

# The Future European Grid Infrastructure

## Towards a common sustainable e- infrastructure

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### Introduction

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 hesitate to rely on this new computing paradigm, potentially jeopardising the large investments that have been made so far.

The current situation for Grid infrastructures is in some ways analogous to that of 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<sup>1</sup> network infrastructure and the creation of the DANTE organization in 1993 to plan, build and operate networks. 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 evolution of e-infrastructures needs to be planned now, to maintain Europe's leading position in global science Grids.

### 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. Taking the existing political structures

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<sup>1</sup> <http://www.geant.net>

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.

To ensure that Europe capitalises fully on its large investment in Grid infrastructures, middleware development and applications, the objectives of the future EGI 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 for a wide range of scientific disciplines to link National Grid Infrastructures;
- 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 project.

Following the design study project 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<sup>2</sup>, but also ETICS<sup>3</sup> and OMII-Europe<sup>4</sup>, 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 project of EGI and thereafter its initial implementation, co-funding should come from the NGIs at the outset. Therefore, the EGI should be “owned” by the NGIs.

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<sup>2</sup> <http://www.eu-egee.org>

<sup>3</sup> <http://etics.web.cern.ch/etics/>

<sup>4</sup> <http://www.omii-europe.org>