarters of the Institut National de Physique Nucléaire et de Physique des Particules (IN2P3), the Laboratoire de l'Accélérateur Linéaire (UMR 8607 - being a Joint Research Unit) and the Centre de Calcul de l'IN2P3 (CCIN2P3, USR 6402).

Key staff – Guy Wormser

Doctor Guy Wormser is one of the founders of the Grid projects in Europe. Since 2000, he actively participated at the management board level of the various European grid flagships projects: DATAGRID, EGEE, EGEE-II. G. Wormser is currently director of the Laboratoire de l'Accélérateur Linéaire d'Orsay, the largest CNRS lab devoted to particle physics and cosmology. He is thus daily exposed to legal and organizational challenges similar to those EGI will have to face.

Key staff – Béatrice Merlin-Noël
Role in EGI_DS: WP4 Leader
Dedication: 50%

Béatrice Merlin-Noël is a legal expert at the National Institute for Nuclear and Particle Physics (IN2P3) of the CNRS.
Her main mission is to give legal advice on institutional and strategic contracts for the Institute. She is involved in the elaboration, instruction and negotiation of conventions. She is the official spokeswoman of the IN2P3 laboratories for questions concerning legal matters. She works in relation with the Direction of Legal Affairs and the Direction of European Affairs of the CNRS.

B.2.3 Consortium as a whole

The project participants arranged a workshop in March 2007 attended by representatives of the NGIs of 32 of the countries eligible for EU FP funding where they unanimously supported the principal of an EGI to co-ordinate a European grid infrastructure on a sustainable basis.

All countries involved would have liked to be members of the consortium but that was not practical since the effort would have been too thinly spread. The consortium has been constructed under the guidance of two principles:

1) That the stakeholder interests representing the main contrasting views should be represented within the consortium.

2) The skills required to achieve the objectives of the project are represented in the consortium.

Following the first principle, the consortium represents those motivated to operate a production grid (CERN, INFN, CNRS, GRNET, CESNET), as well as those motivated to develop middleware (INFN, CESNET), organise the training and education of new NGI and users (the UK represented by STFC) and as users from the core existing grid users (CNRS, CERN, INFN, CESNET, GRNET) and those representing a wide range of academic disciplines (CESNET, STFC). There are representatives of the network infrastructure on which the grids operate (Dante: DFN, GRNET, CESNET), and supercomputer service providers who can offer both a component and a complementary service to the grid (CSC, DFN), and of major facilities which can be linked into the infrastructure (CERN, CNRS, STFC). There are also members representing the interests of both large (DFN, STFC, INFN, CNRS) and small countries (GRNET, CESNET). Lastly, the project leadership has been put into the hands of an individual (Dieter Kranzlmüller) in a university which has a long experience of use and development of the grid infrastructure, who is known and respected by the actors, whilst also not being a player who has its own institutional position to defend (GUP). It is planned that through this selection of consortium members the main interests of the stakeholders will be advocated within the consortium itself so that results can be achieved which will require minimal modification for agreement by the NGI representatives and the member states.

The consortium members also bring complementary skills to the project following the second principle. The main effort in each work package is being contributed by the WP leaders. Each of these has been chosen to have the skills required to achieve the objective that the WP addresses. For WP1, the management of the project is undertaken by an experienced, respected, yet neutral individual (Dieter Kranzlmüller as designated Project Director) who can broker negotiations (GUP). For WP2, the requirements capture is lead by GRNET who have experience of interacting with the NGIs and other stakeholders from having lead the activity in the EGEE project devoted to such interaction. For WP3, all partners will be involved to represent the views of the various stakeholders outlined above. INFN will lead WP3 in order to ensure that the functions undertaken by the EGI address all of those which they are aware of from their long experience in the European grid activity, and their experience of functional analysis for software development. For WP4, CNRS will act as WP leaders since, as the largest scientific organisation in Europe, they have the internal skills in legal, financial and organisational issues which smaller organisations would need to outsource. The existing EGEE infrastructure is mainly operated within CERN, therefore it is

appropriate that they manage WP5 which will migrate this into the new EGI structure. To achieve the objective of ensuring awareness of stakeholder groups and a trustworthy basis for interaction with them in WP6, the Finish supercomputer centre CSC will lead the work, drawing on their long experience of interacting with the range of users, standards bodies, network providers and other interested parties. The skills and experience of the leaders of each WP are complemented by those of specific partners following the argument stated above about representation, and the skills described in the individual partner descriptions.

In this way the participants collectively constitute a consortium capable of achieving the project objectives, who are suited and committed to the tasks assigned to them. The complementarities between participants have been described in order to show how the composition of the consortium is well-balanced in relation to the objectives of the project.

i) Sub-contracting: The project does not expect to employ any subcontracts.

ii) Other countries: No funding is requested for countries outside the EU.

iii) Third parties: The CNRS also represents the Laboratoire de l'Accélérateur Linéaire (UMR 8607), which legally depends on both CNRS and the Université Paris XI (as a Joint Research Unit). Therefore the Université Paris XI may charge costs related to the expenses of Guy Wormser and other personnel participation of the LAL in WP3, WP4 and WP5.

B.2.4 Resources to be committed

Partners have already committed resources to the project beyond those usually required to create a project proposal. In particular they arranged a workshop in March for the NGI representatives of the countries eligible for FP7 funding in order to ensure that they both had input into the proposal and agreed to the approach taken. This shows the commitment of the partners to the project.

As demonstrated in the previous section, the consortium partners already attained high level of experience and skills in the areas necessary for the successful completion of the EGI_DS project. All the partners will contribute with highly skilled personnel at appropriate moments of the project, being able to mobilise the right people at the right time. While the key personnel, that will be involved all or most of the EGI_DS project existence is explicitly mentioned in the Section 2.2, the consortium partners guarantee that additional people will become available as needed. In order to involve all the NGIs, experts from NGIs will be invited to the workshops and to directly contribute to some of the planned deliverables.

For the design study itself no equipment, buildings or other capital expenditure is planned.

Over the period of the design study the costs presented in this proposal cover direct necessary personnel costs and travel and subsistence for the meetings planned during the projects as well as participation on events where EGI_DS approach and results will be presented.

Apart from these costs, some additional costs are foreseen, to be used for the following purposes[20]:

- Preparation of the dissemination and printing material, targeted to different groups (NGIs, member state representatives and funding bodies, scientific community, industry etc.). We also anticipate direct expenditure associated with the participation in booth at the major conferences.

- To make participation at the planned EGI_DS workshops easier for the NGIs, we propose to cover part of the local costs directly by the project. Specifically, we expect participants of

20

these workshops to pay travel and accommodation, but the catering and eventual expenses associated with the rent of the meeting rooms will be covered directly by the EGI_DS project.

- We plan to explicitly invite selected experts from NGIs and other partners (not members of the project consortium) at some EGI_DS project meetings and events to contribute to the preparation of deliverables and other documents. To make their participation on such events easier, we will cover the costs associated with their participation from the EGI_DS project, asking the experts to contribute their time only, not asking for additional subsistence from their home institutions.

- While the consortium members represent an ideal mix of knowledge and expertise, successful completion of the project will need also help of external consultants, especially in the legal and governance areas.

The costs presented are complete, and the partners have accepted the EC recommendation that the project be funded as a Support Action with the reduced re-imbursement to the public bodies participating compared to an R&D project. This requires them to make a greater financial contribution to the project, further showing their commitment.

During the project the member state NGIs will contribute effort and their costs in attending the five workshops planned and time to be involved in presenting their requirements and ratifying the EGI agreement once it is drafted in order to establish the EGI.

Once the EGI is established it is planned to operate in a sustainable way through contributions from the member states and other sources. At that time the contribution by the member states will be as required. The exact details of both the costs and the method of contribution will be calculated during the design study.

For the EGI service, and the EGEE projects the NGIs have contributed computing resources to the value of hundreds of millions of Euro. This long term commitment is expected to continue in order to provide the NGI infrastructures which the EGI will co-ordinate.

B3. Impact

B.3.1 Strategic impact

Realizing the EGI vision described in this document will require the broad participation and collaboration of individuals from all fields and institutions, and across the entire spectrum of research. It will require leveraging resources through multiple and diverse partnerships among academia, industry and government. An important challenge for the EGI_DS is to develop the leadership to move the vision forward in anticipation of a comprehensive European grid infrastructure that will strengthen innovation and economic growth.

While hardware performance has been growing exponentially—with gate density doubling every 18 months, storage capacity every 12 months, and network capability every 9 months—it has become clear that increasingly capable hardware is not the only requirement for computation-enabled discovery. Sophisticated software, visualization tools, middleware and scientific applications created and used by interdisciplinary teams are critical to turning flops, bytes and bits per second into scientific breakthroughs. In addition to these technical needs, the exploration of new organizational models and the creation of enabling policies, processes, and economic frameworks are also essential. The combined power of these capabilities and approaches is necessary to advance the frontiers of science and engineering, make seemingly intractable problems solvable, and pose profound new scientific questions.

The contribution of the EGI_DS project is to prepare a roadmap for the process to leverage existing grid infrastructures into a new quality level. The existing national grid infrastructures have been mostly developed under the project-based funding, with different implementation rates and very differing formal setups. The same applies to the largest international grid, currently supported under the EGEE-II project with the prospect of another short term project funding. The currently fragmented "grid landscape" needs a consolidation and a novel framework both for its better organization and coordination and also for its funding, to guarantee a sustainable existence while staying open to further development. The EGI_DS project will contribute through analysis of the requirements of such an infrastructure both in technical and legal (organizational) properties and through the preparation of a blueprint of the EGI institution. The EGI_DS project will also contribute through the ratification of such a blueprint by the expected constituencies—the NGIs. And the end of the EGI_DS project, a transition of the responsibility for the sustainable grid infrastructure from the a possible follow-up project of EGEE-II to the EGI institution will be initiated.

The contribution of the resulting grid infrastructure to technological development capacity and to the scientific performance and attractiveness of the European Research Area is through availability of e-science. We understand e-science as one of the three legs of scientific discovery along with experimentation and theory, with e-science allowing theories to be refined down to models testable through experimentation. e-science relies upon an infrastructure that provides computational power, data storage, communication and human interaction (usually visualisation), simplifying human collaboration without regard to physical distances. The grid provides a managed infrastructure which enables access to superior computing, storage and other capacities even without demand on large capital investments localized to the users. This way, large resources like supercomputers can be efficiently shared while smaller communities could still contribute (with their clusters or even pools of PCs), helping create a true scientific community.

The (computing) grid also allows access to users who require extremely large resources for short periods, no matter what their financing. The larger the set of resources available through a grid the faster and more accurate solution can be found to a problem.

There are four main areas in which the large capacity, managed computational and storage resources of a European grid infrastructure will have a significant impact. The expected impact in each of these four areas is summarised here:

1) Fundamental science

There are some questions to which all civilised people want to know the answers—what is the origin of the universe, what are we made of, what is the origin of life, how does the genetic control of life operate, how does the brain operate, what is consciousness, what am I? These questions require theory, modelling of the theory and eventually carefully crafted experiments to test the theory. The modelling of these theories as they become more detailed is one of the day to day uses of grid computing technologies. Society decides how much it wishes to invest in finding the answers to these fundamental questions. National and international peer review systems decide which scientists should be funded to further their ideas. These theories are not likely to result in immediate or medium term economic benefits. But, the search for the answers to them is an intrinsic part of the values of Western liberal democracies, and there is political value in showing that our society is investing in them in order to show the value we place in our Western liberal democratic freedoms when our values are in conflict with those of religious fundamentalism, and other dogmas. The larger the computational resource available, then the greater the resolution of these models, the shorter the turn-around in refining these models, and the greater the accuracy of the results. The EGI is an essential step in ensuring that Europe continues to have a cutting edge role in modelling, and therefore being part of, fundamental scientific advance.

2) Engineering technologies for economic growth

The second day to day use of large computation resources lies in complex scientific modelling for engineering purposes: the stage between theory and experimentation, or the point between theory and crisis. For meteorological studies, geosciences, biosciences, fundamental chemistry, and economics, theories lead to computational models which need to be resolved at the best available resolution in order to create the technological products which drive forward the European economy. The earth's atmosphere, the earth's magma, the structure of molecules, or the capitalist economy can all be modelled at ever increasing resolution, resulting in increasing accuracy of predictions about how they will perform in the future. The result is an essential step in the development of new technologies which will be the basis of the knowledge driven economy of the twenty first century for a Europe competing with the lower labour, social and environmental costs of Asia (e.g. China and India), Latin America (e.g. Brazil), and Russia.

In 1991 there was one web server in the world, at CERN providing the telephone directory for the OPAL project. By 1998 Alan Greenspan as governor of the US central reserve stated that the World Wide Web had contributed 3% to the US GDP in that year. Since then the contribution of the Web to the European economy has been so complex it is hard to quantify.

The large scale scientific grid offers the next step towards economic growth, and it cannot grow beyond the boundaries of single European countries without the sustainable pan-European infrastructure offered by the EGI.

3) Maximising the return on large European capital investment in facilities

After theory and modelling in the scientific triad comes experimentation. Experimentation at the cutting edge; at the rarefied and unique limit is undertaken at the edge of science; at the edge of what can be done; that is, in large scientific facilities whose capital cost pushes the limits of national and international economies. Europe hosts several major international facilities which are key to their own disciplines, and the data from which can be used across disciplines through a common grid infrastructure accessible across Europe through the EGI: CERN, EFDA, EMBL, ESA, ESO, ESRF, ILL. These EIROforum institutions are the large international European facilities. National facilities are hosted in many countries at a scale below these but which also provide essential data to answer the fundamental questions raised by scientific and engineering models. These facilities constitute a massive investment in a future for Europe driven by scientific and technological innovation. It is essential that researchers throughout the universities and technological companies of Europe can have access to these facilities and the results they produce in order to ensure the quality of life, and economic advances that Europe needs to progress through the twenty first century. The pan-European grid provided by the EGI is the backbone of the communication, data transfer and analysis that joins together these massive investments and allows the intellectual power of Europe to benefit from their results.

4) Crisis and emergency analysis

It is a cliché of retirement parties for computer luminaries to talk about the days when the single resources at Colossus, Whirlwind, GCHQ in the UK, or the NSA in the USA were each equal to the rest of the world's available computing resources. Today, there are enormous managed resources which can be brought to bear on strategic emergencies under the control of HP and Google, but they are still small compared to the potentially co-ordinatable resources of European researchers. In times of crisis it is necessary to have a very large, managed, computational resource which can be brought to address specific modelling problems under strategic control. There are openly identified potential catastrophes which will, and do, require immediate computational solutions. These include geophysical incidents such as earthquakes and floods, biochemical incidents including global viral pandemics such as SARS and bird flu as well as military and financial incidents of strategic importance. In these cases it is essential for European governments to be able to turn to an easily managed resource to provide massive computational modelling in order to predict and potentially resolve the problem. Like networks, the grid infrastructure is failure resistant, being able to deliver results even if substantial parts of it became inaccessible during the actual

incident The EGI will provide the pan-European co-ordination of computational resources which could be available in these strategic emergencies.

Breadth of research disciplines addressed

It is true that the impetus for the European grid developments originated from the needs of CERN for an infrastructure to analyse the results of the LHC when it starts producing data in 2007/8. It is a myth that the European grid only serves particle physicists. Today, there is an average of 10,000 application executions[21] of a non-particle physics nature on the EGEE infrastructure alone. In most universities about 10% of research teams want to use some form of high performance computing. These teams cover the Arts & Humanities, Social Sciences, Engineering, Biosciences, Medicine, and conventional sciences of physics and chemistry. And much larger fraction of scientists needs support for sharing their data and computations with their remote peers.

Among the potential EGI users are all of those who take a scientific approach to their discipline including:

- archaeologists who need to analyse data from a broad range of instruments and computationally model their theories to tell the story of our past;
- economists who wish to model the economy, employment, markets and many aspects of the business world in order to guide investment decisions;
- particle physicists who search collision data for the event the shows the existence of a predicted particle in order to explain our existence;
- meteorologists who model water and air convection to predict the weather;
- geoscientists who model the convection currents in magma and its effect on tectonic movements in order to predict earthquakes and volcanic eruptions;
- astrophysicists who model the origins of galaxies, solar systems and planets in order to explain how the world came about;
- ab-initio chemists who model the interaction of molecules at the quantum level in order to develop new technologies to drive the economy;
- material scientists who model the structure of materials from spallatial data in order to develop new materials to drive the economy;
- bioscientists who model the structure, folding and interaction of molecules from synchrotron data in order to identify new drugs;
- geneticists who deconstruct genetic sequences against massive databases in order to identify new drugs;
- medical epidemiologists who model the transmission of disease among human populations in order to prevent the spread of disease and identify new treatments.

Virtual Organizations for Distributed Communities

With access to state-of-the-art grid services, many researchers and indeed entire fields of science and engineering now share access to world-class resources spanning experimental facilities and field equipment, distributed instrumentation, sensor networks and arrays, mobile research platforms, HPC systems, data collections, sophisticated analysis and visualization facilities, and advanced simulation tools. The convergence of information, grid, and networking technologies with contemporary communications now enables science and engineering communities to pursue their research and learning goals in real-time and without regard to geography. In fact, the creation of end-to-end grid systems—comprehensive networked resources—by groups of individuals with common interests is permitting the establishment of Virtual Organizations (VOs) that are revolutionizing the conduct of science and engineering research and education. A VO is created by a group of individuals whose members and resources may be dispersed geographically and/or temporally, yet who function as a coherent unit through the use of end-to-end grid systems. These

[21] As reported in the EGEE-II project deliverable: DSA1.4 Assessment of production service status, https://edms.cern.ch/document/726140

grid systems provide shared access to centralized or distributed resources and services, often in real-time. Such virtual organizations supporting distributed communities go by numerous names: collaboratory, co-laboratory, grid community, science gateway, science portal, and others.

VOs built upon grids, enable science and engineering communities to pursue their research goals with dramatically relaxed constraints of time and distance. As such environments become more and more functionally complete they offer new organisations for discovery and bold new opportunities for broadened participation in science and engineering. Creating and sustaining effective virtual organisations, especially those spanning many traditional organisations, is a complex technical and social challenge. It requires an open technological framework consisting of, for example, applications, tools, middleware, remote access to experimental facilities, instruments and sensors, as well as monitoring and post-analysis capabilities.

An operational framework from laboratory level to international scale is required, as well as a need for partnerships between the various grid stakeholders. Overall effectiveness also depends upon the appropriate social, governance, legal, economic and incentive structures. Formative and longitudinal evaluation is also necessary both to inform iterative design as well as to develop understanding of the impact of virtual organizations on enhancing the effectiveness of discovery.

The expected impact of the EGI

Desktop PC's can solve some computational problems in the time required by their users; local clusters can solve larger problems; national or organisational supercomputers solve even larger problems in a timescale set by their users; but for the largest problems, and the most urgent problems a larger managed resource is required. The EGI provides a pan-European computational resource which can provide the day to day computing and storage resources while also able to address the largest, most immediate, and potentially most important problems.

First-class science is now of an international nature and individual European member states must provide means for the researchers to collaborate if Europe is to maintain its world-leading position. National e-Infrastructure programs contribute to this vision but are developing at different rates across Europe while the research communities they support are already of an international dimension. Pan-European e-Infrastructures are essential to ensure that the potential of European research is not restricted to the most wealthy member states and that the full potential of Europe's researchers, independent of geographical location, can be effectively engaged.

An e-Infrastructure spanning the European Research Area will be a competitive advantage for Europe enabling first-class research resulting in increased employment and wealth creation.

Under the EGEE and related projects, Europe has effectively defined a rich e-Infrastructure ecosystem which supports a dynamic and growing diversity of research communities. The models created and deployed by these projects demonstrate the added-value of the European dimension that is acknowledged on a global scale.

EGEE has developed under the funding of a series of project grants to cover development and operation. The dimensions of EGEE's production infrastructure has exploded during 2006 with a doubling of the compute resources available (now totalling more than 30,000 CPUs and 7 Petabytes of storage), a three-fold increase in the number of application executions (more than 19 million) and a rapid increase in the number and diversity of user communities supported (some 10,000 researchers collaborating in nearly 200 Virtual organisations). Growth of this rate is not sustainable given the current framework and a long term resource cannot be managed under these conditions. It requires a long term commitment to cover investment costs and to motivate staff. The EGI will provide that investment. Under the EGI the achievements of EGEE so far will be able to continue, and be repeated in a broader range of disciplines, and with greater capacity given the every decreasing cost of computing power, storage and network communications.

The EGI will co-ordinate the national grid initiatives (NGI) of member states into a single managed resource. The member states will provide the sustainable basic funding for the EGI in order to be able to provide the resource required for both their day to day, exceptional and also crisis needs.

Working together while competing

Many of the scientific and research communities, which are the current primary users of this infra-structure, already operate on a global scale. For this reason it is imperative that e-Infrastructures in Europe inter-operate among themselves and with the rest of the world.

The USA and Japan have both well established e-infrastructures, or cyber-infrastructures, for which their nations are committed to sustaining support. Europe is both in competition with them to achieve the scientific breakthroughs, and resulting economic benefits, and needs to work together with them.

In the USA the 2007 NSF CyberInfrastructure report states:

> With the increasing globalization of science and engineering and its attendant cyber-infrastructure, NSF supports international efforts of strategic interest. NSF will endeavour to: (i) facilitate U.S. researchers' collaboration with international partners through cyber-infrastructure; (ii) identify exemplars of international collaboration and partnerships, utilizing cyberinfrastructure, that offer efficient and beneficial relationships and build on these; and (iii) encourage international collaboration in the development of cyberinfrastructure.

The EGI will provide the focus for international collaborations such as those offered by the NSF in the USA, while also providing the focus for Europe to compete with our international competitors. The EGI_DS will create conditions to achieve the EGI constitution in a way that will best suit the European needs.

Maximising the impact of the EGI

Following the recommendations of the e-Infrastructure Reflection Group (e-IRG) Task Force on Sustainable e-Infrastructures (SeI) to maximise the impact of the EGI over the longer term it is planned to:

- To strengthen the integration of industrial efforts and SMEs into sustainable infrastructures in this context, industry has to be seen as both a potential user and a major partner for service provision. Clear policies have to be established for access from industrial research projects in pre-competitive domains, industrial production projects accessing innovative technologies or deploying innovative strategies and industrial production projects with occasional exceptional requirements (critical computing on demand).

- Infrastructures need to remain state of the art; therefore new technologies should be evaluated and introduced continuously. In order to make investments in R&D more efficient, the take up of new technology in production infrastructures should be improved by appointing e- Infrastructure providers as stakeholders in relevant R&D efforts.

- To accelerate and expand the adoption of e-Infrastructures attention must be paid to their ease of use. Investing in improving the usability (e.g. by hiding complexity and increasing interoperability) will broaden their user base, adding significant value to the science community and increasing European competitiveness.

- The new opportunities presented by distributed infrastructures requires increased training and an improved skills base for the research community, which also needs to form part of any national or European strategy for e-Infrastructure. This will require further advisory and guidance services that collaborate across Europe.

These recommendations will be used within WP2 and WP3 as a checklist to the use cases, functional recommendation, work distribution among NGIs and EGI and other resulting recommendations from the EGI_DS work.

B.3.2 Spreading excellence, exploiting results, disseminating knowledge

Outreach and dissemination towards public at large, decision makers and funding bodies is one of the key issues in ensuring a successful EGI. The following activities are planned targeting these stakeholders:

- Increase the visibility of grid computing for national decision makers and funding bodies
- Provide EGI material, such as success stories, for supporting decision making
- Actively inform EU, European policy groups and other related organizations about EGI progress
- Expand the synergy in IT services between the different user communities and research infrastructures (for example existing user communities and potential new users linked with research infrastructures listed in ESFRI roadmap)
- Collaborate and interoperate with existing European grid projects
- Interact with European industry interested in grid deployment and usage

Work package 6 (EGI promotion and links with other Initiatives) in the EGI proposal is dedicated in spreading the excellence achieved in EGI work. Results will be disseminated and exploited through EGI workshops organized during the project, and through a number of events, such as industrial workshops and EGI presence in international conferences.

Dissemination for the public at large will be supported in WP6 through Web pages, communication material and press releases.

B4. Ethical Issues

Within the proposal and the design study to be undertaken no ethical issues arise.

All activities of the EGI will respect fundamental ethical principles, including those reflected in the Charter of Fundamental Rights of the European Union. These principles include the need to ensure the freedom of research and the need to protect the physical and moral integrity of individuals and the welfare of animals.

The following issues have been considered in detail before making this assertion:

Informed consent & Data protection issues: Data to be used in the EGI once it is established may include that collected in medical studies and other personal data, although no data is expected to be transferred within the design project itself. The project will ensure that users of the EGI when established conform to the appropriate mechanisms to ensure that data used for research purposes is sanitised and anonymous so that it cannot be traced back to individuals.

Racial or religious bias: There are no issues of exclusion of groups or nations within the project on the racial or religious grounds. Within the project countries will be included in the decision making role if they are eligible for EU framework funding. After the project the EGI itself will decide the limits on admission of countries to use its facilities. The design study project will ensure that the mechanism to make this decision conforms to ethical standards.

ETHICAL ISSUES TABLE

	YES	PAGE
Informed Consent		
• Does the proposal involve children?		
• Does the proposal involve patients or persons not able to give consent?		
• Does the proposal involve adult healthy volunteers?		
• Does the proposal involve Human Genetic Material?		
• Does the proposal involve Human biological samples?		
• Does the proposal involve Human data collection?		
Research on Human embryo/foetus		
• Does the proposal involve Human Embryos?		
• Does the proposal involve Human Foetal Tissue / Cells?		
• Does the proposal involve Human Embryonic Stem Cells?		
Privacy		
• Does the proposal involve processing of genetic information or personal data (eg. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)		
• Does the proposal involve tracking the location or observation of people?		
Research on Animals		
• Does the proposal involve research on animals?		
• Are those animals transgenic small laboratory animals?		
• Are those animals transgenic farm animals?		
• Are those animals cloning farm animals?		
• Are those animals non-human primates?		
Research Involving Developing Countries		
• Use of local resources (genetic, animal, plant etc)		
• Benefit to local community (capacity building ie access to healthcare, education etc)		
Dual Use		
• Research having potential military / terrorist application		
I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	X	