«Business problems like Infoglut and Knowledge Management are calling for new ways of managing information and knowledge... it is no longer enough to simply manage information – we have to start managing the meaning of information.»

Steve Pepper
Chief Strategy Officer, Ontopia
Convenor, SC34/WG3
Editor, XML Topic Maps
<pepper@ontopia.net>
Road Map

• **10.30-12.00**
  – Introduction
    • The Findability Problem
  – Understanding Topic Maps
    • The TAO of Topic Maps
  – Applying Topic Maps
    • The Business Case

• **13.30-17.00**
  – Towards Seamless Knowledge
    • Integrating Public Sector Portals in Norway
  – Hands-on Topic Maps
    • Syntax
    • Ontology
    • Topic Map Creation
Ontopia – The Topic Map Company

• **Our mission:**
  – To provide Topic Map technology and services for information and knowledge management

• **Background:**
  – Established April 2000 out of STEP Infotek
  – Headquarters in Oslo, Norway
  – Partners in 8 countries around the world
  – Recognized leaders of the Topic Map community

• **Products:**
  – The Ontopia Knowledge Suite™
  – Consultancy, training, application development

On'topia, 1999.[f. Gr. 'onto-' (being) + Gr. ‘topos’ (place); see -IA.]

I. An imaginary world in which knowledge is well organized.
II. A company that provides tools to help you realize your own Ontopia.

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What is Topic Maps?

• An International Standard for the formal representation of knowledge

• More importantly...

• What is Topic Maps used for?

• (What are topic maps used for?)
  – Organizing large bodies of information
  – Capturing organizational memory
  – Representing complex rules and processes
  – Supporting concept-based eLearning
  – Managing distributed knowledge and information
  – Aggregating information and knowledge

• = Seamless Knowledge
Views on Topic Maps

• **From Information Management**
  – A new paradigm for organizing, retrieving, and navigating information resources

• **From Knowledge Management**
  – A knowledge representation formalism optimized for use in information management

• **From Library Science**
  – A way to collocate all knowledge about a subject – in particular its relationship to other subjects and to information resources
Topic Maps are an International Standard

- **Roots go back to early 1990’s**
  - Davenport Group → CAPH → ISO
  - In other words: A mature standard

  - Model and syntax based on SGML

- **Web Standard (XML Topic Maps 1.0, 2001)**
  - XML version for use on the Web
  - Adopted by ISO, October 2001

- **Second Edition**
  - ISO 13250: 2003 (includes XTM)

- **Revised Edition**
  - Multipart standard including data model, query language and constraint language (2005)
The Findability Problem

Traditional Approaches
What is an Index?
The Findability Problem

• **Ask yourself:**
  – Is this problem really “new”? Didn’t it exist before the advent of computers?
  – How would you go about locating a specific piece of information in a book – short of reading it from cover to cover?

• **Isn’t that what (back-of-book) indexes are for?**
  – An index is an information retrieval device
  – Publishers have traditionally set great store by indexes:
    • “There is no book … so good that it is not made better by an index, and no book so bad that it may not by this adjunct escape the worst condemnation” (*Sir Edward Cook*)

• **Indexes and maps**
  – The task of the indexer is to chart the topics of the document and to present a concise and accurate map for the readers
    • “A book without an index is like a country without a map”
What is an Index, Really?

Madama Butterfly, 70-71, 234-236, 326
Puccini, Giacomo, 69-71
soprano, 41-42, 337
Tosca, 26, 70, 274-276, 326

topics (in fact, names of Topics)
page numbers (locators for Occurrences)
Constituents of a (Simple) Index

- **Topics** (shown as a list of *topic names*)
- **Occurrences** (shown as a list of *locators* of topic occurrences)

- the kinds (or types) of topics may vary
  ...and so might the addressing mechanism

- But the principle is always the same
A More Complex Index

Cavalleria Rusticana, 71, 203-204
Mascagni, Pietro (composer)

Cavalleria Rusticana
Rustic Chivalry, see Cavalleria Rusticana

singers, 39-52
See also individual names
baritone, 46
bass, 46-47
soprano, 41-42, 337

Additional concepts:

- Index of names
- Index of places
- Index of subjects

topic types
occurrence types
topics with multiple names
associations between topics

+ multiple indexes
+ other conventions
The Key Features Are

Topics
- named “subjects of discourse”
- may have multiple names
- may be typed

Associations
- relationships between topics

Occurrences
- information relevant to a topic
- may be typed
- pointed to via locators

These are also the key constructs in the topic map model!
What is a Glossary?

bass: The lowest of the male voice types. Basses usually play priests or fathers in operas, but they occasionally get star turns as the Devil.

diva: Literally, “goddess” – a female opera star. Sometimes refers to a fussy, demanding opera star. See also prima donna.

first lady: See prima donna.

Leitmotif (German, “LIGHT-mo-teef”): A musical theme assigned to a main character or idea of an opera; invented by Richard Wagner.

prima donna (“PREE-mah DOAN-na”): Italian for “first lady”. The singer who plays the heroine, the main female character in an opera; or anyone who believes the world revolves around her.

soprano: The female voice category with the highest notes and the highest paycheck.

• Glossaries have a different purpose than indexes:
• The purpose is not to provide pointers to every occurrence of a topic...
• ...but rather to provide one specific occurrence type – the definition
• Therefore, instead of using locators (page numbers) to point to the definition...
• ...the definition is simply placed in-line.
• It looks different on paper, but the underlying model is exactly the same
What is a Thesaurus?

<table>
<thead>
<tr>
<th>soprano</th>
<th>The highest category of female (or artificial male) voice</th>
</tr>
</thead>
<tbody>
<tr>
<td>definition</td>
<td>The highest category of female (or artificial male) voice</td>
</tr>
<tr>
<td>broader terms</td>
<td>vocalist, singer</td>
</tr>
<tr>
<td>narrower terms</td>
<td>lyric soprano, dramatic soprano, coloratura soprano</td>
</tr>
<tr>
<td>related terms</td>
<td>mezzo-soprano, treble</td>
</tr>
</tbody>
</table>

Note: The associations are typed!

Basic concepts:
- topics
- associations
- occurrences

Additional concepts:
- topic types
- occurrence types
- association types

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What are Semantic Networks?

• From the realm of AI (artificial intelligence)

• A formalism for representing knowledge
  – Examples:
    – “Puccini composed Tosca”
    – “Ontopia employs Steve”
    – “Model B uses engine X”

• Principle building blocks are
  – concepts, and
  – relations
The TAO of Topic Maps

Topics, Associations, Occurrences
Subject Identity
Scope
The 2-Layer Topic Map Model

• The core concepts of Topic Maps are based on those of the back-of-book index

• The same basic concepts have been extended and generalized for use with digital information

• Envisage a 2-layer data model consisting of
  – a set of information resources (below), and
  – a “knowledge map” (above)

• This is like the division of a book into content and index
(1) The Information Layer

- The lower layer contains the content
  - usually digital, but need not be
  - can be in any format or notation
  - can be text, graphics, video, audio, etc.

- This is like the content of the book to which the back-of-book index belongs
(2) The Knowledge Layer

- The upper layer consists of topics and associations
  - **Topics** represent the subjects that the information is about
    - Like the list of topics that forms a back-of-book index
  - **Associations** represent relationships between those subjects
    - Like “see also” relationships in a back-of-book index
Linking the Layers Through Occurrences

- The two layers are linked together
  - **Occurrences** are relationships with information resources that are pertinent to a given subject
  - The links (or locators) are like page numbers in a back-of-book index

```
<table>
<thead>
<tr>
<th></th>
<th>composed by</th>
<th>composed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puccini</td>
<td>Tosca</td>
<td>Madame Butterfly</td>
</tr>
<tr>
<td>born in Lucca</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

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Summary of Core Topic Maps Concepts

• A pool of information or data
  – any type or format

• A knowledge layer, consisting of:
  • Topics
    – a set of knowledge topics for the domain in question
  • Associations
    – expressing relationships between knowledge topics
  • Occurrences
    – information that is relevant in some way to a given knowledge topic

• = The TAO of Topic Maps
Topic Maps and Ontologies

- The basic building blocks are
  - Topics: e.g. “Puccini”, “Lucca”, “Tosca”
  - Associations: e.g. “Puccini was born in Lucca”
  - Occurrences: e.g. “http://www.opera.net/puccini/bio.html is a biography of Puccini”

- Each of these constructs can be typed
  - Topic types: “composer”, “city”, “opera”
  - Association types: “born in”, “composed by”
  - Occurrence types: “biography”, “street map”, “synopsis”

- All such types are also topics (within the same topic map)
  - “Puccini” is a topic of type “composer” … and “composer” is also a topic

- A topic map thus contains its own ontology
  - (“Ontology” is here defined as the classes of things that exist in the domain…)

- Constraints on the ontology are defined separately
  - Topic Map Constraint Language (ISO 19756) will provide a standard way to do this
  - It will be compatible with OWL
With this Simple but Flexible Model You Can

• **Make knowledge explicit, by**
  – Identifying the *knowledge topics* that your information is about
  – Expressing the *relationships* between those knowledge topics

• **Bridge the domains of knowledge and information, by**
  – Describing where to find *information* about the knowledge topics
  – Linking information about a common topic across multiple repositories

• **Transcend simple categories, hierarchies, and taxonomies, by**
  – Applying rich associative structures that capture the complexity of knowledge

• **Enable implicit knowledge to be made explicit, by**
  – Providing clearly identifiable hooks for attaching implicit knowledge

**Demo of the Omnigator**
A free topic map browser from [http://www.ontopia.net/omnigator](http://www.ontopia.net/omnigator)
The Omnigator

A free topic map browser

Online demo:

http://www.ontopia.net/omnigator

Download:

http://www.ontopia.net/download/freedownload.html
The Omnigator: A Generic Topic Map Browser

• An Omnivorous Topic Map Navigator
  – The Omnigator will Eat Anything (provided it’s a topic map!)
  – Any Ontology: including your own
  – Just drop your own topic map into the Omnigator directory and away you go!
  – The Omnigator makes “reasonable sense” out of any “reasonably sensible” topic map

• And it’s Free!
  – Download it from the Ontopia web site
    • http://www.ontopia.net
  – Or view it online at
    • http://www.ontopia.net/omnigator

• Built using Ontopia’s flagship product
  – The Ontopia Knowledge Suite (OKS)
  – A complete Java toolkit for building topic map applications
  – Academic licenses available from sales@ontopia.net

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http://www.ontopia.net/
How the Omnigator Works

server

Omnigator

Ontopia Topic Map Engine

J2EE Web Server e.g. Tomcat

client

<HTML> pages

http://www.ontopia.net/

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http://www.ontopia.net/
omnigator 007
The free topic map navigator from Ontopia. Powered by the Ontopia Knowledge Suite.

Il Tabarro

Current topic

Type(s): Opera

(multiple) names
- Il Tabarro
  - Tabarro - Scope: Sort
  - The Cloak - Scope: English
- Cloak - Scope: English; Sort

(multiple) occurrences

Internal Occurrences (1)
- Première date
  - 1918 (14 Dec)

External Occurrences (3)
- Home page
  - http://opera.stanford.edu/opera/Puccini/ITabarro/main.html
- Illustration
  - file:/C:/oks-demo/jakarta-tomcat/webapps/omnigator/WEB-INF/topicmaps/occurs/opera/puccini/il-tabarro-poster1.jpg
- Poster

Associations (13)
- Based on
  - La Houppelande
- Composed by
  - Puccini, Giacomo
- Dramatis personae
  - Frugola
  - Giorgetta
  - Luigi
  - Michele
  - Talpa
  - Tinca
- First performed at

multiple occurrences

multiple associations
Topic Map Query Language

- ISO/IEC 18048 TMQL
  - Intended to simplify application development
  - Used to extract information and modify TMs
- A requirements document exists
- Various proposals have been put forward
  - One of these will be chosen as the basis of TMQL this spring
- Ontopia has developed tolog
  - tolog also supports inferencing

Demo of querying in the Omnigator
Topic Map Constraint Language

- ISO/IEC 19756 TMCL
- Used to define constraints on topic maps
  - “all persons must be born somewhere”
  - “a person may have died somewhere”
  - “all persons must have a date of birth occurrence, which must contain a date”
  - “email occurrences are unique”
- Ontopia has developed OSL
  - Ontopia Schema Language
- TMCL will interoperate with OWL (Web Ontology Language)

Demo of OSL in the Omnigator
But Wait, There's More...

• **Automated merging**
  – Topic Maps can be merged automatically
  – The merge capability enables many advanced applications
    • information integration across repositories
    • knowledge aggregation and sharing across organizations
    • knowledge federation from different sources
    • distributed knowledge management
    • reuse of knowledge across applications
  – The concept that makes merging possible is subject identity

• **Context support**
  – Topic Maps handle context sensitivity through the concept of scope
  – Scope makes it possible to
    • cater for the subjectivity of knowledge
    • express multiple viewpoints in one knowledge base
    • provide personalized views for different groups of users
    • combine knowledge without loss of traceability
The Crucial Concept of Subject Identity

- Every topic represents some subject in the “real world”
  - **Subject identity** establishes *which* subject a topic represents
  - **Subject indicators** work for humans *and* computers
  - **Published Subject Indicators** (PSIs) allow subjects to be “shared” across topic maps, e.g. [http://psi.opera.org/composers/#puccini](http://psi.opera.org/composers/#puccini)
How Merging Works

- The concept of **Subject Identity** makes it possible to merge Topic Maps automatically
  - When two **Topic Maps** are merged, topics that represent the same subject should be merged to a single topic
  - When two **topics** are merged, the resulting topic has the union of the characteristics of the two original topics

- Merge the two topics together...
  - ...and the resulting topic has the union of the original characteristics
Applications of Merging

- **Reuse of knowledge**
  - e.g. a Topic Map about geography can be reused across applications
  - Once the knowledge that “Oslo” is a “city” located in the “country” “Norway” has been captured, it should never again be necessary (for most applications) to recapture that knowledge

- **Integration of knowledge**
  - e.g. knowledge residing in legacy systems can be integrated without the need for migration
  - new knowledge can be created in a distributed manner and federated (combined) as required

- **Mediation of knowledge**
  - Topic Maps can be used to map different ontologies to one other
  - Knowledge emanating from different sources can thus be combined
How Scope Works

• Topics have “characteristics”
  – Its names and occurrences, and the roles it plays in associations with other topics
• Every characteristic is valid within some context (scope), e.g.
  – the name “Allemagne” for the topic Germany in the scope “French”
  – a certain information occurrence in the scope “technician”
  – a given association is true in the scope (according to) “Authority X”

Demo of filtering: opera.xtm
e.g. Puccini, subject domain “biography”, location “offline”, short names

Filtering by scope
Applications of Scope

• **Multiple world views**
  – Reality is ambiguous and knowledge has a *subjective dimension*
    • Scope allows the expression of multiple perspectives in a single Topic Map

• **Contextual knowledge**
  – Some knowledge is only valid in a *certain context*, and not valid otherwise
    • Scope enables the expression of contextual validity

• **Traceable knowledge aggregation**
  – When the *source of knowledge* is as important as the knowledge itself:
    • Scope allows retention of knowledge about the source of knowledge

• **Personalized knowledge**
  – Different users have *different knowledge requirements*
    • Scope permits personalization based on personal references, skill levels, security clearance, etc.
Visualizing Topic Maps

• The network or graph structure of a Topic Map can be visualized for humans

• This provides another “view” on your information that can lead to new insights
  – Demo of Ontopia’s Vizigator
Applications of Topic Maps

Intelligent Indexes

Topic Map Driven Web Portals

Knowledge Management

Information Integration

Application Integration
Intelligent Indexes

• The simplest Topic Map application!
  – Derives directly from the original motivation for Topic Maps
    • How to merge back-of-book indexes

• Single point access to information
  – A topic is a “binding point” for all knowledge relating to a given subject

• Associations provide easy and intuitive navigation
  – Mirrors the associative way people think
  – Supports intelligent queries:
    • “Composers who wrote operas based on plays written by Shakespeare”
    • “Give me the top five candidates who have leadership skill levels on 80 percent of the knowledge competencies for this job and who are based in the Frankfurt area”

• Intelligent indexes solve the findability problem
Topic Map-Driven Knowledge Portals

• Let the index drive the presentation!
  – The Topic Map structure governs the application – and the knowledge

• Users navigate intuitively from topic to topic
  – Having found the appropriate topic, they
    • immediately see all recorded explicit knowledge
    • can dip down into information resources to “extract” implicit knowledge

• Publisher benefits:
  – Easier content maintenance (simply update the Topic Map)
  – Easier link maintenance (links are in separate layer, not in content)
  – New portals easy to derive from same content

• User benefits:
  – Shorter click-through
  – Easier, more intuitive navigation mirrors associative way of thinking
  – Far greater structural consistency means less confusion

Try the OperaMap portal
http://www.ontopia.net/operamap

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From Information to Knowledge

• **Knowledge exists in many places:**
  – Documents, business systems, processes, people
  – Topic maps help relate the pieces of knowledge in all of these places together, using a standard knowledge representation

• **Application Area:**
  – Knowledge Management
  – Most KM tools only manage information – with topic maps you really manage knowledge...
  – and in such a way that it can survive the systems that manage it!

• **Benefits:**
  – Standard representation of key corporate assets
  – Enables sharing of personal, departmental, and corporate knowledge
Integrating Information Across Systems

• **Topic Maps are designed for ease of merging!**
  – Multiple Topic Maps can be created from many different repositories of information ... and then merged to provide a unified view of the whole

• **Typical Applications:**
  – Integration of hitherto disconnected “islands” of information within an enterprise
  – Connecting knowledge from multiple sources

• **Advantages:**
  – Consolidated access to all related information
  – Does not require migration of existing content
  – Standards based
Fuelling Application Integration

- **Topic Maps provide a means of integrating information**
- **It is but a small step to integrating applications**
  - A Topic Map Engine can provide a single API to all your information systems
- **Application Area:**
  - Enterprise Application Integration
- **Advantages:**
  - Developers need only learn one API to data stored in vastly different repositories
The Biggest Win of All

• All these different Information Management applications are based on **one underlying technology**
  – Topic Maps that emanate from one application feed into the next
  – Each application builds on the previous one

• **Topic Maps provide a single, extensible platform for**
  – Indexing information, integrating systems, and managing knowledge

• **Intellectual effort is preserved, reused, and exploited to the full**
  – Most information management technologies produce a single output
  – The intellectual effort involved is lost once the technology has been applied
    • e.g., the results of data analysis may be a database schema, but the knowledge embodied in
      that schema is inaccessible to other applications
  – With Topic Maps the same knowledge can be leveraged repeatedly

• **This is the “Ontopian vision”**
  – If you share it, contact us!
Some Ontopia Knowledge Applications

• Starbase Corp., USA
  – Content Management Integration
  – Information Integration for Software Development
  – Technical Team Collaboration
  – Knowledge Event Management

• Large Company X, Finland
  – Product Configuration Management
  – Knowledge Base for configuring feature sets for new products

• US Department of Energy
  – Security Classification
  – Knowledge Base for use in Classification Guidance

• Ministry of Culture, Norway
  – Internet Portal
  – Domain Specific Portals for Publishing Official Information
Four Topic Maps Case Studies

Borland Software Corporation
US Department of Energy
BrainBank
www.forskning.no
Why Topic Maps?

• **General business requirement to manage semantics in order to:**
  – Control infoglut
  – Improve findability

• **Topic Maps chosen because:**
  – Flexible, powerful data model
  – Enables dynamically extensible applications
  – Supports multiple data types and knowledge structures
  – ISO standard
Implementations

• **Borland Software Corporation**
  – TMs for Application Integration

• **US Department of Energy**
  – TMs as Knowledge Bases

• **BrainBank**
  – TMs in Education

• **www.forskning.no, etc.**
  – TMs as Portals
Borland: TMs for Application Integration

• StarTeam products support software development teams

• Product suite consists of
  – source code repository with version control
  – bug and feature tracking database
  – requirements definition and tracking database
  – test management software
  – CRM system

• Products acquired from other companies; no integration
Elmer Solution: Topic Maps

- Elmer is an internal Borland project to develop the next generation of their suite
- Rather than rewrite the products, a new integration product is being added
- Elmer is a topic map server which integrates information from different products
Elmer: Data Example

Elmer

C++ class
caused by
breaks
Requirement

Source repository
Bug database
Requirements DB
Elmer Architecture

- Elmer Client Application (e.g. StarPoint)
- Search/Query Service
- Harvester/Listener
- Mapping Service
- Unified Information Space
- Indexing Service
- WWW
- Elmer Client Application (e.g. StarPoint) connects to Search/Query Service.
- Search/Query Service sends HTTP Request to Harvester/Listener.
- Harvester/Listener sends HTTP Request to WWW.
- WWW sends HTML, XML, etc. to Harvester/Listener.
- Harvester/Listener sends Indexable Document to Mapping Service.
- Mapping Service sends Indexable Document to Unified Information Space.
- Unified Information Space sends XML to Mapping Service.
- Mapping Service sends HTTP Request to Text Index.
- Text Index sends HTTP Request to Other Listeners, MPX Listener, Harvester, and eXpressroom.
- Other Listeners, MPX Listener, Harvester, and eXpressroom send HTTP Request to StarTeam, Caliber-RM, eXpressroom, Test Director, and Onyx.
- StarTeam, Caliber-RM, eXpressroom, Test Director, and Onyx send HTTP Request to Elmer Client Application (e.g. StarPoint).
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http://www.ontopia.net/
Uses of Information in Elmer (1)

- All information provided through a portal
  - straightforward navigation interface
  - querying, both full-text and structured
Uses of Information in Elmer (2)

- Drives Smart Tags integration with Microsoft Office
  - terms known from Elmer are highlighted
  - (names of topics used as a vocabulary)
  - appear as links back into the portal
Elmer: SmartTags Screenshot

Elmer

Topic maps offer a powerful, standardized paradigm for organizing, retrieving, and navigating information resources. An important difference between topic maps and traditional information indexing systems is their ability to enable advances in areas of processing.

The Elmer Project utilizes Topic maps to collect, manage, and export information.

Virtual DXML Repository (VRX)

Many different repositories may contribute to the content of a topic map, but client applications needn't understand how to communicate with each type of repository. They simply communicate with a virtual repository (VRX) that delivers resources in terms of DXML. This XML format is readily delivered to a topic map.

A given VRX implementation may utilize XSLT to transform a DXML document into another format such as HTML. This flexibility is important when gathering data for other purposes such as feeding content to a portal. See diagram.
Key Benefits from Elmer

- Application integration without changing the existing applications
- Highly flexible architecture through combination of Web Services and Topic Maps = Semantic Web Services
- Unexpected uses of topic map content once collected in one place
US DoE: TMs as Knowledge Base

- The US Department of Energy has many research laboratories working on production of nuclear energy as well as nuclear weapons
- Much of this information is extremely sensitive
- To make it clear which information is secret DoE maintains several hundred classification guide documents
- Each of these contains guidelines for classification collected in hierarchical tables
US DoE: Classification Guides

- General guides are developed by DoE centrally
- More specialized guides are derived from these by departments and laboratories across the US
- Problems:
  - how to manage all this information?
  - how to ensure consistency, avoid gaps
  - how to know what to update when?
## US DoD: Example Guidance Topic Hierarchy

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Description</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td></td>
<td>Fuel Systems</td>
<td></td>
</tr>
<tr>
<td>110.1</td>
<td></td>
<td>Basic technology associated with fuel supply.</td>
<td>U</td>
</tr>
<tr>
<td>110.1.1</td>
<td></td>
<td>Basic technology associating carburetors with fuel supply systems.</td>
<td>CRD</td>
</tr>
<tr>
<td>110.1.2</td>
<td></td>
<td>Fact of Electronic Fuel Injection (EFI), no elaboration.</td>
<td>U</td>
</tr>
<tr>
<td>110.1.2.1</td>
<td></td>
<td>Information revealing theory or technology of EFI.</td>
<td>CRD</td>
</tr>
<tr>
<td>110.1.2.2</td>
<td></td>
<td>Identification of EFI as part of a specific engine or vehicle make or model.</td>
<td>SRD</td>
</tr>
<tr>
<td>110.2</td>
<td></td>
<td>Fact that a specific engine or vehicle requires high octance fuel.</td>
<td>SRD</td>
</tr>
<tr>
<td>110.3</td>
<td></td>
<td>Capacity of fuel tank.</td>
<td>U</td>
</tr>
</tbody>
</table>
Guidance Topic as Nexus

- Master topic
- Parent topic
- Guidance topic
- Derived topic
- Responsible person
- Workflow state
- Child topic
- Concept

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Knowledge Base Feeds an Inference Engine

- The complexity of interdependencies between “guidance topics” is captured in a topic map
- Concepts are connected to if-then-else rules
- This constitutes a knowledge base that is used by the Ferret inference engine
- Ferret can read text and
  - Automatically filter outgoing email if classified
  - Automatically remove classified content from documents being published
DoE: Why Topic Maps?

• Model expressive enough to capture the complexity of the rules
• Status as ISO standard ensures stability and longevity
BrainBank: Topic Maps in Education

- Knowledge management and instruction tool
- Serves the needs of users in an education scenario
  - **Students** – create topics, associate them, link them to occurrence, discuss them with teacher
  - **Teachers** – create topics that can be published to class and view the BrainBanks of their students
  - **Administrators** – create new classes, users, assign members of a group, etc.
  - **Super Users** – view multiple schools, import information about sets of users from learning management systems
BrainBank: Student User Interface
BrainBank: Why Topic Maps?

• Conceptual models that people create are extremely diverse and flexible
  – Can easily (and perhaps only) be supported by a model such as Topic Maps
  – Concepts of identity and occurrences are of great importance as users are relating concepts to real resources

• BrainBank proves that it is possible to build user-friendly interfaces for editing topic maps
  – Initial users of BrainBank are 11-13 year olds who have no idea what a topic map is...
  – Or that they are actually creating them!
forskning.no: Topic Map Driven Portals

• Norwegian government portal to popular science and research information

• Owned by the Norwegian Research Council

• Purpose:
  – To present science and research information to young adults
  – Intended to raise interest and recruitment
Content of forskning.no

- The main content is articles about science and research subjects
- There is also a classification system used as a navigational structure
- The site is entirely topic map-driven
  - Navigation structure is a topic map
  - Articles are represented as topics
  - Even images are topics...
The Dual Classification

Science
  ↓
Human body
  ↓
Hormones
  ↓
The Brain

Volcanoes

Medicine
  ↓
Clinical Med.
  ↓
Neurology
  ↓
Oncology

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http://www.ontopia.net/
A Subject

Articles

Subjects

Fields

People

http://www.ontopia.net/
A Person

Person: May-Britt Moser
Title: Professor
Home page: http://www.svt.ntnu.no/psy/laboratorium/neuro/mb/may-b.htm
Mentioned in:
- Artikler som omfatter May-Britt Moser
- Hjerneforskning på tvers av Tag (01.08.2003)
- Avslører minnets biologi (07.10.2002)
Employer: forskning.no - en netavis om norsk og internasjonal forskning - Phoenix

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http://www.ontopia.net/
The Project

- Wide ontology; research covers *everything*
- Ontology was created by reusing an existing thesaurus, automatically converted
- A series of 4-5 workshops established the basic principles
- Finally, the publishing application was built by a consulting company
Maintenance

- Maintained by central editorial staff in Oslo
- Articles written by distributed network of authors
- Authors write and submit articles online
- Articles enter workflow and are added by editors
- Editors also add connections to topic map
forskning.no Today

- The site is now in production
  - authors and editors constantly publish articles
  - they also modify the topic map to suit themselves
- The authors/editors are very enthusiastic
- The site has also been a success with the users
- The TM layer, while simple, does simplify navigation and makes the content “sticky”
Similar Projects in Norway

- itu.no  IT in education
- forbrukerportalen.no  Consumer information
- matportalen.no  Food information
- avhending.no  Real estate sales
- hoyre.no  Political party
- Many others on the way…
- …not least, kulturnett.no v3
For more information

• **At least read**
  – The TAO of Topic Maps
  – The XML Papers

• **At least play with**
  – The Omnigator

• **Further pointers on the Welcome page of the Omnigator**
Topic Maps at XML Europe 2004

• Wednesday AM
  – Coolidge (11.00)
  – Towards Seamless Knowledge – Integrating Public Sector Portals (Steve Pepper)
  – Classifying Content through XTM (Steve Carton)

• Wednesday PM
  – Harding (14.45)
  – Ontopia’s Vizigator™ – Now you see it! (Pam Gennusa)

• Thursday PM
  – South Cotillion (16.45)
  – BrainBank Learning – Building Personal Topic Maps as a Strategy for Learning (Stian Lavik)

• Friday AM
  – Eisenhower (9.00)
  – Tutorial: Constraining and Querying Topic Maps (Steve Pepper)

• Exhibition
  – Ontopia – Booth 414 (with partners)
  – Tuesday 17.30-19.00, Wednesday 10.30-14.00, 15.30-19.00, Thursday 10.30-16.00