The Role and Impact of the New Data Reference Model 2.0

Internal Government Agency Communications,
Knowledge-Sharing and Collaboration:
Capitalizing On Collaborative Efficiencies,
Transforming Inter & Intra Agency Communications
June 13-14, 2006
Brand Niemann, US EPA and SICoP Co-Chair
http://colab.cim3.net/cgi-bin/wiki.pl?SICoP

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Prospectus

- Identifying new approaches to enhancing collaboration, secure communications, and increase timely decision making between, within, and across agencies.
- Outlining the latest technologies and programs crucial for information sharing including: wikis, blogs, RSS feeds, podcasts.
- Lessons learned in the implementation process.
- Using the horizontal management style to encourage collaboration/information sharing.

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What's New

- Open Collaboration: Networking Wiki Information Technology for Information Sharing and Knowledge Management, July 18th Collaborative Expedition Workshop.
  - Wikis Changing Agency Culture for Information Sharing in "Wikis and Blogs"
    - D. Calvin Andrus, Ph.D., Chief Technology Officer, Center for Mission Innovation, CIA
  - The Wiki: A grassroots approach to providing KM solutions... Wikis seem to be an ideal tool for furthering corporate KM goals and outcomes, as they are true sharing and collaborating environments that grow both individual as well as organizational knowledge and competency
    - Niall Sinclair , Stealth KM: Winning Knowledge Management Strategies for the Private Sector, Butterworth-Heinemann (2006).

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What's New

- 5th Semantic Interoperability for E-Government Conference, Oct. 30-31st.
  - Featuring the Semantic Wiki - Three Functions: Edit. Semantic Metadata, and Semantic Modeling of the SICoP Semantic Wiki & Information Management WG
- SemanticGov Project-Providing Integrated Public Services to Citizens at the National and Pan-European Level with the Use of Emerging Semantic Web Technologies.
  - September 29th Workshop in Helsinki and October 30-31st Conference above.
- NARA Guidance for Web-Related Technologies (Blogs, Wikis, Portals, and RSS) and Instant Messaging
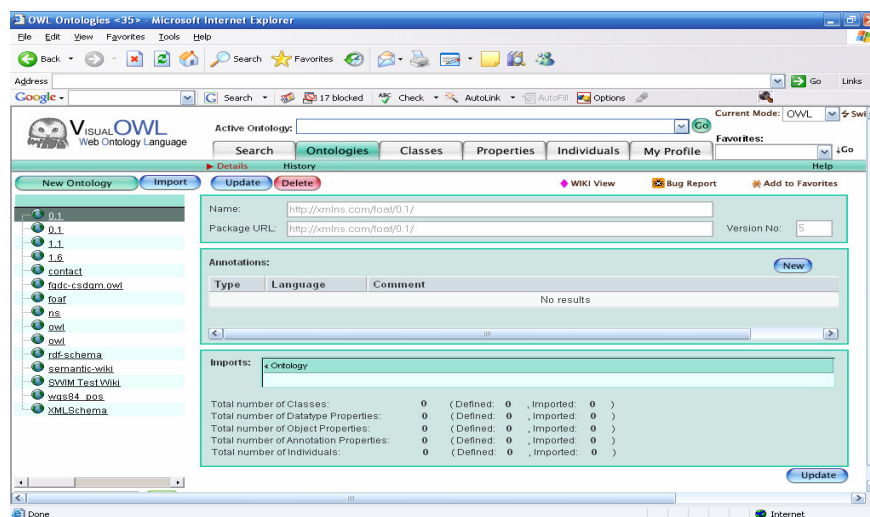 - Initial meeting yesterday to gather agency input to develop guidance documents.

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SICoP/SWIM Test Semantic Wiki
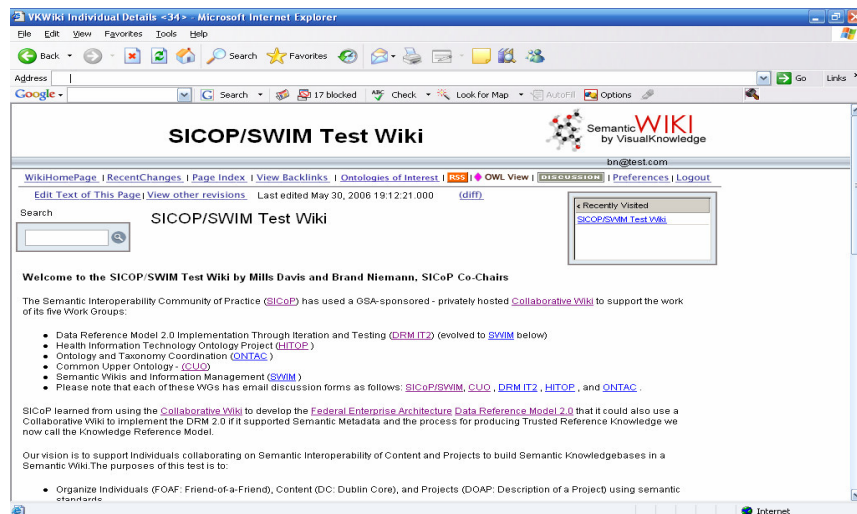
See at the Open Collaboration: Networking Geospatial Information Technology for Interoperability and Spatial Ontology, June 20-22nd, Collaborative Expedition Workshop. 5

SICoP/SWIM Test Semantic Wiki

See at the Open Collaboration: Networking Geospatial Information Technology for Interoperability and Spatial Ontology, June 20-22nd, Collaborative Expedition Workshop. 6

Abstract

- SICoP has supported the Data Reference Model (DRM) 2.0 before, during, and after its formal release in December 2005 with:
  - Semantic standards, technologies, and metadata;
  - Implementation pilots and guidance;
  - A Knowledge Reference Model (KRM) built on DRM 2.0 and implemented in Semantic Wikis for Trusted Reference Knowledge (TRK); and
  - Work on the convergence of semantic naming and identification technologies for TRK.
- This presentation summarizes these contributions, provides a specific example, and encourages use of Semantic Wikis and Semantic Information Management for building Trusted Reference Knowledge (TRK) in Dynamic Knowledge Repositories (DKR).

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Definitions

- Reference Model:
  - A reference model is an abstract framework for understanding significant relationships among the entities of some environment that enables the development of specific architectures using consistent standards or specifications supporting that environment.
  - A reference model consists of a minimal set of unifying concepts, axioms and relationships within a particular problem domain, and is independent of specific standards, technologies, implementations, or other concrete details. (It does seek to provide a common semantics that can be used unambiguously across and between different domains. December 15, 2005).
  - Source: OASIS Reference Model for Service Oriented Architecture, Committee Draft 1.0, 7 February 2006:
    - **http://www.oasis-open.org/committees/download.php/16587/wd-soa-rm-cd1ED.pdf**

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Overview

- 1. DRM – SICoP History
- 2. DRM 2.0 Education and Implementation
- 3. Semantic Wikis and Information Management
- 4. Questions and Answers

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1. DRM – SICoP History

- December 2004, DRM 1.0 – Just structured data (Description) and exchange packages (Sharing).
- February 2005, SICoP White Paper 1 ("Data Architecture of the Future") – All three types of data (Description) and ontologies (Context).
- October 2005, SICoP DRM 2.0 Implementation Guide – Metamodel and Semantic Metadata (see slides 11-12).
- December 2005, DRM 2.0 – Description (3), Context (2), and Sharing (2) (see slide 13).

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1. DRM – SICoP History

- Metamodel: Precise definitions of constructs and rules needed for abstraction, generalization, and semantic models.
- Model: Relationships between the data and its metadata.
- Metadata: Data about the data.
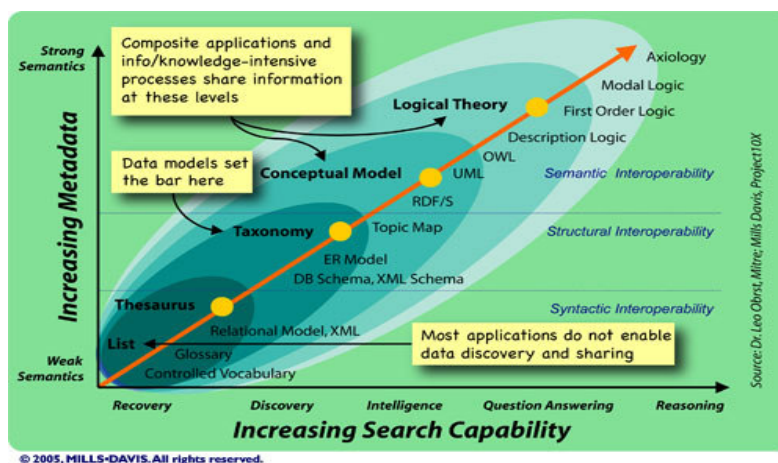- Data: Facts or figures from which conclusions can be inferred.

Relationships and associations
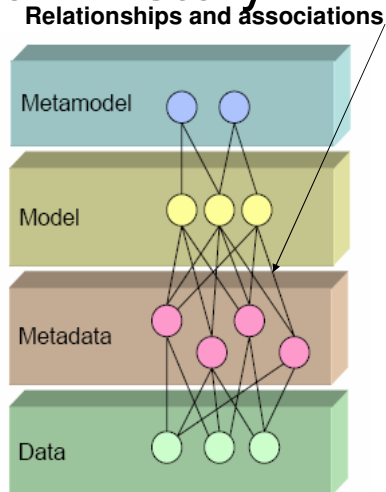
Source: Professor Andreas Tolk, August 16, 2005

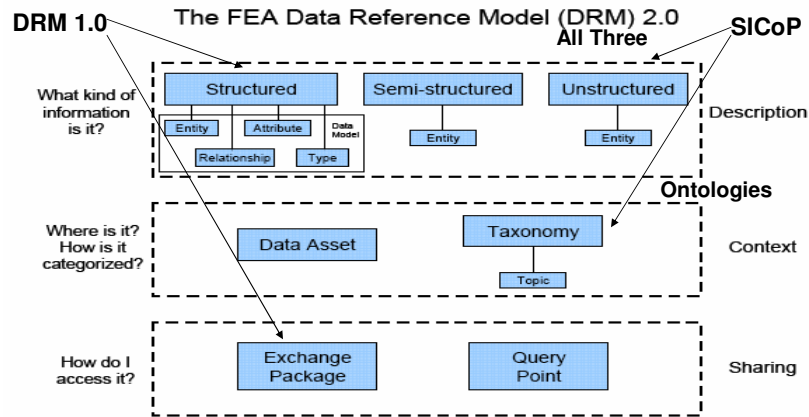**Source: DRM 2.0 Implementation Guide, page 6, October 17, 2005, 19 pp. See slide 14 for explanation.**

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1. DRM – SICoP History

Source: DRM 2.0 Implementation Guide, page 6, October 17, 2005, 19 pp. See slide 14 for explanation.

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1. DRM – SICoP History

Source: Expanding E-Government, Improved Service Delivery for the American People Using Information Technology, December 2005, pp. 2-3. http://www.whitehouse.gov/omb/budintegration/expanding_egov_2005.pdf

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1. DRM – SICoP History

- Summary:
  - Slide 11: We need to describe information model relationships and associations in a way that can be accessed and searched.
  - Slide 12: Increasing Metadata (from glossaries to ontologies) is highly correlated with Increasing Search Capability (from discovery to reasoning).
  - Slide 13: Three things about data (Description, Context, and Sharing) are needed for information sharing.
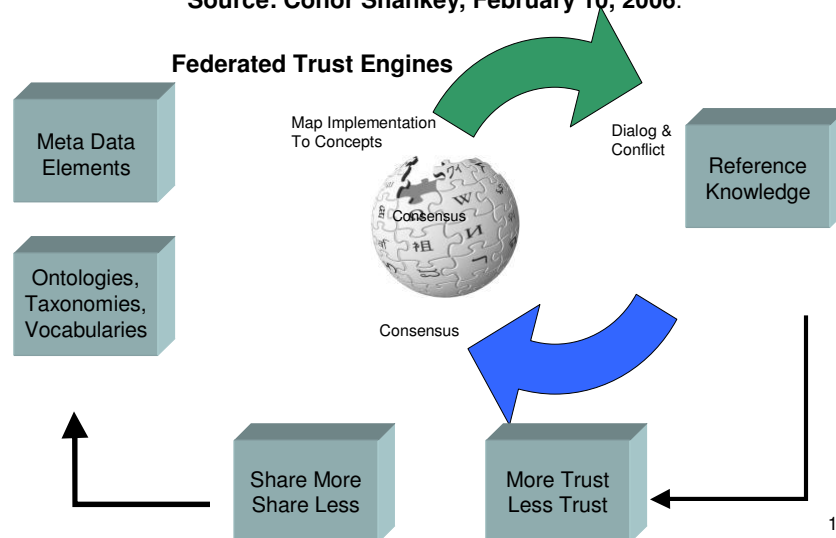
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1. DRM – SICoP History

- February - April 2006, Semantic Wikis: Giving Communities of Practice Tooling to Implement the Data Reference Model (DRM) and Build Trusted Reference Knowledge (see slides 16-18):
  - Fourth Semantic Interoperability for E-Government Conference, Government Printing Office, Semantic Technologies Conference, FOSE 2006, NIST Interoperability Week, Delphi Conference, Norwegian Semantic Days, KM Conference, etc.
- April 2006, Convergence of Semantic Naming and Identification Technologies for TRK (see slide 19):
  - Open Collaboration: Networking Health Information Technology, Collaborative Expedition Workshop #50, Tuesday, April 18, 2006 at NSF and Convergence of Semantic Naming and Identification Technologies?, April 27, 2006, Hilton Crystal City.

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1. DRM – SICoP History

Source: Conor Shankey, February 10, 2006.

Federated Trust Engines

Map Implementation To Concepts

Dialog & Conflict

Consensus

Meta Data Elements

Reference Knowledge

Ontologies, Taxonomies, Vocabularies

Consensus

Share More Share Less

More Trust Less Trust

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Special Recognition

Conor Shankey, CEO, Visual Knowledge

For "Tooling to Implement the Federal Enterprise Architecture Data Reference Model and a Knowledge Reference Model" in a "Semantic Wiki" in Support of the SICoP Semantic Wiki and Information Management (SWIM) WG at the Joint Open Group, Federal Semantic Interoperability Community of Practice (SICoP), and Federal Metadata Management Consortium Conference, April 27-28, 2006, Hilton Crystal City, Arlington, Virginia

By SICoP Chair, Brand Niemann, U.S. EPA

KM.GOV

SICoP

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Architecting to the Edge™
Hilton Crystal City, Washington DC, USA
April 24-26, 2006
The Open Group Member Meetings, April 24-28

THE *Open* GROUP

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1. DRM – SICoP History

- So DRM 2.0 + Semantic Metadata = Knowledge Reference Model (KRM).
- DRM 2.0 Implementation Evolves to the SICoP Semantic Wikis and Information Management (SWIM) WG:
  – Antoinette Arsic, MITRE, and Mills Davis, Project10X, Co-Leads:
    • See http://colab.cim3.net/cgi-bin/wiki.pl?SICoP/SemanticWikisandInformationManagementWG
  – Semantic Wikis - Semantic Research, Mills Davis:
    • Stage 1: Internet Wiki
    • Stage 2: Semantic Web-based Wikis (15-20 projects circa 2006)
      – See http://colab.cim3.net/file/work/SICoP/SWIM/SemanticWikiReview.ppt
    • Stage 3: Knowledge Worker Automation
    • Stage 4: Knowledge Computing
  – Semantic Wikis for collaboration, information sharing, knowledge management, & knowledge computing, Mills Davis:
    • Semantic Wiki Scenario: COI develops & publishes reference knowledge for net-centric information sharing and Ten scenarios where semantic wikis add value.
      – See http://colab.cim3.net/file/work/SICoP/SWIM/SemanticProspects06425.pdf

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1. DRM – SICoP History

- Open Collaboration: Networking Health Information Technology, Collaborative Expedition Workshop #50, Tuesday, April 18, 2006 at NSF:
  - Standardized vocabulary (e.g. CHI) – medical terminology
  - ISO/IEC 11179/UDEF – medical data
  - RFID – medicine in containers
  - RDF – medical instructions
  - RDF – medical images
  - IPV6 – medical devices
  - PURLs, etc. – medical literature
- An Electronic Health Record (EHR) that is not just electronic, but machine processable to reduce errors and costs (express and store in RDF, organize and reason over in OWL, etc.) that supports the FHA Data Architecture Work Group – a Semantic Technology EHR!

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2. DRM 2.0 Education & Implementation

- June – September 2005, DRM 2.0 Pilots in Collaborative Expedition Workshops and Public Meetings.
- October 15, 2005, DRM 2.0 Implementation Guide and Education Pilot.
- November 21, 2005, Mapping DRM Abstract Model 2.0 to OMB Section 207d / DRM Guidance.
- December 6, 2005, DRM 2.0 Implementation Through Iteration and Testing: Performing, Collaboration Expedition Workshop #46: Advancing Information Sharing and Data Architecture.
- December 13, 2005, SICoP and DRM 2.0 Implementation Through Iteration and Testing: Making It Real for the Federal Metadata Management Consortium Meeting.

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2. DRM 2.0 Education & Implementation

- December 28, 2005, SICoP DRM 2.0 Pilot of LoB/CoP Started in Support of the New Federal Health Architecture's Data Architecture Working Group to Model (Ontology) the Documents for the DKR.
- January 11, 2006, Data Reference Model 2.0 and the role of metadata. GCN Senior Writer Joab Jackson moderated an online forum with Brand Niemann, Chair of the Federal CIO Council's Semantic Interoperability Community of Practice (SICoP).
- February 9-10, 2006, Fourth Semantic Interoperability for E-Government Conference. See February 10th Session on DRM 2.0 Implementation.
- February 15, 2006, SICoP Provides Keynotes and Presentations at the Lockheed Martin 11th Annual Information Technology Trends Conference on DRM 2.0.

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2. DRM 2.0 Education & Implementation

- March 7-9, 2006, DRM Version 2 and Metadata @ FOSE 2006: Opportunities for Agencies and Vendors and Semantic Wikis for Information Management and Sharing.
- March 21-23, 2006, DRM 2.0 and Metadata and Semantic Wikis for Information Management and Sharing for the USGS Scientific Information Management Workshop.
- April 20, 2006, KM Business Case Successes and Potential Way Ahead for a KM Line of Business "Business Case" Using a KRM and the Federal Transition Framework (FTF) Metamodel for the KM WG Meeting at the KM Conference.
- April 12 and 25, 2006, DRM 2.0 and Metadata for the Shenandoah-Mid-Atlantic Region Pilot and the Sustainable Water Resources Roundtable Preliminary Report on Indicators in a Semantic Wiki for CEQ and the Key National Indicators Initiative.

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3. Semantic Wikis & Information Management

- GPO - SICoP/DRM 2.0 Pilot of Trusted Reference Knowledge:
  - CIA Fact Book:
    - See http://www.odci.gov/cia/publications/factbook/index.html
      - Updated periodically throughout the year.
    - Lots of Metadata (Notes and Definitions and Appendices)
    - Use of Multiple taxonomies:
      - 270 County Profiles by Alphabet Plus Worlds and Other:
        - » Nine Categories: Introduction, Geography, People, Government, Economy, Communications, Transportation, Military, and Transnational Issues
      - Rank order statistics for 48 sub-categories in 6 of 9 categories.
    - See Bryan Aucoin, Service Oriented Architecture, Information Sharing and the FEA DRM, January 24, 2006 (next slide).

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3. Semantic Wikis & Information Management
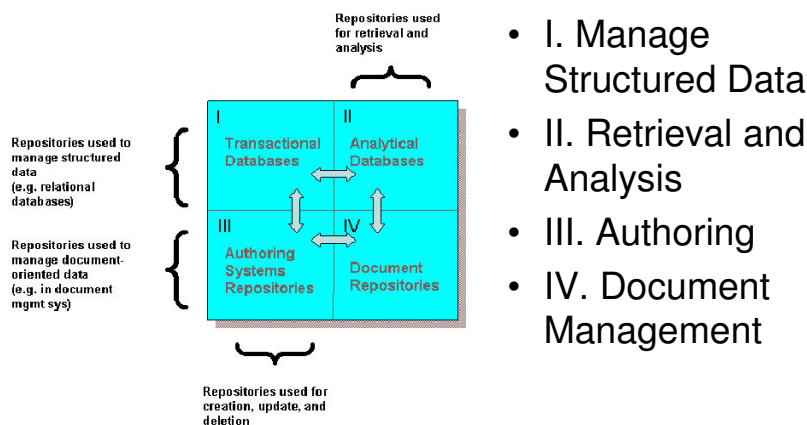
- I. Manage Structured Data
- II. Retrieval and Analysis
- III. Authoring
- IV. Document Management

Source: Bryan Aucoin, Service Oriented Architecture, Information Sharing and the FEA DRM, January 24, 2006, slide 9.

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3. Semantic Wikis & Information Management

This Data Architecture Provides the Three S's: Structure, Searchability, and Semantics.
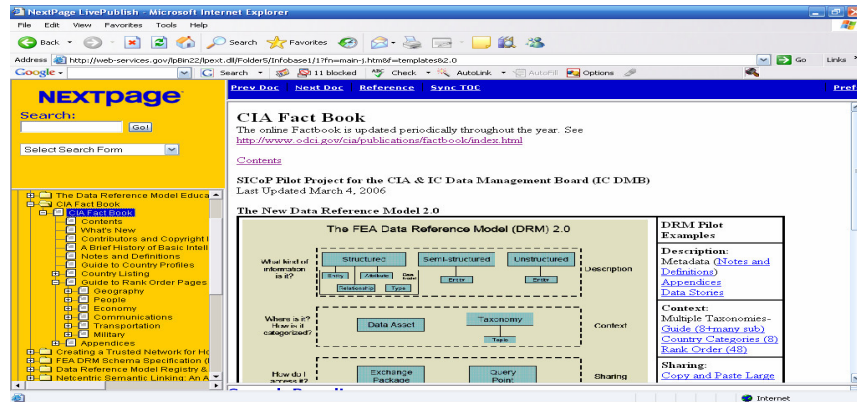
See http://web-services.gov and Dynamic Knowledge Repositories 25

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3. Semantic Wikis & Information Management

See next slide for explanation. Federated Search of All DRM Taxonomy Nodes
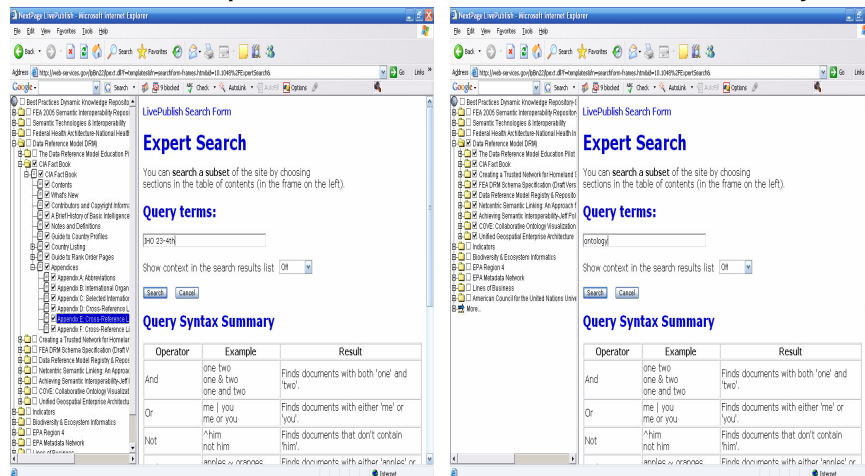
Query of CIA Fact Book Taxonomy Nodes 26

3. Semantic Wikis & Information Management

- Query of CIA Fact Book Taxonomy Nodes:
  - This is the Expert Search Form Interface in the Web Browser where the (1) left pane has the hierarchical table of contents structure in the left pane where the document (s) and their subsections are selected for search and the (2) right pane has the boxes for the actual search query terms ("IHO 23-4th"), number of words about the highlighted search terms that are desired (none), the search execution button, and the query syntax explanation.
- Federated Search of All DRM Taxonomy Nodes:
  - This is the same as item 2 above, except that a different set of boxes are checked in the (1) left pane (the entire DRM Node) and a different query ("ontology") and number of words about the highlighted search terms that are desired (five) are used in the (2) right pane.

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3. Semantic Wikis & Information Management

Recall Slide 8

Data Story

Metamodel

Model

Metadata

Data

Note: Can Highlight Table and Copy and Paste to Spreadsheet Because of XML Markup.
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3. Semantic Wikis & Information Management

Separation of the Data Presentation from the Data & Metadata.

Data & Metadata (see next slide)

Data Presentation/ Visualization

http://web-services.gov/statabs2003no1.htm

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3. Semantic Wikis & Information Management

The Data & Metadata Travel Together in XML Format!

Data & Metadata in XML

http://web-services.gov/statabs2003no1.htm

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3. Semantic Wikis & Information Management

FEA Reference Model	CIA Fact Book	FEA Profile	CIA Fact Book
BRM	Intelligence Support to US Government	**Security & Privacy**	The CIA does that!
PRM	62nd Year of Publication	**Records Management**	Slide 23 – Document Management
DRM	Slide 24 Shows Implementation of Slide 7	**Geospatial**	Country Maps & Appendices D-F
SRM	Digital Asset Services/Knowledge Management		
TRM	SOA (Publish, Find, & Bind) with Taxonomy of XML Web Services Nodes		

Note: This pilot treats all five FEA Reference Models and three FEA Profiles! 31

4. Questions and Answers

- Responsibilities & Contact Information:
  - Enterprise Architecture Team: Data Architecture, U.S. Environmental Protection Agency, Office of the CIO and Assistant Administrator for Environmental Information, EPA East Building, 1301 Constitution Avenue, NW, Washington, DC 20460, 202-564-9491, niemann.brand@epa.gov.
  - Board Member of the Federal CIO Council's Knowledge Management Working Group.
  - Co-Chair, Semantic Interoperability Community of Practice (SICoP), Best Practices Committee, Federal CIO Council, W. Hord Tipton, CIO, Department of the Interior, and George Strawn, NSF CIO, Co-Chairs.
  - Member, Architecture & Infrastructure Committee, Emerging Technology Subcommittee, John McManus, NASA, CTO, and Susan Turnbull, GSA, Co-Chairs.
  - Lead, DRM 2.0 Implementation Through Iteration and Testing Team.

http://colab.cim3.net/cgi-bin/wiki.pl?BrandNiemann

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