

# Enabling Semantic Grid Computing with ebXML

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**Abstract.** ebXML is a suite of standards from the e-business community addressing the entire lifecycle for Service Oriented Architectures for business to business and business to consumer activities. This position paper outlines how the Semantic GRID can benefit from the use of ebXML related standards (such as Business Process, Collaboration Protocol Profiles and Agreements, Registry, Business Centric Methodology, Access Control Policy Management).

## Introduction

The Semantic GRID is about the autonomous discovery and assembly of distributed remote resources including computational, informational, storage or instrumental. This autonomous discovery and assembly is performed by agents acting towards achieving user specified goals, and involve the interaction of independent resources from different domains and owned by different entities. ebXML is a suite of [ISO/TS 15000] standards from the e-business community addressing the entire lifecycle required for Service Oriented Architectures for business to business and business to consumer activities. This position paper outlines the relevance of ebXML technologies in enabling Semantic GRID computing. In a similar manner to the emerging GRID standards, ebXML uses Web Service standards as a foundation layer. ebXML builds upon these to define agreed mechanisms for aspects such as the registration, description and discovery of services, and service contract (or quality of service) negotiations in a generic manner (not dependent upon any particular business context). The GRID also attempts to define generic standards for the discovery of research oriented resources and the negotiation of their use (including quality of service e.g. for moving and processing large quantities of experimental data). At present, ebXML and GRID are tackling these issues in different ways but a merger of technologies would benefit both communities.

## ebXML and Semantic Grid

All stakeholders in the Semantic Grid need to be able to publish and discover resources, exposed as web or Grid services. Agents representing the stakeholders would

use ontologies to both assist the discovery process and also to pull the services together into a workflow. An example of this would be the semantically enriched web services planned for the ARTEMIS project, which provides interoperability of medical information systems [1]. In the worst case, service enablement would require a coordinating agent to employ the ontologies of many different domains declared using a differing formats (RDF, KIF, OWL, Topic Map). The worst case scenario combined with the dynamic nature of the Grid, (e.g. providers changing characteristics of service offering at will), agents working to deliver a seemingly simple service are faced with major semantic management challenges.

Federated ebXML knowledge management and SOA policy management offers an infrastructure to meet that challenge. In particular, when following BCM (Business-Centric Methodology) guidelines, SOA / ebXML service description and discovery extends beyond classification and resource location towards the support of activity negotiation. Specifically, when a service is profiled within a federated ebXML registry, the meta-information identifies both the SOA business conditions and the policy rules of access per level of privilege. For instance, service procurement requires the construction of a contract and workflow. The ebXML Business Process (ebXML BP) standard defines metadata for describing the service capabilities needed to support electronic business collaborations with default error state resolution. An “e-contract” employing terms of workflow can be structured using Collaboration Protocol Profiles (CPPs) and Collaboration Protocol Agreements (CPAs). ebXML BP also defines and describes activities during service enactment for the transactions (including point-in-time parameters) that have to be fulfilled according to the services’ usage terms. When facilitated by an ebXML repository, workflows may be tracked with a messaging audit trail. A future e-Notary option, would enable the provision of self-proving electronic legal information [2].

ebXML management specifications explicitly addresses the semantic support needed for the choreography of the web services. The Business Centric Methodology improve the understanding of the semantics in the Conceptual layer by aligning the terminology of the business with the operational meaning of the services [3]. ebXML BP define the business process-rules, semantics and syntax for collaborations.

The ebXML registry would contain the grid meta-information. It allows for publishers to retain ownership of their content and knowledge classifications using locally or externally stored Taxonomies. Support for OWL ontologies in the next evolution of the registry will lever ongoing research as the Satine project [4]. ebXML Registry & Repository can be federated for high scalability to handle huge content.

## **Conclusion**

Many of the issues in co-ordinating Service Oriented e-business transactions are similar to those facing Semantic Grid architectures. The leverage of the ebXML standards, which facilitate e-business processes, would facilitate the development of the underlying Semantic Grid architecture & allow for the sharing of tools & expertise between the two different communities.

## References

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4. Satine - a secure semantic-based interoperability framework for exploiting Web service platforms in conjunction with Peer-to-Peer networks in tourism industry <http://www.srdc.metu.edu.tr/webpage/projects/satine/index.html>