SATURN Update

DAML PI Meeting

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SATURN: Needs and Challenges [1 of 2]

- SATURN = **s**emantic **a**ccess to **t**ime-ordered **u**rl's and **r**elated **i**nformation
- Objective: easier and more accurate access to intelligence information
  - Unstructured intelligence (documents, in broadest sense)
  - Profiled and retrospective search, retrieval, and discovery
    - Based on time, geography, producing organization, ***content***, etc.
  - Results displayed chronologically
- Federated search across document collections
- Incorporate promising advanced technologies
  - Especially Semantic Web

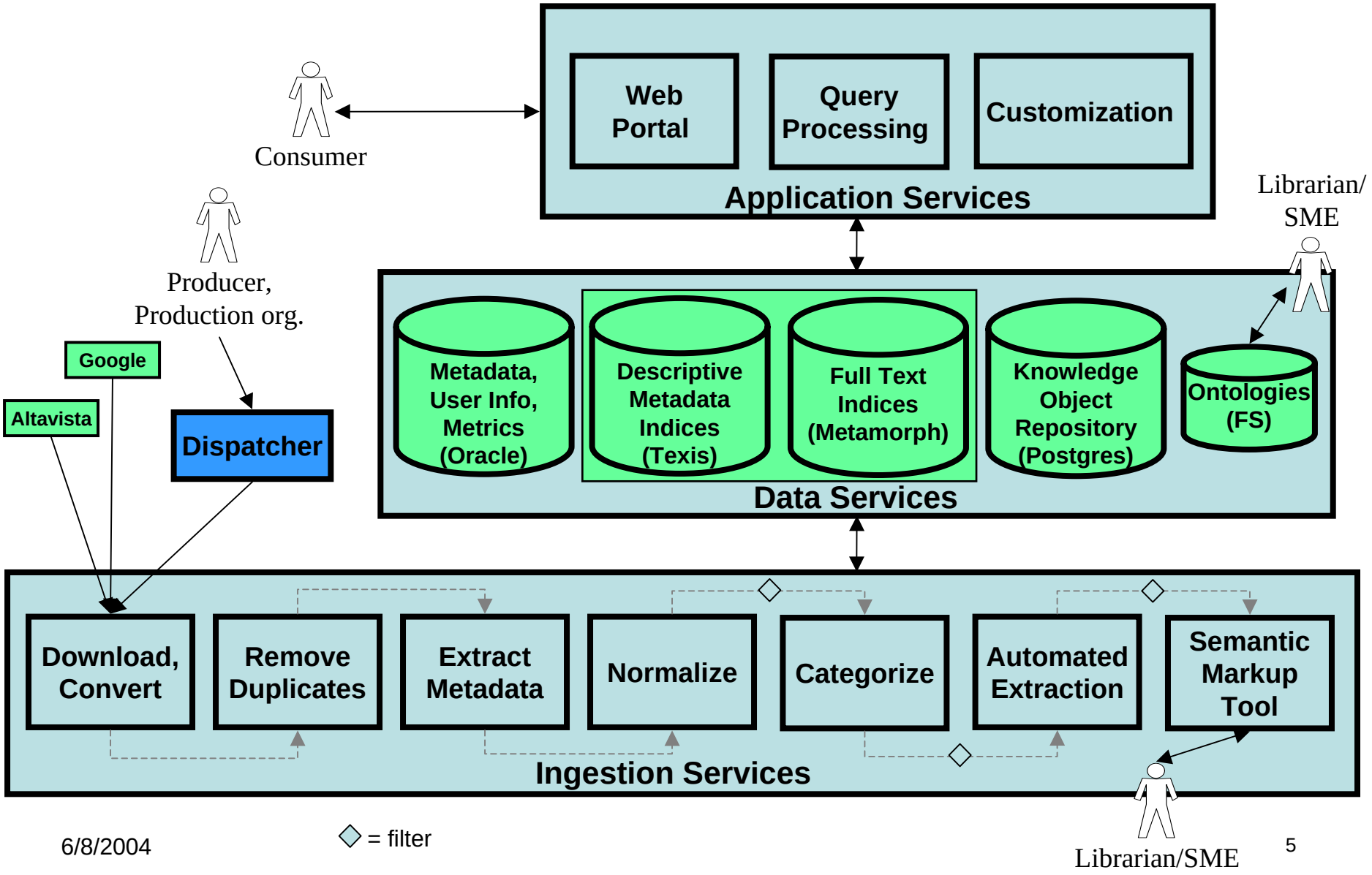
SATURN: Needs and Challenges [2 of 2]

- Profiled (“push”) search and retrieval
  - Users can establish any number of standing queries
  - Resulting metadata displayed chronologically (like Google News), in sections (per standing query), with pointer to document
  - Customizable display (number of results, sorting, etc.), updated as new documents become available
- Retrospective (“pull”) search and retrieval
  - On-the-fly queries using the same form as for establishing profiles
  - Resulting metadata displayed chronologically or by relevance, with pointer to document
- *Support making conclusions on metadata alone*
  - *Capability depends on the depth of metadata expressed and returned from query*

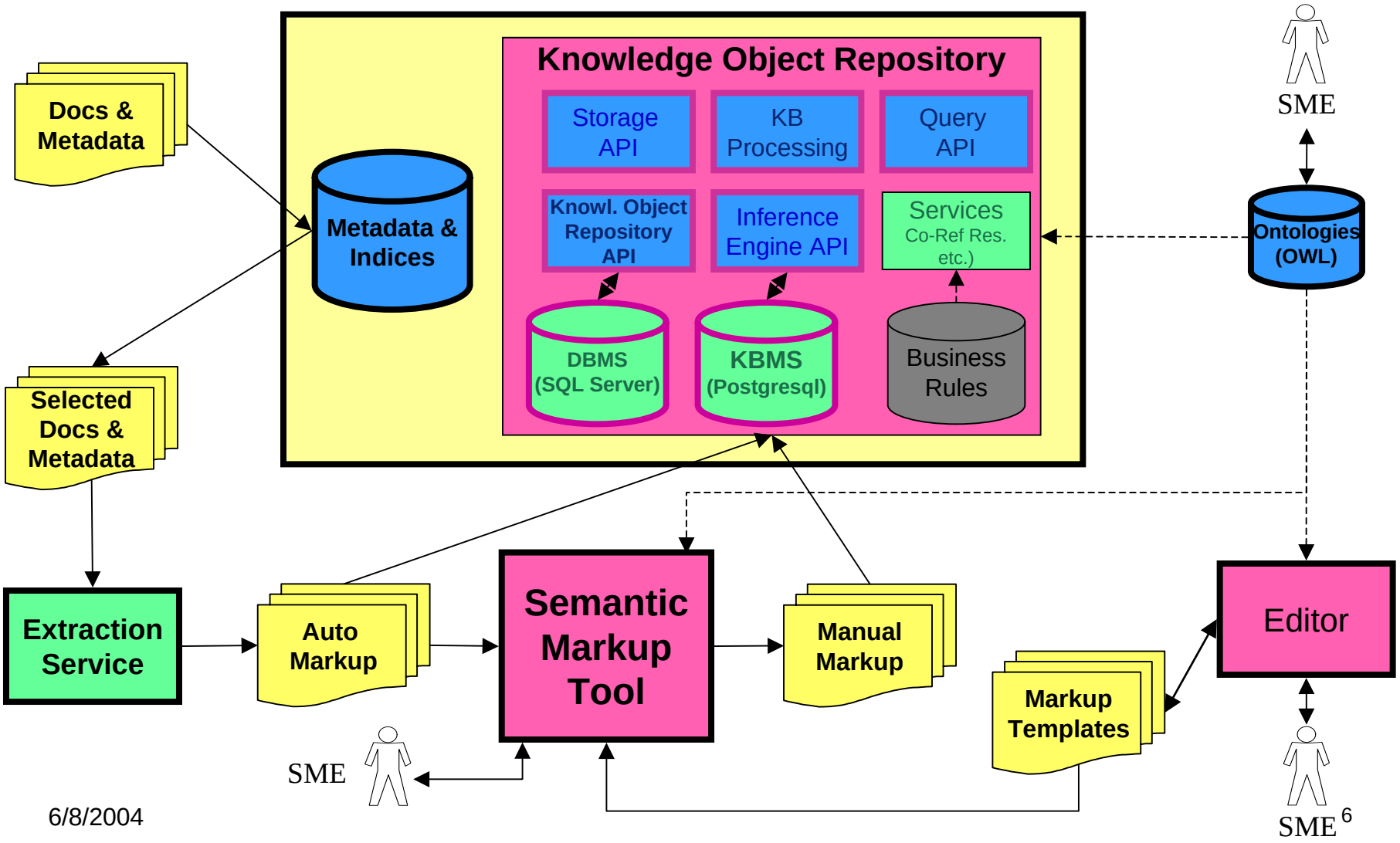
SATURN: Semantic Markup Approach

- If product has no metadata assigned
  - Derive estimates of time, organization, geographic reference, etc.
  - Use automated categorization tools to derive subject (according to common ontology)
  - For subset of all documents, use automated markup then semantic markup by SME to derive entities, relationships, etc.
- If product has metadata assigned by author or producing organization
  - Normalize to common syntax and semantics
    - Mappings may be difficult to produce and to apply
  - May have to add metadata not assigned as above
- Use assigned metadata to “train” automated tools

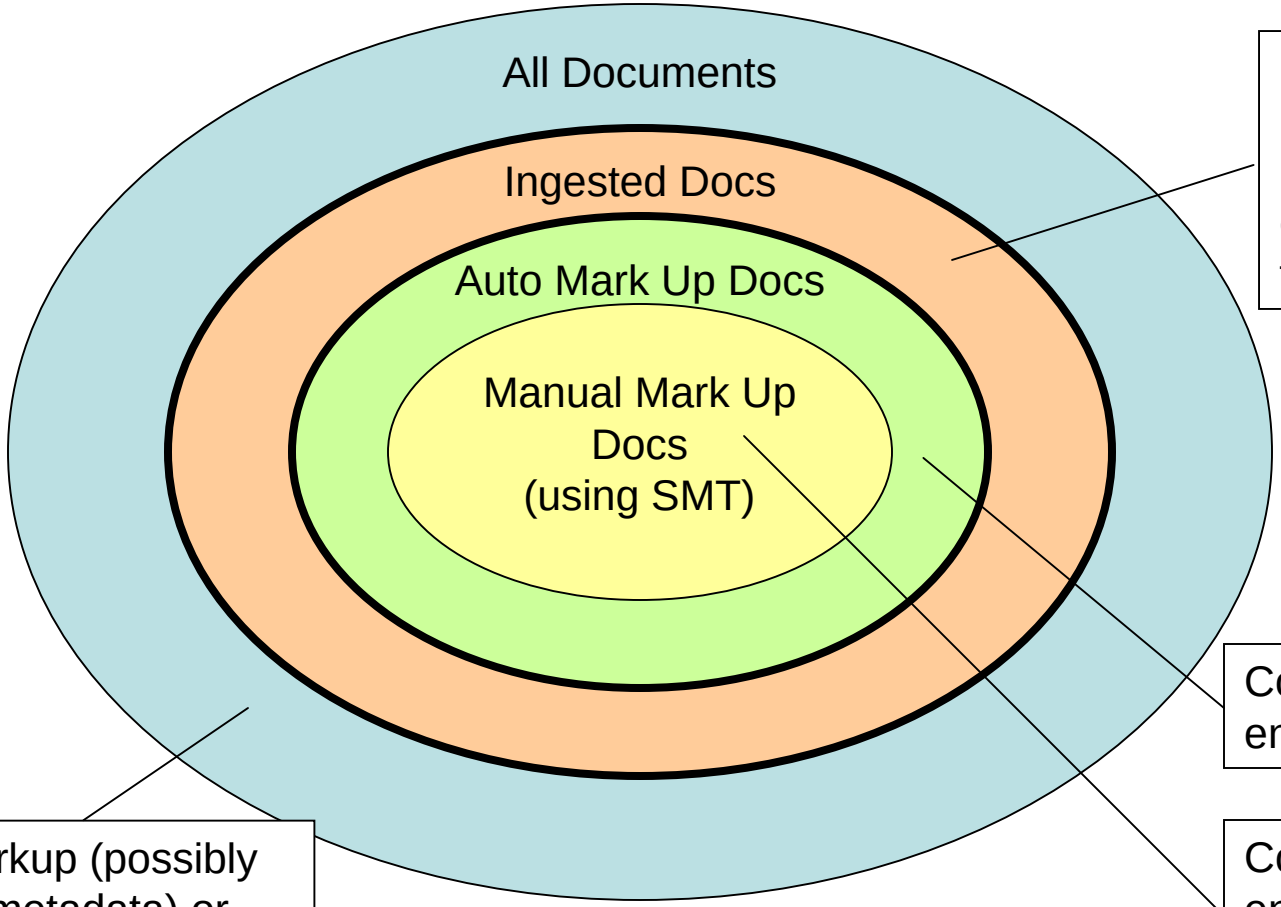
SATURN Functional Architecture



Semantic Markup Functional Architecture



Document Markup Landscape



Descriptive metadata markup (with automatic categorization) & text indexing

Content markup: entities

Content markup: entities & relationships

HTML markup (possibly including metadata) or XML metadata markup

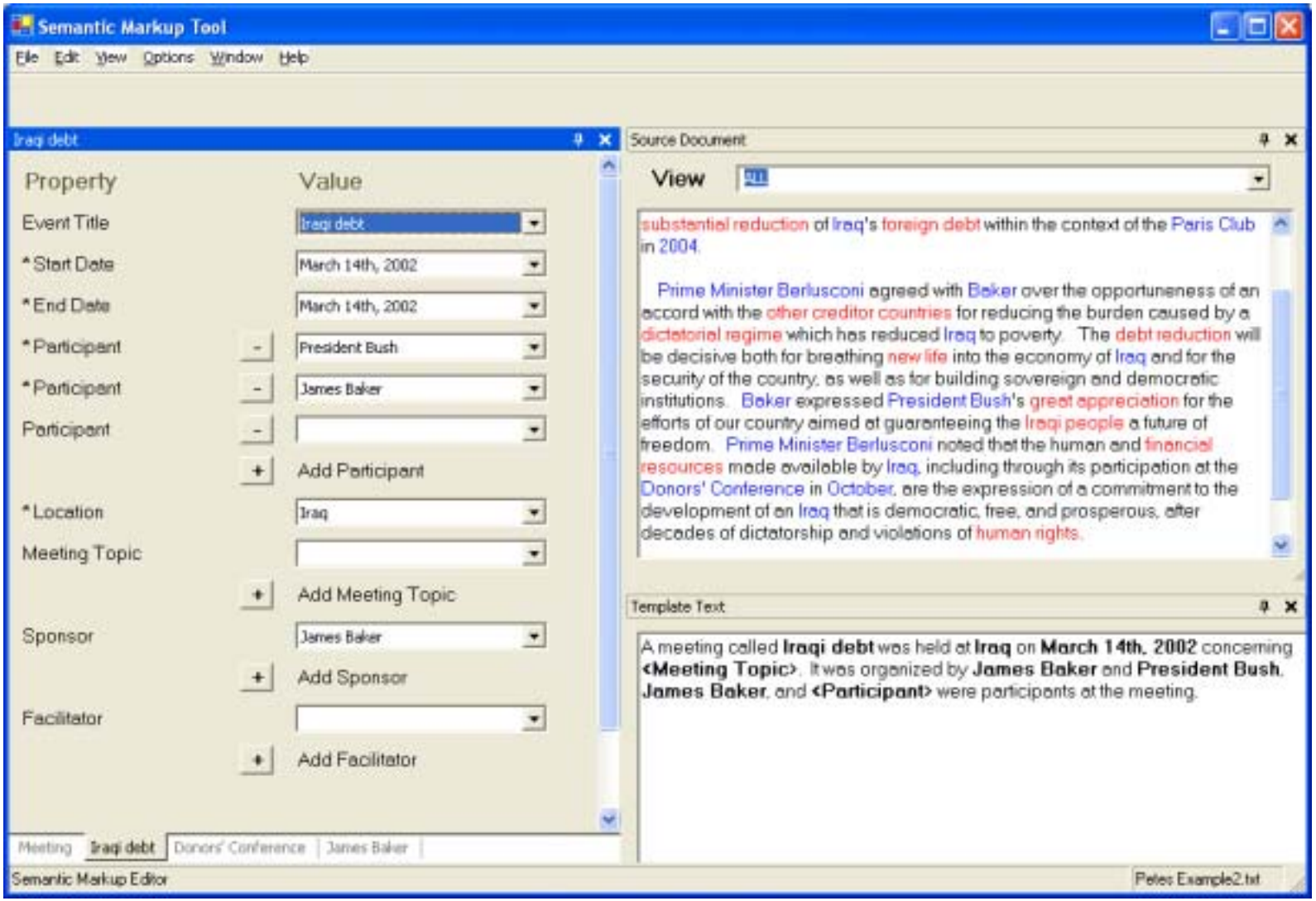
SATURN API's

- Portal
  - TBD (possible ones include accessing an external knowledge/data source, calling a search tool or results ranker, etc.)
- Document Ingest
  - Arbitrary query including category
- Data Services
  - Accessible using JDBC (could implement as a web service)
- Markup Tools & Knowledge Object Repository
  - Knowledge object repository has an external API (OWL-based, queries in DQL/KBQL supported)
  - Entity extractor API for plugging in different entity extractors
  - Co-reference resolution service to use an external reasoner to match knowledge objects

Longer-Term Technical Challenges

- Knowledge Object Repository
  - Investigating various COTS/GOTS options
  - OWL support/inference making & scalability
- Co-reference Resolution
  - Investigating several approaches
- Integration of search with varying levels of metadata
  - “Virtual” documents (from knowledge objects)
  - Investigating applicable DAML Program tools
- Integration of Semantic Markup Tools into Early Adopters’ Production/Dissemination Approaches
  - Using .net for SMT (GUI) implementation to facilitate
  - Support for local storage/exploitation of OWL markup from SMT
- Support for ontology evolution once SMT & Knowledge Object Repository is deployed
  - DIONE work on ontology versioning by ISX & Lehigh Univ.

Example: Markup Tool



Summary

- In the real world, metadata ranges over a spectrum, from simple descriptive to deep content
  - Many documents will have no, bad, or simple metadata
  - It will be cost effective to add deep semantic markup to only a subset of all documents
- Integration of search and retrieval, metadata browsing, and analysis must be across documents with all types of metadata
- To the extent possible, support analysis and making conclusions on metadata alone
  - Use documents for detail and reference