# Semantic Grid Roadmap

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Technology roadmapping is a **needs-driven** technology planning process to help identify, select, and develop technology alternatives to satisfy a set of (product) needs. It can provide a framework to help plan and coordinate technology developments both within a company or an entire industry. Semantic Grid - a grid where its components are semantically annotated - is a technology that addresses a set of needs of others. It is therefore more of a technology alternative - a road - in some other roadmap, than a need in itself.

Semantic grid can potentially play a significant role in roadmaps related to e-science, collaboratories, digital libraries, virtual organizations, collaborative enterprises etc. For example, one can easily envision it to play a role in the following collaborative enterprise vision[2]:

> *"The vision is to achieve a seamless collaborative enterprise which is a networked organisation, dynamically formed to create sustainable value through the delivery of integrated Product-Service-Organisation (PSO) configurations providing benefits to customers."*

The Figure below shows the vision of an evolution of collaborative enterprise:
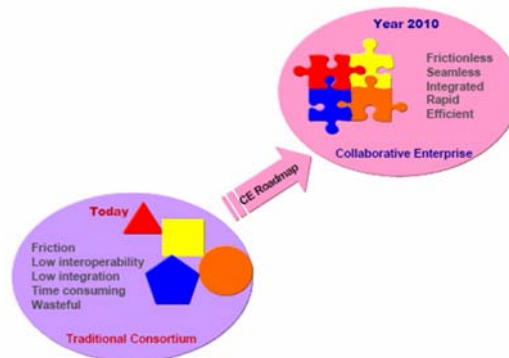
Issues such as the friction (of workflow, information flow and to some extent communication), low interoperability (agreements on syntax and structures at best, but not on formal semantics), low integration and a waste of resources due to human intervention during CE operation are all issues that can potentially be resolved by increasing the semantic richness of the ICT infrastructure. Semantic Grid is a technology competing and overlapping particularly with the CORBA, web services and semantic web technologies. Common to these is the commitment to the **service oriented architecture**, which is providing an opportunity for the convergence of these technologies, starting with the WSDL, UDDI and the rest of the WSRF framework.

The **topic map of semantic grid research** could be structured according to the following axes:

- **interoperability levels** evolving from syntactic (e.g. XML), syntactic (e.g. XML schema), semantic (e.g. RDF and OWL) and mapping well to the semantic web stack.
- **universe of discourse** that is semantically modeled: models or the products, process and organizations from the business domain meet with the models of IT infrastructure that is supporting the organizations, involved in processes creating products (Figure below). The modeling, of course includes not only the definition of concepts but also a definition of (semantic) services processing or inferring over these concepts and instances.

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[2] Kulwant S Pawar, coordinator (2005) Roadmap towards theCollaborative Enterprise – CE Vision 2010, Centre for Concurrent Enterprising, University of Nottinghan, UK.

- **actors involved** with the semantic grid: end users, software developers, service provides, systems administrators etc.
- **technology maturity** levels ranging from emerging, research, development, standardization, take-up and in-use.
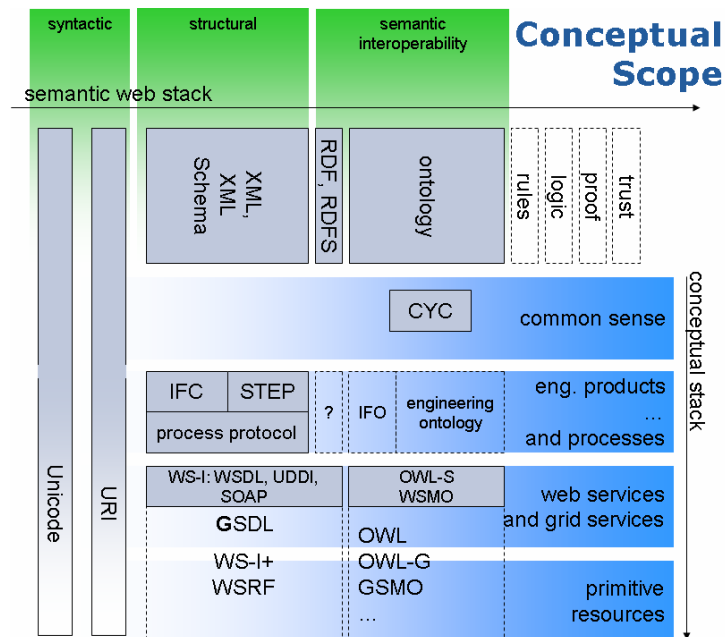
The immediate research issues include:

- **Clarification of terms and concepts.** The formal modelling of the grid, semantic grid, web service environment etc. should provide a clearer, even formal definition of these terms as well as of service, resource, capability, process, actor, agent, goal etc. that have different meanings in different topics contributing to the broader semantic grid research area.
- **Ontologies** describing the UoD of a virtual organization including the product, process and organization from the business layers and the ICT concepts discussed in the bullet above.
- **Reference architecture.** It should be developed in two layers. A VO reference architecture that is possibly technology and the semantic grid realisation of that architecture.
- **Requirements analysis and its matching to semantic grid technologies.** Perhaps this would reveal a killer application for the semantic grid.

Conclusion: While the first level of information systems was built to assist humans in real world processes, the increasing complexity of the ITC infrastructures calls for a second level of information systems that will assist in making a better use of ITC. All business process roadmaps are foreseeing a strong role of ICT in the future. Semantic grid has a potential to be a highway in these roadmaps or a dead end into which substantial effort will be placed, but that will not address the needs of the users. We will not know, unless we try it out, looking carefully at the technology pull in some areas and applying the technology push if a breakthrough seems possible.