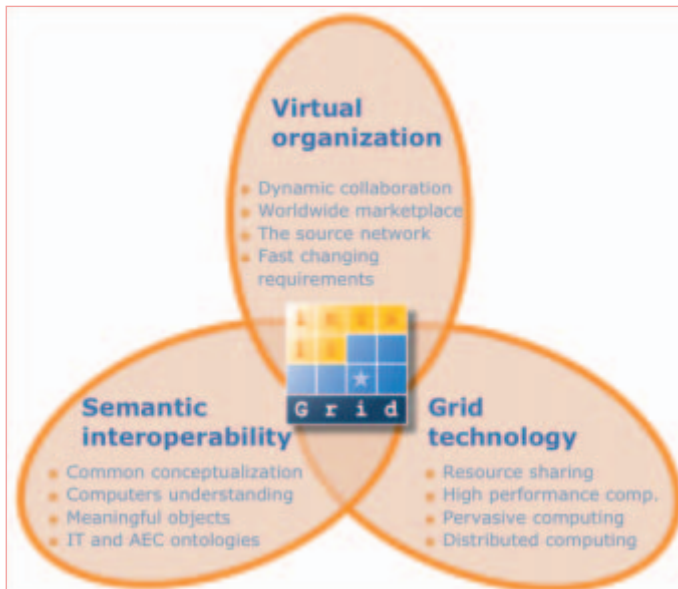# INTELIGRID

Scope

European large-scale engineering industries - like many other sectors - face daily challenges in orchestrating the work of numerous organisations and professions towards a common goal. The design of a building, a bridge or an aeroplane requires a huge number of experts across Europe and beyond to co-operate, using a wide range of software tools and collaboration platforms. For example, a building that will be built in Germany may be designed by a Dutch architect, engineered by a French structural engineering consultancy, the construction works may be managed by British construction management experts, and when built it may be operated by a Spanish facility management organisation. In various stages even more specialists may need to get temporarily involved with the project, for example Greek earthquake engineering experts or Italian soil mechanics specialists. They constitute a dynamic virtual organisation (VO). VOs need to share a common item of work - the virtual building - the data about the to-be-built and the as-built facility. Inteligrid has developed a grid infrastructure that provides, for the first time, a common platform to such dynamic virtual organisations. By leveraging the superior security, scalability and performance characteristics of grid technologies this platform provides specialists with the ability to rapidly collaborate and share distributed heterogeneous resources.

Advances

The true innovation of Inteligrid, however, lies in its focus on offering support for rich semantics in the infrastructure. The vision was to make the grid a «semantic grid», one where the infrastructure has the ability to dynamically «manage the meaning» of data and where there is «awareness» of the topic for which data is being used. Central to the technical solution developed within the Inteligrid consortium are the ontology services and the semantic information management services — handling the semantically-rich information both about the business domain (e.g. aerospace) as well as about the IT infrastructure (including the grid) that is used to support the business processes. These services are then used by other Inteligrid developed applications and services.

Positioning in global context

Inteligrid was the world-leading EU FP6 grid project in the architecture, engineering and construction context. Using grid technology and semantic interoperability in a context of virtual organisations is a unique multidisciplinary area that the project was working in. Inteligrid focused on semantic collaboration among businesses was one of the first projects (and the only grid project) to implement the Information Delivery Manual (IDM), a key technology that makes structured information exchange work for the construction industry.

Contribution to standardization and interoperability issues

Engineering interoperability was the key issue in Inteligrid as it leads to more efficient collaboration, increased agility of the VO and reduced overhead costs that the VO is incurring. The project has been working closely with the ISO-STEP efforts and the International Alliance for Interoperability (IAI) where members of the consortium have leading positions. Project partners have also contributed to different grid standardisation activities such as the Open Grid Forum.

Target users / sectors in business and society

The direct target group of the Inteligrid project are the system integrators specialised in the engineering domain, developers of the engineering software and providers of the engineering services on the Internet, particularly those dealing with project information services. It is they who are (a) using the Inteligrid infrastructure to plug their software into and (b) who are offering Inteligrid-like platforms and services.

Overall benefits for business and society

Inteligrid platform has lowered the entrance barrier to grid-based collaboration infrastructures and allowed SME users to get access to capable third party collaboration infrastructures that they cannot afford themselves. It also allows SME service providers to market their software and services. Inteligrid delivers a dynamic, secure, scalable, semantic infrastructure for collaboration of the VO on the grid. Inteligrid targets the business processes in complex engineering domains, allowing them to make better and safer designs faster. Although the projects has focused on the AEC sectors its developments are generic solutions and are therefore not restricted to use in other economically important sectors.

Examples of use

The Inteligrid usage scenarios include:

- **Building lifecycle:** The Inteligrid platform provides coordinated resource and competency sharing to the different organisations involved in the design, construction and use of facilities. Inteligrid provides a semantic interoperability level on top of international standards such as the ISO-STEP and IAI-IFC.
- **Civil safety:** The Inteligrid infrastructure provides engineers with both functional and computational power to analyse a much broader spectrum of solutions leading to better, safer, more long lasting, and low cost infrastructures.
- **Aerospace:** Data sharing and information management for the collaboration in the design, simulation and production of complex products is an extremely complex task and subject to security and integrity concerns.
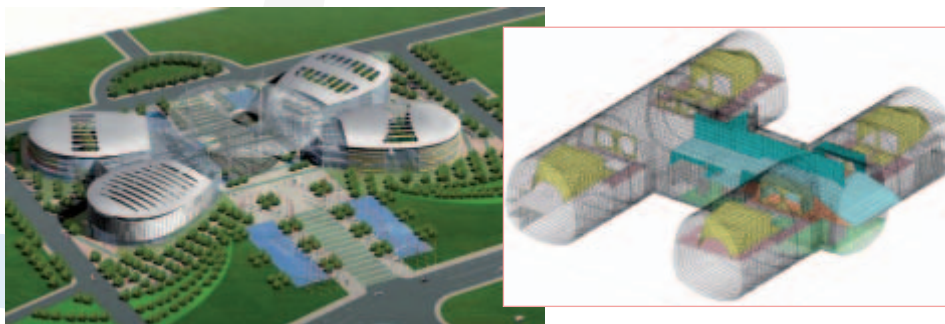
Achievements

Inteligrid key features and achievements are depicted bellow:

- **Inteligrid semantic grid architecture:** Inteligrid semantic grid architecture focuses on providing the semantic interoperability layer based on domain specific ontologies. The layered architecture successfully integrates general-purpose grid middleware as well as traditional engineering end-user applications and services.
- **Inteligrid engineering VO guidelines:** Inteligrid has gathered end-user requirements based on the several identified user roles. The main observations based on the requirements analysis were summed up in the «5S» requirements: Security – Simplicity – Stability & standards – SOA – Semantics. The project also provides a number of documents detailing the use of (a) semantic interoperability, (b) virtual organisations and (c) grid technology for providing end-to-end solutions for engineering virtual organisations.
- **Inteligrid reference implementation:** Inteligrid developed portal based implementation of the proposed semantic grid architecture that integrated different end-user tools and services.
- **Inteligrid tools and services:** The project has developed a number of software components for integration of diverse data resources into grid environments, grid-enabling existing engineering tools and services, as well as extending existing grid middleware with new security mechanisms. All software components are provided under different compatible open source licenses, with the potential for integration in different commercial or non-commercial environments.