

# Topic Maps

## What are Topic Maps?

Topic Maps are a standard generic framework for both representing knowledge and indexing resources in a networked environment (intranet or internet). The main objectives of the technology are to ease navigation over large, heterogeneous and distributed content, and to provide an interoperable knowledge representation format.

Topic Maps have been developed as an ISO standard (ISO/IEC 13250), the first release dating back to the end of 1999, expressed in HyTime syntax. In 2000, an ad-hoc independent working group, TopicMaps.Org, developed the XML syntax (XTM). After XTM 1.0 release in February 2001, standardization work has been again the responsibility of ISO/IEC JTC1/SC34. XTM 1.0 DTD was integrated into ISO 13250 during 2002.

The basic principle of Topic Maps is to achieve the collocation objective, which means providing binding points (topics) for aggregation of information and knowledge about any well-identified subject. Subjects represented in Topic Maps can be anything from concepts found in vocabularies, thesaurus, classifications, through identified individuals in the real world (people, organizations, products), down to documents and resources themselves. Topics can be used to index resources and documents relevant to the subjects they stand for, and be linked together through specific mechanisms (associations and roles) to form semantic networks or knowledge bases. Those two features together enable integration in a single framework of representation and navigation, of two tasks usually managed through different tools and by different people: indexing resources and organizing knowledge.

Early adopters have been very various in scope and field, from portal organization to technical documentation indexing, from legal and financial information to pharmacy and electrical engineering, most early developments being bound to enterprise intranets. Publicly available and visible applications remain scarce at the end of 2002, but growing interest is building up in administration and e-government fields. For example, several European Community institutions and projects are currently considering Topic Maps as a key technology for enabling interoperability of administrations across countries and languages, and easing access of citizens to multilingual and complex EC regulations and legal documentation.

## Research activity

Unlike similar or related tools in Knowledge Representation, such as Conceptual Graphs, Semantic Networks, Ontologies, and Semantic Web languages (RDF, DAML, and OWL), Topic Maps have been first developed without much academic support or funding, and quite off the main alleys of public research. In fact the weakness of conceptual or formal foundation has been pointed out as a critical flaw of Topic Maps by major academic experts in Knowledge Representation. Nevertheless, Topic Maps provide an open field for various research subjects, getting growing interest of various academic teams, and being the object of many ongoing PhD research:

- Links with graph theory, including clustering and 2D-3D representations
- Formal foundation, and interoperability with other Knowledge Representation tools
- Integration with Semantic Web technologies and Ontology languages
- User interfaces and visualization
- Automatic population using text or data mining tools
- Middleware integration with content management and publication tools

## Standards activity

The Topic Maps family of standards is currently led by ISO/IEC JTC1/SC34. The main current activity is focused on the "Standard Application Model", a data model for Topic Map applications, that should be delivered by 2003-Q2. Parallel activity is taking place on conceptual foundations and the "Reference Model".

Further work is intended to develop the Topic Map Constraint Language (TMCL) and Topic Map Query Language (TMQL). TMCL Requirements are under preliminary discussions.

Alongside ISO/IEC activity, and in coordination with it, OASIS Technical Committees have been set up to specify recommendations on Published Subjects. Those recommendations should enable publishers of ontologies, classifications, vocabularies, etc to make their subjects available to Topic Maps technology. Development of Published Subjects is a critical requirement for the widespread adoption of Topic Maps.

## Commercial activity

Commercial activity in Topic Maps has so far been led by a fairly small number of SMEs and consultants, most of them having worked together in the standard development activity for a number of years, and therefore acting as a small "cooperative community". Three European vendors, empolis (a subsidiary of Bertelsmann GmbH), Mondeca (France) and Ontopia (Norway), are the main software providers. In the USA, the market is led by independent consultants, such as CoolHeads (featuring the "historical fathers" of Topic Maps, Steve Newcomb and Michel Biezunski) and Cogitech. The Japanese market is opening to the technology, with actors like Synergy Incubate.

Major players in the IT industry have not got into the Topic Maps market so far, although some of them (including Microsoft) have been lurking into the field. But some major industrial actors are developing Topic Maps applications for internal use, either using specific developments or integrating vendors' software. Such developments are not necessarily much advertised, so real activity in the domain is certainly wider than its public visibility tends to show.

## Current issues

**Standard foundation.** What is "really" a Topic Map representation or application? What should be the respective scopes of the Standard Application Model and the Reference Model? Should there be a single multi-part standard, or a family of standards addressing different purposes? The standards community is currently working hard to settle those questions.

**Interoperability.** Relationship with Semantic Web technologies like RDF and Ontologies have been and remain highly controversial, and development of TMCL is likely to rekindle the debate. Are those tools to be concurrent or complementary ones? At what level, and for which scenarios, should they be interoperable?

These interoperability issues have both technical and political aspects, since Topic Maps have been developed by ISO and OASIS working groups, and Semantic Web activity by W3C, so far without formal liaison.

**Technology integration.** Should Topic Maps show off their structure and concepts in end-user interfaces, or should they stay a back-office middleware technology, integrated into content management environments, only known by system technical managers, and hidden "under the hood" for the end user?

**Marketing.** More Use Cases are needed to prove the efficiency and the scalability of the technology, including both wide scale public Web applications, using friendly and intuitive interfaces, and scalable developments in integrated production environments. This goes along with involvement of major industrial actors, and more high-level support from academic research centers and governmental institutions.

## The future

As early as October 2000, Gartner Group experts predicted that "50 percent of portal and search engine providers would be using technologies on a Topic Map basis in the next three years". More recent forecasts have been less enthusiastic, but still consider Topic Maps as having a high probability to become a "mainstream technology" by 2003; whereas METAGroup estimations see the technology significantly hitting the market by 2005-2007, with a potential over \$1 billion.

Even if such figures are bound to be reviewed according to both the general market situation and the resolution of the issues discussed above, Topic Maps are currently a technology that every Knowledge Engineer should at least be aware of, and that any Information System Architecture should consider as a potential component.

Analysis of early Use Cases tends to show that more intranet and vertical applications are needed to show the way to wide-scale Web applications. It will be particularly interesting to compare Topic Maps' adoption curve with that of Ontologies, and to monitor the synergy between the two technologies. Integration of the strong logical foundation of the latter with the flexibility of the former could turn out to be the basis for the "killer applications" of the next few years.

## To find out more ...

- ISO/IEC JTC1/SC34 and ISO 13250 standard  
<http://www.isotopicmaps.org>
- OASIS Topic Maps Published Subjects Technical Committee:  
<http://www.oasis-open.org/committees/tm-pubsubj/>
- More resources - Open Directory category for Topic Maps:  
[http://dmoz.org/Reference/Knowledge\\_Management/Knowledge\\_Representation/Topic\\_Maps](http://dmoz.org/Reference/Knowledge_Management/Knowledge_Representation/Topic_Maps)

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**Mondeca** ([www.mondeca.com](http://www.mondeca.com)) is a French SME, editor of Intelligent Topic Manager™, a software product dedicated to knowledge and information management, supporting the Topic Maps standard.