



Dieter Kranzlmüller, Project Director of European Grid Initiative



Jamie Shiers, CERN

# GRID COMPUTING

Read how the leading faces of Grid computing see the future shaping up following a groundbreaking meeting at the recent Open Grid Forum 23 media conference in Barcelona, which brought together some of the key figures in European Grid research to look at the possible future applications affecting commerce, academia and beyond

**Although Grid computing** represents the cutting edge of modern technology, many of the fundamental ideas which underpin it have a long history. Sharing computer power between users was essential as long ago as the 1960s, a time in which computing was dominated by huge mainframe computers that were shared between employees.

Similarly the idea of computing as a utility has its roots in the same era. In 1965 the developers of the Multics operating system proposed that computing resources be accessed in the same way as essential services, a revolutionary idea that paved the way

for modern advances in Grid computing. While such ideas may be relatively well-established, it is only through the rapid advances of recent times that they have once again become technologically relevant.

Ideas like computing as a utility and power sharing are now integral to the modern vision of Grid computing – a vision that sees it as a means to enable large-scale collaborations and provide researchers with computing power on the kind of scale that is increasingly required to advance knowledge.

Witness the Large Hadron Collider (LHC) based in Geneva, a facility that



Mario Campolargo, Head of Unit, DG INFSO/F3 and GÉANT



Werner Vogels, CTO, Amazon.com

# FACES THE FUTURE

will generate volumes of data well beyond the capability of conventional computers, meaning there is a clear need for researchers to gain access to greater computing power.

The idea of sharing computer capabilities in order to gain access to Grid computing resources is one that excites many, aware as they are of the potential Grid technologies offer in terms of eScience, financial modelling and climate modelling, to name just three of the more prominent applications.

Indeed, the broad relevance of Grid technologies and the depth of interest their development has generated was

further reinforced recently at the OGF23 Media Conference in Barcelona, an event in which a high-profile panel, including participants from government institutions, research organisations and enterprises, discussed the development of Grid technologies and responded to public queries.

The panel members included Mario Campolargo, Head of Unit, DG INFSO/F3 - GÉANT & e-Infrastructures; Craig Lee, President of OGF; Werner Vogels, CTO Amazon.com; Dieter Kranzlmüller, European Grid Initiative (EGI); Santi Ristol, ATOS Origin; Jamie Shiers, CERN; Carlos Henrique de Brito Cruz, the

State of Sao Paulo Research Foundation (FAPESP); and Francesc Subirada, BSC Associate Director. The questions focused on the impact of distributed computing and future trends in EU research and commerce.

The wide range of perspectives they offered reflected the multi-faceted nature of the event and helped give a comprehensive overview of the development of Grid technologies. eStrategies Projects was there to take note of what was discussed by those at the cutting edge of Grid technology.

Of course, with Grid technologies taking on an increasingly important role

within both academic research and the wider business environment, we were eager to question the panel closely and get a sense of how those charged with development saw the future strategic direction of the technology.

Faced by this rigorous questioning on the impact of distributed computing and the future trends in EU research and commerce, the panel were in agreement that ICT can play a key role in tackling the major scientific challenges that we face.

Mario Campolargo described grids as being one of the most important means by which we can empower Europeans to take control of their future in the face of the growing challenge from developing economies. By enabling scientific communities to share computing resources, data, talent and people power significant research advances can be made. In the age of the knowledge economy these are advances which can translate directly into both social and economic benefits.

### EC portfolio

This latter point is one recognised by the European Commission, which has responded by putting in place a significant portfolio of member state-endorsed initiatives.

These initiatives are driving the deployment in Europe of advanced ICT-based infrastructures, infrastructures which are aimed at making the scientific development process more efficient. For his part Campolargo highlighted a number of concrete examples where eInfrastructures have been used to real effect. Satellite imaging helped reduce disaster response times during the recent earthquake in China, while grid technologies have also been used to drive forward in-silico drug discovery to tackle diseases like malaria, AIDS and Bird Flu.

This approach, which has proven significantly quicker and more efficient than using traditional tools, represents an important advance, a point on which Craig Lee concurred. "Creating sustainable infrastructures is the key to grid computing," he said. "Grid computing can help with hurricane forecasting and other climate modelling projects."



**Grid concepts from big science will ultimately cross over to the wider community when general computing requirements are met by web services**

Craig Lee, president of OGF

Of course, while clearly of enormous potential, work in drug discovery is far from being the only possible application of Grid technologies. Grid has empowered communities, both across Europe and globally, by giving them equal access to data. This helps prevent 'brain-drain', as scientific research can be funded and undertaken locally. From a financial viewpoint, funding bodies can invest in local research initiatives, which can also lead to international partnerships.

This is a point reinforced by Jamie Shiers of CERN, part of the team that has developed the Large Hadron Collider (LHC) computing project, for which a readiness challenge has recently been conducted. "The people behind the LHC are highly motivated, as applications

on the LHC will help tackle key issues, such as disaster response and flood prediction," says Shiers.

This is an approach that has been replicated in a number of other areas. European researchers have established partnerships with their counterparts in many different parts of the world so as to be able to provide rapid support when necessary.

These partnerships draw on expertise and human knowledge that exist only in certain parts of the world, thus creating centres of excellence in specific fields. Many observers have suggested that this approach gives us the best possible chance of responding quickly and effectively to unexpected events, a view echoed by

Dieter Kranzmueller, who highlighted the human aspect of grid computing and how it brings together people with specific skill sets, thus allowing them to share resources and knowledge to tackle key issues of mutual interest. The new goal is to come up with a long-term plan to ensure the sustainability of the infrastructure.

However, if these collaborative partnerships are to be truly effective it is clearly enormously important that all parties share a vision for the future of Grid computing. European researchers can be reassured that there is no lack of enthusiasm for Grid computing outside their own continent.

Take Carlos Henrique de Brito Cruz, who is convinced that grid computing offers real opportunities for collaboration between scientists in Latin America, Europe and the rest of the world. Cruz recognises that Grid computing lends itself very well to tackling the key challenges that Brazil faces, such as Biodiversity – which generates huge amounts of data – and climate change, with specific reference to the Amazon rainforest.

The global implications of climate change illustrate the value that international partnerships can add and the importance of raising awareness, both areas in which Grid technologies can play a significant role.

This demonstrates that, far from being an abstract concept with no immediate relevance to the lives of ordinary people, Grid technologies are well capable of addressing key contemporary issues, something that a number of attendees at the conference were keen to pick up on.

Francesc Subirada argued that the Grid has a large part to play in improving energy efficiency, and pointed to a number of European initiatives aiming to reduce power consumption at various levels of the IT infrastructure, such as the IT architecture, IT systems, components and sites.

“If we do not significantly reduce the power needed to run any kind of computer then we will reach the point where energy costs are higher than the cost of a computer,” said Subirada. The reasons for doing so are not only ecological but also economical, something in which every nation has a vested interest.

This last point reminds us that if distributed computing is to reach its full potential then the needs of business must be taken fully into consideration, something to which those in the Grid development field have responded. Grid technologies are a crucial element in the goal of ‘greening’ IT, while they also have great potential in enabling the development of novel technologies. Furthermore they can provide power tools to any industry that uses modelling and simulation, as well as the creative industries, pharmaceuticals, biotech firms and financial services, to name just a few.

### Boosting European business

These practical benefits show that Grid technology is now in a stronger position than ever before to play a central role in boosting European business. This was a point on which Santi Ristol from ATOS Origin, the co-ordinator of the BEinGRID project, was keen to expand.

He highlighted the project’s work in analysing 25 businesses, work which involved evaluating their needs and assessing the features that help them offer more efficient services, all with the overall aim of gaining a better understanding of the role grid plays in delivering business benefits. The project

embraces end-users from diverse sectors, something that it views as being key to assessing those needs and demonstrating the tangible benefits Grid technologies can bring.

These are benefits increasingly recognised in the higher echelons of business. Take Werner Vogels, the Vice President and CTO at Amazon.com, responsible for driving the company’s technological vision of enhancing global innovation. Summing up the main impact of Grid technologies on the commercial sector, Vogels cited the improved availability of the right IT resources and the faster worldwide delivery of products and services, which is crucial to predicting the kind of resources we will need as we move forward, and reiterated his belief that clouds offer access to raw resources, whereas grids provide higher level services.

His keynote speech, immediately after the media conference, was peppered with lively examples of on Web Services (AWS) success stories, where customers have coped with surges in demand or performed multiple one-off tasks using AWS. The goal was to reduce the complexity of related technologies and enable the faster delivery of results, a goal which could well widen the user community of Grid technologies even further.

Indeed, the impact of distributed computing in both the scientific and business worlds has been such that it leads us to consider whether or not it will catch on in the public arena. In Craig Lee’s mind Grid concepts from big science will ultimately cross over to the wider community when general computing requirements are met by web services. Non-experts are likely to use distributed computing resources with user-friendly tools, though they may not even realise that that is what they are doing! After extensive discussion and intense debate on a wide range of topics the Barcelona panellists agreed that increasing end-user engagement is key to increasing the adoption of Grid technologies outside the scientific domain, and ultimately by the wider community. Europe has invested in the development of a sustainable model. It is now time to shape that model and push forward a sustainable infrastructure. ★



**Further reading**

For more on the greening of IT using Grid technology, turn to page 68 for news of a new initiative launched at the OGF23 Media Conference