

Towards A Commercial Ontology Development Environment

Elisa F. Kendall, Mark E. Dutra, and Deborah L. McGuinness

Sandpiper Software™, Inc.
{ekendall, mdutra}@sandsoft.com

Stanford University, Stanford, CA
d1m@ksl.stanford.edu

While research in knowledge representation, ontologies, and related environments has a rich history, interest is just beginning to extend to the broader business community. Emerging applications in collaboration, application integration, web services, and content management require large, complex ontologies that must be built and maintained by distributed teams. Because such ontologies can be difficult even for experts to build, the need for a new generation of commercial-grade tools supporting knowledge sharing and collaborative ontology development is becoming increasingly urgent.

Current ontology development systems such as Ontolingua and Chimaera, Protégé, and LOOM have emerged from the knowledge representation research community. Unfortunately, most are not widely known outside the artificial intelligence arena and their use requires significant understanding of knowledge representation languages and methodologies. On the other hand, commercial methodologies for object-oriented analysis, design, and implementation such as the Object Management Group's Unified Modeling Language (UML) have become industry standards and have a rapidly growing user community.

Sandpiper Software is developing key components of a model-driven interoperability framework designed to support collaboration in a highly distributed, heterogeneous environment; namely, a suite of tools designed to resolve ambiguity issues, terminology conflicts, and other complex information sharing issues. The Company's solutions are based on knowledge representation, information brokering, and intelligent agents, as well as component and standards-based software engineering best practices and methodologies. Key drivers for Sandpiper's innovative approach include scalability, flexibility, and commercial quality well beyond the capabilities of LISP and PROLOG-based tools, as well as support for distributed development, integration with best-in-class configuration management tools, and ease-of-use by domain subject-matter experts.

Sandpiper's Visual Ontology Modeler™ and Medius® Knowledge Brokering Suite are

currently under development, supported by investment from the venture community and private investors. The Visual Ontology Modeler™ (VOM), an add-in to Rational Software's Rose Enterprise Edition, is a UML-based ontology modeling tool that enables component-based ontology development and management. Capabilities include:

- A distributed, multi-user ontology development environment in a rich, graphical notation.
- A feature-rich set of ontology authoring wizards that create and maintain the required UML model elements for the user, saving time and substantially reducing construction errors and inconsistencies.
- Automated export of XML schema, RDF, DAML+OIL, and other formats.
- Integration with a commercial, scalable object database that supports efficient evaluation, comparison, validation, and management of ontologies with OKBC and CORBA access.

The VOM implements Sandpiper's UML Profile for Knowledge Representation (KR), which extends UML to enable modeling of frame-based KR concepts such as class, relation, function and individual frames, as well as the slots and facets constraining those frames. It also includes an ontology library representing the IEEE Standard Upper Ontology, concepts relevant to XML, RDF, and DAML generation, and other basic concepts required by the collaborative product commerce and bioinformatics markets. Subsequent releases will include support for active, first-order logic expression, tools for model verification, and reverse engineering of XML schemas, RDF, DAML+OIL, relational databases and other resources as a basis for semi-automated ontology development. Beta testing of the Visual Ontology Modeler™ was initiated in January 2002. Customers include government and commercial organizations involved in the DARPA/DAML program as well as commercial companies solving large-scale interoperability problems.

The poster will focus on emerging work on DAML+OIL and the Web Ontology Language by the Sandpiper tool suite.