DAML Integration and Transition

BBN Technologies

Cola Atkinson (PM)
Mike Dean (PI)

November 2004
DAML Integration and Transition

Overall Program Summary

The mission of the DAML program is to create technologies that will enable software agents to dynamically identify and understand information sources, and to provide interoperability between agents in a semantic manner.

• Integration and Coordination
  – www.daml.org
  – Joint US/EU ad hoc Agent Markup Language Committee (Chair)
  – W3C Working Groups (RDF Core, WebOnt)
  – OWL-S Coalition and SWSI
  – Testbed Application (SONAT)
  – SemWebCentral.org (with InfoEther)

• Development
  – Tools (OWL Validator, SWeDE, etc.)
  – Data Sources (Countries, MIDB, GNS, etc.)

• Transition
  – Semantic Web for Military Users workshops
  – Pilot programs (Horus, FCG, NOTAMS, JBI TIE, CODE, Combine)
• Data Sources
  – One of the keys to bootstrapping the Semantic Web
  – Early focus on reference data (http://www.daml.org/data/)
  – We’ve employed various OWL generation approaches
    • Static conversion (CIA World Factbook)
    • Delimited file conversion (NASDAQ)
    • XSLT (Internet RFCs)
    • HTML Gateway (NYSE)
    • Dynamic database servlet (MIDB)
    • Natural Language Processing (Newswire)

  – Results
    • Over 40 data sources available in OWL
    • Tools & techniques span spectrum of legacy data representations
• Data Integration Techniques & Examples
  – Need to integrate data from multiple independent legacy data sources
    • Develop data source ontology in OWL for each new data source
    • Remain faithful to the original logical data model to promote re-use
    • Develop a domain ontology in OWL for each application/community of interest
    • Use SWRL to map between data and domain ontologies
      – Employ automated alignment tools where practical
  – Results
    • Multiple instantiations of data integration methodology incorporated in transition pilot projects
    • Translation Coverage Matrix generated from rules
    • Key enabler for data deconfliction and other high level analysis
• Rules Standards (In collaboration with others)
  – Expressive power needed beyond ontology language
    • Builtins are needed to support translation
    • SWRL continues W3C RDF/OWL trajectory
  – Worked with Joint Committee to define SWRL
  – Worked with RuleML Steering Committee to help maintain alignment with Semantic Web
  – Used various rule engines (JESS, CLIPS, Jena, etc)
    • Initial exploration of performance and scalability
  – Results
    • Employed rules for ontology translation and data deconfliction
    • SWRL acknowledged as a W3C Member Submission
Integration and Coordination

- BBN’s collaboration role with key Working Groups and Committees have contributed to the W3C OWL Recommendation and various W3C Member Submissions as mentioned previously.

- daml.org [original program collaboration site]
  - Repository for much of the DAML data
  - Used as collaboration site by Joint Committee and SWSI
  - Still number 2 or 3 Google hit for “DARPA”

- SemWebCentral.org [Semantic Web Open Source Site]
  - 63 projects
  - 182 registered users
  - 3,529,736 total hits
  - 275,000 average hits per month
• Development
  – Several widely used tools
    • OWL Validator
    • DumpOnt
    • BBN Object Viewer
  – Semantic Web Development Environment (SWeDE)
    • Includes
      – editors, validators, viewers and helpful wizards for OWL developers
      – framework for easy integration of new Semantic Web tools
    • Metrics
      – 4500 total downloads
      – 1000 downloads of latest release Version 1.0.1
      – 515 downloads of SDK
  – These and others all available via SemWebCentral.org
• Transition
  – CODE (Common Ontological Data Environment)
    • Multi-source data translation using SWRL
    • Translation coverage map generation
    • Semi-automated data Deconfliction
    • Integrated with existing analysis tool environment
    • Attribute Level Versioning
  – Combine
    • Multi-source data translation
    • Structured and Unstructured data sources
      – Uses BBN IdentiFinder™
    • Co-reference resolution
    • End user query tools (including displays)
DAML Integration and Transition
Milestones & Accomplishments

• 2000
  – [www.daml.org](http://www.daml.org)
  – DAML-ONT (Joint Committee)
  – DAML Ontology Library
  – DAML Crawler
  – DAML Validator
• 2001
  – DAML+OIL (Joint Committee)
  – PalmDAML, hyperdaml, dumpont
  – data: countries, airports, etc.
• 2002
  – DAML+OIL tutorial
  – SONAT
  – DQL (Joint Committee)
• 2003
  – OWL Conversion
  – DAML JBI TIE
  – Tools Assessment
• 2004
  – SemWebCentral.org (InfoEther)
  – CODE demonstration
  – Combine demonstration
  – SWRL (Joint Committee)
  – SWeDE open source development environment
  – SweetRules (MIT, UMBC, Stanford)
DAML Integration and Transition
Transition/Handoff

- Specifications (support others)
  - OWL Reference (co-editor)
  - SWRL Member Submission (particularly builtins)
  - OWL-S Member Submission
- Software (In use via SemWebCentral.org)
  - OWL Validator
  - SWeDE
  - Dumpont
  - SweetRules (with MIT, UMBC, Stanford)
  - ...
- Data (In use via daml.org)
  - Country information
  - CIA World Factbook
  - MIDB (classified version used in CODE)
  - NGA Geographic Name Server (GNS)
  - ...
- DoD Pilot Projects
  - CODE
  - Combine
  - Other IC pilots underway or being explored
### DAML Integration and Transition

**Remaining Issues**

1. What do you still have to do that is relevant to your original programmatic vision?
2. What big problems are still out there?

<table>
<thead>
<tr>
<th>Issue</th>
<th>Remediation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited data availability</td>
<td>Continued generation of reference data, dynamic interfaces to databases</td>
</tr>
<tr>
<td>Standards for Semantic Web Rules &amp; Services</td>
<td>Establish working groups in W3C, OASIS, and/or other standards organizations.</td>
</tr>
<tr>
<td>SW Application Scalability</td>
<td>Selectively deploy reasoning technologies. Focus attention on optimization and scalability.</td>
</tr>
<tr>
<td>Full exploitation of unstructured data</td>
<td>Continue to evolve entity, relationship, and event extraction technologies.</td>
</tr>
</tbody>
</table>
• BBN’s FY05 Focus
  – Continue supporting Rules and Services standardization
  – Continue to provide SW community support via SemWebCentral through ’05
  – Addition tools for developer support
    • Extensions to SWeDE
    • Snapshot Viewer
    • SW Reference Implementation
DAML Integration and Transition

Summary

• Focused on facilitating the DAML community’s objective of enabling and building the Semantic Web
  – Collaboration
  – Standards support
  – Data
  – Tools
  – DoD Applications

• Our DAML experience has led to several growing Semantic Web pilot programs funded by user organizations