

NEXTGRID

Scope

Defining the architecture that will lead to the emergence of the next generation of the Grid (one that goes beyond the academic roots of the Grid and prepares the way for the use of Grid technologies by business) was the primary goal of the Nextgrid project.

With 22 partners, 14 of whom came from the business domain, the project had a strong focus on tackling the “Grids for business” agenda and is thus far the only project to have specifically focused on driving the architecture of the next generation of the Grid forward. The project had a duration of 43 months and involved some 1,680 months of effort.

As well as developing new architectural solutions, Nextgrid contributed to key middleware components, application support mechanisms, know-how and standards that underpin the next generation Grid.

Advances

The path is clear: IT world is heading for services. Big Despite considerable progress in Grid research since the mid 1990's, most projects have focused on applications and test beds without really understanding the underlying architecture - the central goal of Nextgrid was to change this.

Nextgrid focused on Grids for business. Our vision is of future Grids that are economically viable; in which new and existing business models are possible; in which development, deployment and maintenance are easy; and in which the provisions for security and privacy give confidence to businesses, consumers and the general public.

Today, Nextgrid has created an architecture that enables new business on the Internet and goes well beyond the capabilities of current Grids. The Nextgrid architecture supports diverse and sustainable business models with applications that execute on inter-enterprise, heterogeneous infrastructures. In other words, Nextgrid is a networked IT architecture able to support an unlimited range of applications and business processes throughout their lifecycle.

Nextgrid can be built using its architectural designs that have been published as Generalised Specifications. To complement the Generalised Specifications we have also published the Nextgrid Cookbook. This Cookbook is essentially a guide for system designers and developers who want to implement a business Grid. Consisting of a set of examples showing how the Nextgrid-compliant components can be combined to construct a Grid addressing a range of commercial applications, it addresses an audience that has a basic understanding of Service Oriented Architectures. The Cook book shows how these components interact so that systems of varying complexity can be built to satisfy the needs of particular applications. Components can be downloaded from the project website - www.nextgrid.eu.

Positioning in global context

Nextgrid's work has shown how SLA-driven dynamics can be used to build Grids of dynamically federated services. Current research on Grids is showing how these key technologies can be used to build the Internet of Services. As the next generation of Grid infrastructures is built using these technologies they will use and learn from the work of Nextgrid.

Contribution to standardization and interoperability issues

Nextgrid made a major contribution to standards at both European and global levels.

Nextgrid established an IST FP6 Grid projects strategy group, the Grid Standards Coordination Group (GSCG) to coordinate the activities of the IST FP6 Grid projects. This group focused on achieving and maintaining information about standards relevant to member projects, discussing a standardisation strategy for the member projects, and stimulating collaboration with standardisation bodies and other stakeholders and interest groups active in standardisation.

Throughout the project lifetime Nextgrid partners also took leadership roles in the Open Grid Forum (OGF) and actively worked with other standards bodies including W3C, IETF and OASIS. A major achievement was the concept of Profiles which were brought into the OGF and led directly to the specification of influential profiles such as the OGSA Base Profile. Nextgrid also provided input into several other aspects of OGSA and influenced the unified resource model framework.

Target users / sectors in business and society

Nextgrid targeted the next generation of business users who can see the benefits of service orientated architectures and want to build complex, dynamically federated solutions using them.

To guide and inform the work in Nextgrid, business experiments were undertaken to test and validate the project's ideas in the following business sectors:

- Finance - developing fast Grid services to calculate market volatility and offer this service to customers.
- Digital Media - creating brokered computational and storage services for 3D animation.
- Supply Chain Management - planning and optimisation for logistics leading to faster results and greater information for decision-making.
- Electronic Data Record Processing - supporting new business models for telecoms operators.

Overall benefits for business and society

Nextgrid supported the transformation of the Grid from a key technology for scientists to a vital tool to support business interaction and collaboration. It is a key step towards realizing the broad vision of the Grid and to make it as ubiquitous as the Web is today. Commercial Grid solutions will result from the technical advances made by Nextgrid. These solutions will be used by European businesses and the wider society in the years to come.

Examples of use

Europe's financial sector depends heavily on process and data-intensive computation to deliver competitive advantage. At present, computation is largely performed onsite within a closed network. Secure and on-demand external provisioning of this computation, as enabled by the Nextgrid architecture, would provide the EU financial services sector with a real opportunity to increase competitiveness, manage risk and increase profits.

In the Nextgrid Finance business experiment, we worked with First Derivatives plc, a specialist provider of products and services to the capital market technology sector. We adopted the scenario whereby a major bank wished to use Implied Volatility (IV) data in their trading department. Rather than incur overheads developing their own solution and/or acquiring the computing power required, they chose First Derivatives as their IV data provider. At intermittent intervals the bank would contact First Derivatives to provide them with the data and First Derivatives would take market/bank data and use it as input to their IV application which would in turn produce market relevant results. The experiment successfully demonstrated that many of the Nextgrid architectural components could be used for the secure provision of on-demand calculations.

First Derivatives believe that external Grid based service propositions as described above will happen in the future and bring enormous business benefits to banks as well as companies like themselves.

Achievements

The **Nextgrid architecture** fully supports the requirements of organizations and individuals from business and the public sector. It embraces a service-oriented infrastructure which is as ubiquitous and transparent as the Web is today and which provides support for commercial, public sector and scientific applications. The complete realisation of our vision of Future Grids will take much longer than the duration of Nextgrid and involves a global effort combining resources many times greater than those deployed in the project. Nevertheless the work undertaken by Nextgrid constitutes an important step on the path to this realisation.

The technical challenges derived from the business requirements have been measured against real-world needs through the analysis of application-driven experiments. Together this framework of vision, business requirements, technical challenges, experiments and architectural development has driven the work of the project. It has resulted in a legacy which is the Generalised Specifications, their contribution to the implementation of Grids and their impact on standards.

In summary, the principal outputs of Nextgrid comprise **the Generalised Specifications and associated Cookbook**, which enable commercially viable grids, conforming to Nextgrid architectural principles, to be implemented. All of the Nextgrid partners have clear exploitation plans and many of the partners have plans to take forward these outputs as proprietary and open-source software releases and to use software components and derived know-how in their product and service offerings. Already, many Nextgrid outputs are making their way into new and existing products and services, for example in GRIA, FURA, USMT and OGSA-DAI. This process will continue as SOA solutions grow to meet new challenges. Further projects, some already started and some in gestation, will continue the developments started by Nextgrid.

The project has now successfully concluded with all its major objectives achieved and a significant step has been taken towards the achievement of its driving vision. As a result of the work undertaken by Nextgrid, the business requirements of the Grid are now much better understood and many of the technical challenges have been solved.

Nextgrid has demonstrated the strategic importance of good architectural design. Its results are world-leading and represent an enormous step forward in Grid and Service Oriented Architecture technology.



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project website and partner list

<http://www.nextgrid.org/>

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