

# EGI.eu

## The European Grid Initiative

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**Abstract.** The European Grid Initiative (EGI.eu) is putting in place an organization that will enable the sustainable provision of grid services to the European scientific community. EGI.eu will work in the definition, the policies and procedures necessary to deliver an integrated set of grid services to the European Research Area to support researchers in their daily work. National Grid Initiatives and European Intergovernmental Research Organizations are the stakeholders of EGI.eu, which will work together in this newly created framework to achieve this ambitious objective.

## 1 Introduction

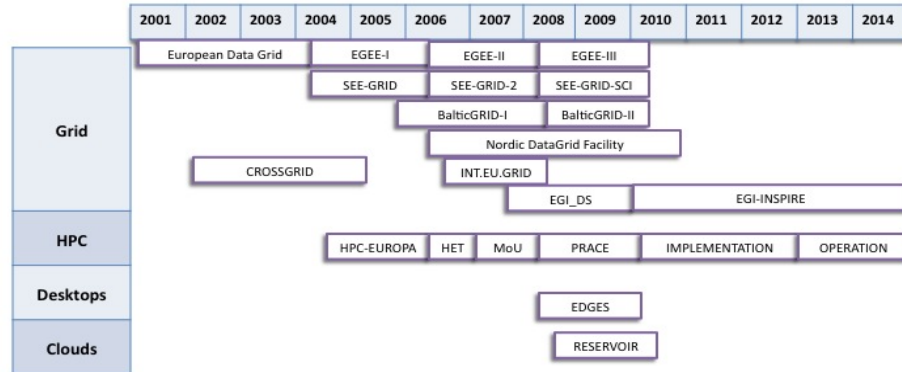
Building and running a pan-European distributed computing infrastructure requires considerable technical, managerial and administrative expertise. It should bring together the experience from resource providers, user communities and technology developers. The coordination effort needed to build such infrastructure will be undertaken by a new dedicated organization, EGI.eu[1].

At the core of EGI is the establishment of sustainable e-Infrastructures, either within individual countries sustained by national funding to support national research communities and coordinated by NGIs, or within international research communities sustained by legally binding collaborations and coordinated by EIRO or ESFRI[2] projects. Individually, each organisation is able to support its own operations and deliver resources and support to its own research communities.

However these organisational resources frequently need to be made available to external collaborators in a secure, controlled, manner as remote resources. The coordination activity of EGI will encompass the operation of the core services needed to provide an integrated European infrastructure and the interface into the national services provided by the National Grid Initiatives. EGI.eu will also coordinate the activities of user support working with national, generic and domain specific support teams. The specification, integration and deployment of middleware from external software providers to provide an integrated secure infrastructure to support the user communities will also be under the responsibility of this recently created legal entity.

The required expertise to setup EGI.eu has been developed in the European Research Area through a succession of FP5, 6 and 7 projects some of which are

shown in Figure 1 for the major pan-European production quality compute infrastructures. It can be seen that bringing new distributed computing technologies to a mature production status can take many years.



**Fig. 1.** Roadmap of FP5,6 and 7 projects deploying e-Infrastructure in Europe

At the Ibergrid level there is already a long history of collaboration from the early days of the DATAGRID project, CROSSGRID, the series of EGEE projects, Interactive European Grid, EELA, etc... This common work has cristalized in a widely acknowledged expertise in the deployment of testbeds, production Grid infrastructures which has generated important synergies concerning middleware validation and rollout, operational follow-up of the infrastructure and user support.

In the EGI era the Spanish and Portuguese NGIs will operate together, integrating the operational tools needed to have the NGIs running in common portals. NGIs monitoring, accounting and activities oriented to user induction will be co-ordinated at the Ibergrid level. They will also cooperate to perform tasks on behalf of EGI for the benefit of the rest of the NGIs, as described below.

In the following sections we will describe the developments that have been taking place over the last year leading to the formal establishment of the EGI.eu foundation. We will also describe the current and future activities of EGI.eu in the framework of the EGI-InSPIRE project.

## 2 Collaborative Research in Europe via EGI

The EGI framework of services, policies and operational structures explicitly supports resource sharing. Furthermore, the added value of EGI.eu with respect to other distributed e-infrastructures is the proximity to the researchers through the local NGIs, in particular:

- The NGIs and other resource owners can share resources in development, operational support and load balancing. All of these have already been demonstrated through the EGEE projects.

- Researchers and research collaborations across Europe can share multiple distributed resources allocated to them to create critical mass to tackle new problems.
- Researchers from different domains can share expertise, services and tools; an area anticipated to grow as more communities build upon the basic EGI services and interfaces, and as the community experience grows.

EGI provides a mechanism whereby local institutional or even departmental resources can be fully integrated into a pan-European infrastructure. This integration will support straightforward migration of work from local to national or international resources as required (and as authorised) and will provide a standard set of interfaces and services whereby local systems can be shared across institutions to optimise use and return on investment.

It is the mechanisms and interfaces for resource provision and project support, rather than the underlying resources, which form the basis of this collaborative environment. The methodology to achieve this collaborative environment implies enabling the development and promoting the exploitation of an increasingly sophisticated generic toolset built on top of these services.

At all times, ultimate control of resources rests with the individual resource owners - this will rarely be EGI. EGI provides the ready made, deployed and tested mechanisms to support resource sharing as required by resource owners in supporting their user communities.

### 3 Establishing EGI.eu

The actual organizational model for a sustainable European Grid infrastructure has been developed from the EGI Design Study project through its primary outputs the EGI Blueprint document and EGI functions definition document[3]. The proposed structure was endorsed by the EGI Policy Board, consisting of representatives from the National Grid Initiatives (NGIs) within Europe, as a sustainable model of future e-Infrastructure operation in Europe.

The main players in EGI.eu are National Grid Initiaves (NGI) and European Intergovernmental Research Organisations (EIROs). The statutes define the maximum participation of entities in EGI that are not NGIs as 25%. Therefore the majority of the stakeholders in EGI.eu are NGIs.

An NGI is a legal entity with a public service mission aiming at integrating resources on a national level for efficient provision of grid-based services to the research community. In particular a National Grid Initiative should fulfill the following criteria

- have a mandate to represent its national Grid community in all matters falling within the scope of EGI.eu;
- be the only organization having the mandate described in (a) for its country and thus provide a single contact point at the national level.
- be able to commit to EGI.eu financially i.e. to pay EGI.eu contribution.
- be able to nominate a representative duly authorised to deliberate, negotiate and decide on all matters falling within the mandate of the Council.

- have a sustainable structure or be represented by a legal structure which has a sustainable structure in order to commit to EGI.eu in the long term.

An NGI is eligible to become a part of EGI.eu if it comes from a Member State of the European Union (EU) or from an Associated Country to the EU. An Associated Country is a country, in which legal entities are eligible for EU framework programme funding on the same footing as legal entities from the Member States. As of today a number of 37 European Countries and 2 EIROs (CERN and EMBL) are participating in EGI.eu.

The governing body of EGI.eu is the Council, which has representatives from all of its participants and is responsible for providing the long-term direction of the organization. The Council chooses an additional body for a period of 2 years, the Executive Board, which is meant to provide frequent guidance to the Director<sup>1</sup>, who leads the organization on a day-to-day basis. The members of the Executive Board are also the formal patrons of the foundation<sup>2</sup>

EGI.eu is funded via fees paid by the Participants and Associated Participants, European and governmental subsidies and other contributions and donations. Other schemes of financing such as the incorporation of service charges are currently under consideration to promote long-term sustainability.

The EGI Council has been working since it was first summit, in July 2009, creating an organization based on the conclusions of the EGI Blueprint document, which have been thoroughly discussed and improved in the course of last year.

The outcome has been the foundation of EGI.eu, the legal entity representing the Grid infrastructure in Europe. It has adopted the legal form a foundation under Dutch law as a preliminary status with a clear will from all the participants of becoming an European Research Infrastructure Consortium[4] (ERIC) in the near future.

EGI.eu has made firm steps in the beginning of 2010 towards. The foundation has statutes [5] which are currently submitted for signature to the participant countries and EIROs. The legal entity was established with the notary on 8 February 2010. It is registered with the Chamber of Commerce (KvK) of Amsterdam under number 34380182 [6]

## 4 Sustainability of the European Grid

The main objective of EGI.eu is to set up an organisation that will enable the sustainable provision of grid services to the European scientific community. Sustainability of the EGI initiative rests on the sustainability of the National Grid Initiatives.

The maturity of NGIs varies widely across Europe, however, over 35 NGIs and EIROs have already committed to paying the annual EGI membership fees as specified in the EGI.eu statutes. This already separates the sustainability of

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<sup>1</sup> The appointed Director of EGI.eu is Steven Newhouse

<sup>2</sup> The current Executive Board members are: Per Oster (also Chair of the EGI Council), Neil Geddes (UK), Isabel Campos (Spain), Michal Turala (Poland), Dieter Kranzmueller (Germany), Arjen van Rijn (Netherlands) and Sverker Holmgrem (Sweden)

the EGI from specific projects. The NGIs themselves exist independently of any specific research field or project. They will continue to be supported while they provide useful services and add value to a range of current and possible future users.

Many NGIs and their funding bodies already support long-term National investments in international projects, such as ESA, EBI, the LHC, etc. At this stage in their development, the lack of NGI uniformity and maturity across Europe is one reason why European funding is essential. Commission funding can support the inter-NGI coordination and co-working which could not yet be supported by the NGIs themselves and can explicitly address policies and developments at a pan-European level rather than focusing only on National or bi-lateral priorities, thereby involving researchers from all parts of Europe.

The resources sharing framework supported by EGI will allow efficient and cost-effective use of resources in support of a wide range of endeavours. This will reduce the work required of each individual NGI, research collaboration or resource owner. The net effect will be a significant efficiency gain across all of these stakeholders,. However, the initial investment required is large compared with the immediate return to any single stakeholder and must be enabled through EC funding at this stage.

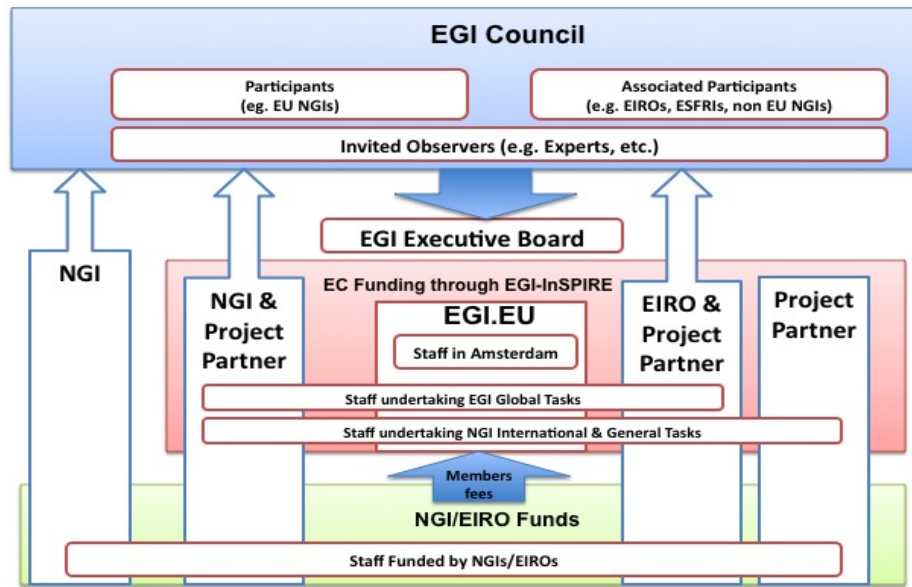
EGI-InSPIRE will undertake the migration of the European Grid e-infrastructure and its services into a new sustainable governance model and plan for the future sustainability of the whole EGI construct. The NGIs are already supporting over 90% of the total costs implied by EGI-InSPIRE. Looking ahead, EGI will evaluate multiple sources of funding including new business models where services are to be offered for a fee or alternative direct contributions. Possible sources of commercial funding are already being investigated by collaborating NGIs.

## 5 EGI-InSPIRE

The FP7 project "*EGI: Integrated Sustainable Pan-European Infrastructure for Researchers in Europe*" acronym EGI-InSPIRE, will contribute to financing the setup of EGI.eu over the next four years in what concerning the provision of grid services to the European scientific community.

It is important to distinguish the portioning of responsibilities between EGI-InSPIRE and EGI.eu, derived from the fact that EGI.eu is the coordinating partner in the EGI-InSPIRE project. As such, matters relating to the organisation and management of EGI.eu and its local staff and those directly affiliated to it through the undertaking of EGI Global Tasks are dealt with internally by EGI.eu.

In addition, EGI.eu provides the structures for the technical management of the infrastructure with active participation and representation from the NGIs. This includes the policy governing its access and operation, and defining the quality of service expected from the various functions within the infrastructure. As EGI.eu grows as an organisation, it will become involved in projects other than EGI-InSPIRE and therefore needs to recognise the difference between internal organisational activities and the managerial actions that take place within a specific project.



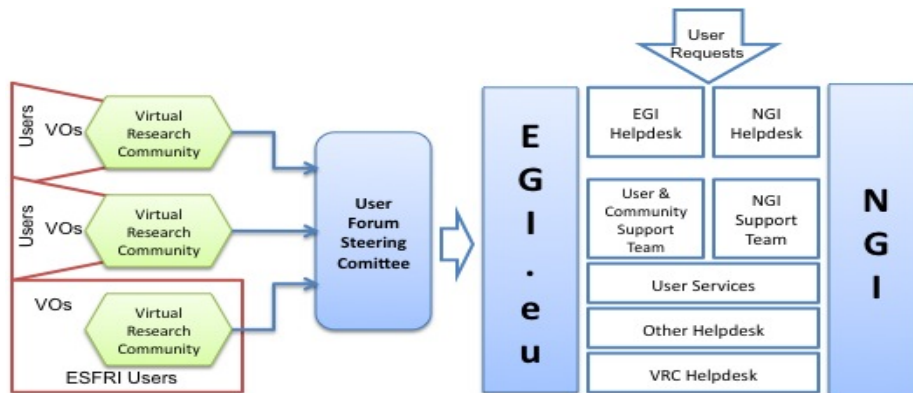
**Fig. 2.** Relationship between the different EGI players and sources of funding

The role of the EGI-InSPIRE is primarily to support activity within EGI.eu as it transitions to a sustainable model, to support the activities of the NGIs as they conduct their NGI International Tasks in order to interface their national infrastructures into the European infrastructure, and to support the Heavy User Communities as they transition activity into their own communities or the generic infrastructure. These activities span staff and activities outside of EGI.eu and are managed through the EGI-InSPIRE collaboration.

The main focus of EGI-InSPIRE is therefore to consolidate national, regional, and international initiatives into an integrated European production e-Infrastructure coordinated by EGI.eu, which in turn is sustained by its stakeholders.

This infrastructure will be initially composed of resources (contributed by the NGIs and EIROs for access by the research partners in their communities) where the organisation and the resources are sustained by their own funding. Therefore the sustainability of NGIs is critical to the sustainability of EGI as they are the providers of the vast majority of the resources within the infrastructure. In addition, the support given by the EGI-InSPIRE project to an NGI provides the extra effort needed by an NGI to support the integration of its resources within a pan-European infrastructure. This enables the NGI to integrate and deploy resources which will serve to support users from international collaborations.

The provision of the operations staff necessary to support its own national activities and the physical hardware resources they manage, are all funded by national funds. Through this infrastructure EGI-InSPIRE will serve an extended and increasing user base comprising user communities, ranging from large organised international user communities to small ad-hoc user groups and to individuals.



**Fig. 3.** Interaction between User Communities and EGI.eu

The project EGI-InSPIRE, which will start 1st of May 2010 and extend for four years, will cover the initial steps of EGI.eu. It is organized in a traditional schema covering networking activities, services activities, plus a comparatively small Research & Development activity focussed on the regionalization of Grid services which will take place at the beginning of the project (second half of 2010 - first half of 2011).

Most probably one of the key networking activity is user support since usage of the infrastructure and the consequent scientific output will be a measure of the success of EGI in supporting scientific projects.

User Support within EGI is coordinated by the User & Community Support Team in EGI.eu in Amsterdam. The user communities are effectively EGIs customers. Users within a Virtual Research Community (VRCs) will be a member of one or more Virtual Organisations (VOs) established within that community. The VRC is a sustainable grouping within a community that allows it to organise itself to provide training, dissemination, support, application porting support and representation to enable access to distributed computing infrastructures. Examples of sustainable VRCs are the emerging ESFRI projects[2] and the Worldwide LHC Computing Grid (WLCG) collaboration[7]. All VRCs are represented within the User Forum Steering Committee (UFSC) which provides a forum for strategic interaction between the users and EGI.eu

The interaction between user communities and EGI.eu can be seen in figure 3

User feedback and requirements on the middleware stack will be handled at the level of the UFSC and transmitted to the Technical bodies of EGI.eu.

The EGI Helpdesk will be used as interaction point between the users and the support staff from EGI.eu. Specialized teams in the NGIs will team-up in order to provide an adequate escalation mechanism to answer user queries. The interaction of the user support staff with the operations support teams will also be handled using the Helpdesk.

## 5.1 Provisioning the Software for EGI

The EGI-InSPIRE framework also contemplates the establishment of collaborative links with other technology projects to foster the integration of their work into the EGI production infrastructure for the benefit of the user communities. An important part of this activity concerns the provision of software services for the EGI Infrastructure.

In the current picture it is foreseen that external software providers will release products potentially covering technology related to Grid, cloud, tools and application support that in principle could be suitable for use in the EGI infrastructure. To manage the software adoption process EGI introduces the concept of the Unified Middleware Distribution (UMD). The UMD will define a set of functional specifications, and performance and quality requirements that the software registered in the EGI software repository must fulfill.

A set of integrated components taken from those in the EGI repository will be released as an integrated distribution for installation. A UMD Roadmap will be designed to indicate when the contributed components will be included in UMD Releases. The roadmap will provide important information for both operations & users about upcoming new functionality and the phasing out of existing ones, as well as for software providers to know about requirements for new functionality.

To source these components it will be necessary to establish a formal relationships with the providers of the key software components within the UMD Release. The relationship, defined in a Service Level Description (SLD), will include the agreed release schedule and expected support and maintenance of the software components. During the project this SLD model is expected to evolve towards a sustainability model which may include agreements negotiated with commercial software providers, as well as open source contributions etc Figure 4 shows the workflow of the middleware verification and validation activity in EGI.

The Ibergrid NGIs have the responsibility of coordinating the testing, verification and roll-out of the UMD distribution (see presentation of Mario David in these proceedings).

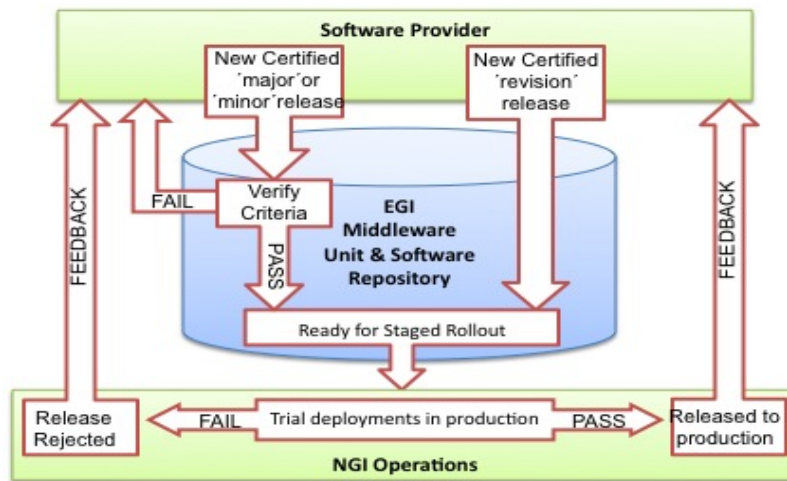
## 5.2 Operating the Infrastructure

The operation of the EGI infrastructure implies the coordination of the European-wide production grid infrastructure federated from national grid initiatives that is integrated and interoperates with other grids worldwide. It is built upon the inherited experience of the series of EGEE projects and has been structured into a number of mutually dependent tasks (see Figure 5).

The activities of the operations teams in EGI include the establishment of monitoring services to manage the production the production infrastructure. An accounting database and portal where the usage of the infrastructure can be recorded is also foreseen.

The coordination of the European infrastructure needs a security layer integrated by the NGI security representatives. This team will maintain a secure infrastructure through the establishment of the necessary operational security teams





**Fig. 4.** Software release cycle in EGI.eu

which will have a representative form each NGI. The validation of new software releases of the middleware and operational tools through a coordinated staged roll-out to sites is also among the operational tasks which need to be

The EGI Helpdesk infrastructure, integrated with national instances, to coordinate the activity between the different support teams will also be provided. It is also necessary to establish the necessary support teams within the infrastructure that once integrated with the EGI Helpdesk will respond to user and site support issues

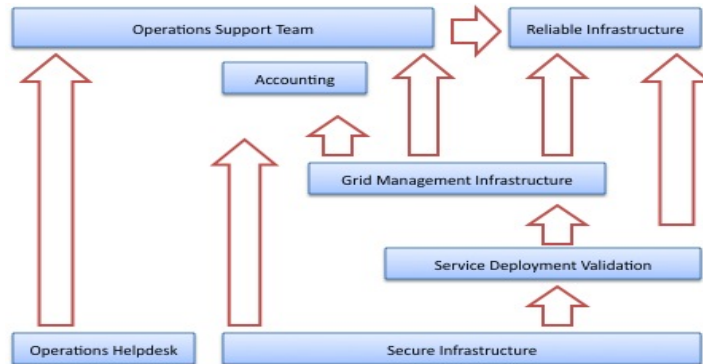
Finally, the provision of a reliable and consistent production grid infrastructure needs to rest on the establishment and monitoring of Service Level Agreements between EGI.eu and the NGIs.

### 5.3 Services for Heavy User Communities

One of the goals of EGI-InSPIRE is to deploy services for user communities that are heavy users of Distributed Computing Infrastructures (DCIs) and have a multi-national dimension.

This activity has three main goals:

- To transition the services and tools from the communities that have already adopted DCIs, to where their services are part of the general service infrastructure provided through EGI or are sustained by other means either through their own community or through external software providers.
- To use the experiences obtained by these early adopting communities in integrating new data sources, tools and services to improve the experience for all user communities.
- To ensure that all the user communities supported by EGI should experience no disruption as they move from their current e-infrastructure provider. This



**Fig. 5.** Task related to operations of the EGI infrastructure

is especially critical for communities such as those that are already actively exploiting the infrastructure.

The communities that have been identified through their current usage of the infrastructures as Heavy Users Communities (HUCs) are:

- High Energy Physics (HEP)
- Life Sciences (LS)
- Astronomy and Astrophysics (A&A)
- Computational Chemistry and Materials Sciences and Technologies (CCMST)
- Earth Sciences (ES)
- Fusion (F)

The continual feedback from these communities on the infrastructure deployed in the projects EGEE, DEGREE, EUFORIA, etc... (the effectiveness of the services, and their functionality, stress tests, operational procedures, etc.) needs to be captured within EGI in order to develop a quality service for all user communities.

The tools and services selected for support are clearly essential to the communities that are already using them, but the supported activities also show significant potential for uptake by other communities as they can all accelerate a community's adoption and effectiveness when using DCIs. The supported activities include job management, workflow tools, MPI support, Dashboards, High throughput data access and visualization tools.

The involvement of the Ibergrid community in this activity in EGI-InSPIRE concerns the coordination of the Fusion activities (mainly from the CIEMAT group), the participation in the Life Sciences support (Univ. Polytechnic of Valencia) and the support to MPI (IFCA-CSIC).

## 6 Future and perspectives

Distributed Computing Infrastructures have become a vital Research Infrastructure that underpins collaborative research activities within Europe and beyond.

The integration of secure controlled access to distributed storage and computing resources, through middleware and high-performance research networks like GEANT, will enable researchers to deal with the data deluge coming from today's research instruments (e.g. LHC, telescopes, computer simulations and micro- array analysis).

Europe has, over the last decade, led the world in developing production-quality research infrastructures to underpin the European Research Area. Having successfully integrated different resources within an infrastructure, a growing issue is the integration of infrastructures to provide a single, seamless pool of resources to the European Research Area.

The next decade will see the establishment of high-volume data-driven science as a routine research methodology through the commissioning of the ESFRI projects, the LHC and other similar international research facilities within the European Research Area. With this adoption of data-driven science there is an urgent need to make the research infrastructures supporting these projects sustainable (as many of the research projects they support will last for years, if not decades) and to support the different computing models and technologies needed by their respective research communities.

EGI.eu is ideally placed to expand and consolidate its proven operational framework to encompass new technologies, such as cloud computing and new users communities. However the fundamental upcoming challenge for EGI.eu is to deliver a production infrastructure that benefits the European Research Area.

## 7 Acknowledgments

The author wishes to thank the Ministry for Science and Innovation in Spain for its support to the activities related to the participation of the Spanish NGI in EGI.eu under the project International Action ACI2009-1002.

## References

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2. Information on ESFRI can be found here: <http://cordis.europa.eu/esfri/>
3. The EGI Blueprint can be found here: <http://web.eu-egi.eu/documents/other/egi-blueprint/>
4. For definition of ERIC see: <http://ec.europa.eu/research/infrastructures/index>
5. The most up-to-date version of the statutes of the EGI.eu Foundation are available at: <http://www.egi.eu/export/sites/egi/about/governance/EGI-eu>
6. See inscription of EGI.eu in the Chamber of Commerce of Amsterdam <http://www.egi.eu/export/sites/egi/about/governance/EGI-eu-extract>
7. See <http://lcg.web.cern.ch/LCG/public/>