Grid TALK GridBriefings
Grid computing in five minutes

European Grid Initiative: towards a sustainable long-term European grid infrastructure

Within the European Grid Initiative (EGI), planning is underway for the implementation of a sustainable, pan-European grid infrastructure to support leading edge collaborative e-science.

Leadership through collaboration

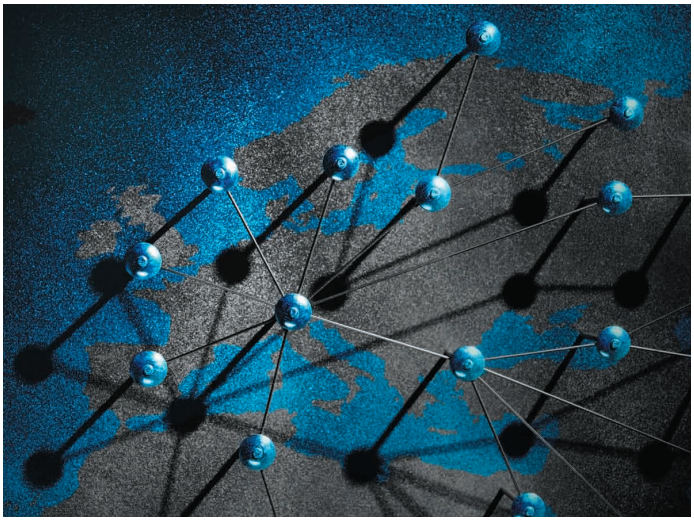
The success of Europe's knowledge-based economy depends on scientific and technological breakthroughs: innovation is paramount if Europe is to stay ahead in international competition. However, research today happens in an international and interdisciplinary environment: science does not stop at national borders.

Increasingly, researchers are being called upon to work on critical projects of global significance. To enable these international scientific collaborations, countries are linking their national computing grid infrastructures, allowing researchers to share compute power, data, instruments and storage space, regardless of their physical location. Such international e-infrastructures and collaborations are essential in powering scientific cooperation on a global scale.

To provide for the scientific community's increasing dependence on digital technologies, the time has come to unite national efforts across Europe into a sustainable, interoperable pan-European grid infrastructure.

European grids: established expertise and infrastructure

Through the EU co-funded Enabling Grids for E-sciencE (EGEE) project, now in its third phase, European scientists already have access to large-scale production-quality grid services, providing the data storage and compute power to stimulate their research. Add to this the recognized strengths of GÉANT, the pan-European communications network; DEISA, the European supercomputing grid; and a host of related research, development and applications-related grid projects, and Europe's position as a leader in facilitating e-science is apparent.



Through EGI, the creation of a distributed, sustainable pan-European resource for promoting and powering scientific research—essential in maintaining this leading position—is currently underway.

Building the pan-European grid

The building blocks of the future European grid are the National Grid Initiatives (NGIs). They are autonomous, recognized national grid bodies, able to mobilize their own national funding and computing resources and to support their own research communities. Together with the EGI Organization (EGI.org), they will coordinate the shared use of grid resources within Europe.

While these NGIs are being put in place, Joint Research Units (JRUs) are used as seeds within EGEE. They allow different legal entities to carry out research as a single, collaborative unit.

Growing the EGI Knowledge Base

The EGI Knowledge Base provides an interactive environment in which NGIs and the EGI Design Study team can showcase and share their work. The site includes information on the evolving status of individual European NGIs, edited by the NGIs themselves, as well as information from grid infrastructure projects.

"The EGI Knowledge Base is a powerful tool useful for enhancing the collaborative working process," says Diana Cresti of the EGI Design Study. "NGIs and other interested parties are able to access information and provide feedback in real time, and on their time. This is a valuable addition to more traditional, formalised workshops."

As part of the EGI Knowledge Base, a "wikified" map provides instant access to information on individual NGIs, as well as discussion pages and information on grid applications, projects and case studies.

Why EGI?

Establishing a centralized pan-European grid computing infrastructure will not be easy and requires certain financial efforts from all stakeholders. It will, however, provide a reliable, flexible computing resource with long-term sustainable benefits for researchers and the countries providing the respective funding.

So why bother to federate national resources?

- Improved coordination: EGI puts in place a coordinated grid computing and data storage solution, reducing the effort required to maintain and coordinate multiple independent solutions.
- Improved compatibility: EGI offers compatible, interoperating technologies that simply and reliably service Europe's grid computing needs.
- Improved collaborative ability: EGI paves the way for smooth and regular coordination of not only computing resources, but also human and intellectual resources.
- Improved capacity: EGI unites European computing and data storage resources, creating a resource with unparalleled facility to push scientific progress towards new and innovative solutions.

Who manages EGI?

The coordinating body responsible for managing EGI will be EGI.org. Individual NGIs will contribute to high-level EGI management through participation in the EGI Council. Together, NGIs and EGI.org will direct the progress, operations, maintenance and sustainability of the EGI infrastructure.

According to current plans, EGI.org will begin operations in 2010 and will be responsible for provision of essential services, such as security, application support, grid software regulation, and monitoring and accounting for resource use.

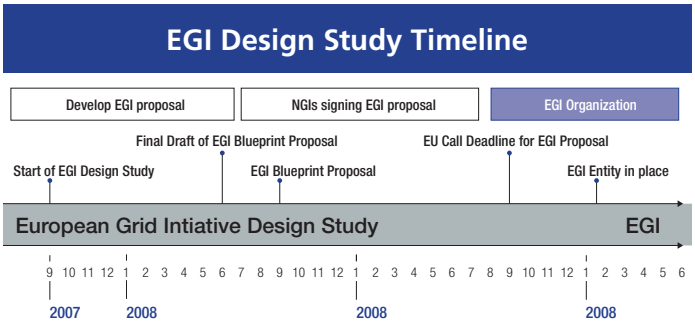


Image courtesy of EGI

Who will pay for EGI?

The main initial funding is expected to come from the European Union. Each NGI will contribute an EGI membership fee to fund the high-level services of EGI.org. These fees will provide for staff specialized in coordinating and managing EGI resources, and will be charged on a sliding scale, envisaged as being based on an index similar to the GDP.

Later, "service charges" will be introduced, added to country membership fees to cover the additional services as requested. Ongoing co-funding by the European Union will help to ensure the long-term cohesion and sustainability of the EGI infrastructure as a cutting edge resource.



A smooth transition…

Reaching the EGI vision is a long and ongoing process, with new NGIs and application communities joining at different times, each with varying needs and levels of maturity and complexity.

Thousands of scientists already rely on EGEE and other grid infrastructures to power their research into medicine, fusion energy, climate change, astronomy, agriculture and more. To ensure their confidence in grid technology, the transition to EGI must be smooth. This means:

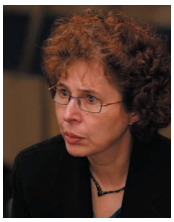
- Moving towards Grid Operating Centers on national and regional levels, to replace the Regional Operations Centers currently in use;
- Establishing a central coordination center, to synchronize and coordinate pan-European activities;
- Creating Specialized Support Centres, to ensure focused support for key scientific disciplines;
- Continuing dedicated development of interoperating, standardized grid software.

Being part of EGI

The EGI Design Study (EGI_DS) project is coordinating the efforts of countries across Europe as they move towards becoming part of EGI. Already today, through their nominated representatives, 38 NGIs have registered their support for EGI, and many more countries are working to create their own fully established NGIs. To be considered for inclusion in EGI, an NGI must accept and adhere to international grid standards, as well as EGI policies and quality criteria.



"Science is becoming more and more international—this is the only way to address large, complex problems—and international science needs effective international computing, offered by grid technology. The Polish scientific community—be it physics, chemistry or biomedicine—is using grid technology. For particle physicists participating in the Large Hadron Collider experiments, grid technology is a must. Now is the time to build a sustainable grid infrastructure, EGI, based on National Grid Initiatives. In our case this will be PL-Grid, which involves five major computing centers." *Michal Turala, PL (Polski) Grid, Poland*



"BEgrid looks forward to the birth of EGI: through the creation of a sustainable European grid infrastructure, our researchers will be assured that their efforts to use grid technology have not been in vain, and they will be assured of access to computing facilities that enable their participation in European projects. The largest challenges I see for EGI are the realisation of interoperability between the different middlewares used in Europe, and the provision of 'easy' access to the infrastructure, for every researcher who might need it." *Rosette Vandenbroucke, BEgrid, Belgium*



"E-Science is increasingly rich and complex. National Grid Initiatives provide a first line of support, but we need to consolidate efforts at the European scale to address the current challenges in science, as projects today require teams with the best possible specialists. The European Grid Initiative will provide coordination, dissemination, training and support for new initiatives, but should also be able to ensure a coherent framework, where research communities can find the elements required to build their complex applications." *Jesus Marco de Lucas, Spanish National Grid Initiative, Spain*



"In the late nineties the Large Hadron Collider experiments began studying how to best use the huge and distributed computing resources they needed: hundreds of computer centres for thousands of users across five continents. Grid technology was soon seen as the main tool for fulfilling our needs. We have actively participated in the Enabling Grids for E-sciencE projects, and the infrastructure based on them is now running several 10,000s of simultaneous jobs, and transferring data worldwide. EGI aims to give a stable, sustainable and unified organisation to the grid infrastructure built by the EGEE projects: thus its success is crucial for the LHC experiments." *Laura Perini, the LHC ATLAS experiment, INFN*



"For an initiative like WISDOM, which fosters research and development on tropical diseases through grid-enabled drug discovery, EGI is like a new playground with exciting new opportunities. EGI offers the opportunity to access extended resources through the NGIs, but more importantly, the chance to further international collaborations, allowing us to work together to optimise the portfolio of services offered on the grid to the research communities on tropical diseases." *Vincent Breton, the WISDOM project, CNRS-IN2P3*



"The EGI Design Study project is currently defining a potential model for a future and sustainable e-infrastructure, which is highly relevant for EGEE. Key considerations for EGEE include ensuring that EGI can support all of our existing user communities and resource providers, as well as working towards a smooth and timely transition from EGEE to EGI." *Bob Jones, EGEE*





Grids rely on and empower collaborations across countries, cultures, projects and disciplines, enabling a new generation of scientific partnership and success.

From a user's perspective

First and foremost, EGI must support and accelerate scientific research, providing for the needs of new applications and user communities. In addition to providing technical support, EGI.org will also provide user support, encouraging grid users to generate their own dialogues and interactions through centrally coordinated user forums, training sessions and other events.



"OGF-Europe views EGI as planning to support multiple disciplines through offering a set of services to scientific users whilst mainly dealing with the grid middleware, its interoperability and standardization—keywords fundamental to OGF-Europe's prime mission—resulting in seamless operation of large-scale international grid infrastructures. It is encouraging to know that EGI will make particular reference to knowledge and technology transfer mechanisms, together with business benefits, placing emphasis on how researchers and engineers can solve today's challenges." *Silvana Muscella, OGF-Europe*



"The EGI Blueprint presents a possible model for a sustainable grid infrastructure in Europe, and is being developed in close collaboration with the National Grid Initiatives and other stakeholders to meet their requirements. As part of the blueprint, the transition to the future EGI model is being carefully planned. This preparatory work is carried out together with EGI_DS, National Grid Initiatives and EGEE-III members to learn from EGEE's experience in operating large scale international grid infrastructures." *Dieter Kranzlmueller, EGI_DS*

The big 3: Challenges for EGI

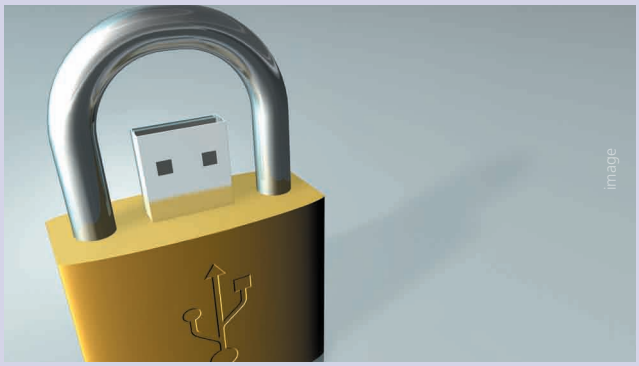
Scalability: EGI must strive for an operations model that provides for flexibility, low cost of entry, and scalability. This will provide the resilience EGI requires to flourish as it grows.

Interoperation: EGI must identify "best practices" in e-infrastructures, ensuring that NGIs use EGI-certified and verified grid technologies. This standardization will ensure that different NGIs can interact and interoperate.

Promotion of NGI autonomy: After the initial transition to EGI, NGIs will be fully responsible for sustaining support for their user communities, middleware requirements and technical operations.

National and international grid security

In a grid environment, where users allow third parties to access their computing resources, reliable security is essential. To ensure the creation and continuation of a secure computing environment, EGI will build upon the security expertise and experience currently available from different middleware solutions, NGIs, countries and user communities.



A standard solution: the Universal Middleware Toolkit

EGI will aim to support NGIs in coordinating and standardising the use and development of their grid software—called "middleware". Grids in Europe today are mostly based on gLite or ARC or UNICORE middleware; however, these middleware groups are proposing the creation of a Universal Middleware Toolkit (UMT)—a common "glue" that would unite grid sites across Europe and serve as the EGI middleware. The timescale of this standardization is still under discussion.

For more information:

European Grid Initiative (EGI)
web.eu-egi.eu

EGI in 3 minutes: the movie
web.eu-egi.eu/public/EGI-jan07.wmv

EGI Knowledge Base
knowledge.eu-egi.eu

Enabling Grids for E-sciencE (EGEE)
www.eu-egee.org/

OGF-Europe
www.ogfeurope.eu/

WISDOM Project
wisdom.eu-egee.fr/

International Science Grid This Week
www.isgtw.org

GridTalk
www.gridtalk-project.eu

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