



TOTh 09

Terminologie & Ontologie : Théories et Applications

Actes de la troisième conférence TOTh - Annecy - 4 & 5 juin 2009



Institut Porphyre
Savoir et Connaissance

Dans un monde où la communication et le partage d'information sont au cœur de nos activités, les besoins en terminologie se font de plus en plus pressants. Il est devenu impératif d'identifier les termes employés et de les définir de façon consensuelle et cohérente tout en préservant la diversité langagière.

La terminologie, en tant que discipline scientifique, se fonde sur une conceptualisation d'un domaine et sur les mots pour en parler. Elle se doit donc de concilier un point de vue linguistique et un point de vue ontologique. Elle doit également, dans une société numérique où les connaissances constituent la principale richesse, pouvoir être opérationnalisée à des fins de traitement de l'information.

Les conférences TOTh se situent dans le prolongement des colloques annuels de la Société française de terminologie organisés en décembre à Paris (Ecole normale supérieure de la rue d'Ulm). Planifiées à mi-parcours, au mois de juin à Annecy (Polytech'Savoie), elles en complètent l'offre et proposent des conférences avec appel à communications, comité de lecture et publication des actes.

Les conférences TOTh ont pour objectif de rassembler industriels, chercheurs, utilisateurs et formateurs dont les préoccupations relèvent à la fois de la terminologie et de l'ontologie et, de façon plus générale, de la langue et de l'ingénierie des connaissances. Elles se veulent un lieu d'échange et de partage où sont exposés problèmes, solutions et retours d'expériences tant sur le plan théorique qu'applicatif ; ainsi que les nouvelles tendances et perspectives des disciplines associées : terminologie, langues de spécialité, linguistique, intelligence artificielle, systèmes d'information, ingénierie collaborative, etc.

Christophe Roche, Président du Comité Scientifique

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Actes de la conférence

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avec le soutien de :

- Société française de terminologie
- Association Européenne de Terminologie
- Ecole d'ingénieurs Polytech'Savoie – Université de Savoie
- Université de Sorbonne nouvelle
- Association EGC (Extraction et Gestion des Connaissances)
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Avant propos



Dès la troisième édition, les conférences TOTh ont trouvé une structuration qui traduit bien à la fois le caractère scientifique et pluridisciplinaire de la terminologie et l'intérêt de notre communauté pour d'autres domaines partageant des préoccupations communes.

Ainsi, la conférence d'ouverture a été donnée par une personnalité invitée issue d'une discipline différente de la nôtre – ici la phylogénèse – mais pour laquelle le langage et la pensée jouent également un rôle primordial.

Les contributions se sont réparties naturellement, et par le jeu des évaluations de façon équitable, en trois groupes ayant donné lieu à trois sessions.

Le premier groupe a rassemblé les articles portant principalement sur la dimension linguistique de la terminologie. Ont été abordés l'extraction terminologique à partir de dictionnaire, la place accordée aux corpus dans la construction de terminologies, l'acquisition de connaissances à partir de textes et l'apport des ressources linguistiques issues du web.

La deuxième session s'est donc logiquement intéressée à la dimension conceptuelle de la terminologie. Les notions de concept, de relation, d'ontologie ont été au cœur des présentations portant sur les cartes conceptuelles pour les bibliothèques numériques, les relations dynamiques et les graphes conceptuels, l'alignement d'ontologies et l'accès multilingue aux ontologies.

Enfin, la troisième session a été consacrée à la présentation de plusieurs applications terminologiques pour des secteurs aussi différents que l'ingénierie nucléaire, l'informatique, le domaine bancaire ou l'agriculture biologique. Il est à souligner que ces applications ont permis d'aborder différents points théoriques tels que la variation terminologique, la diachronie ou la structure des dictionnaires.

La richesse des débats qui ont animé ces deux jours de conférence – chaque présentation, questions comprises, s'est vue allouer plus de quarante cinq minutes de temps de parole – a été certainement une des plus belles récompenses pour les participants de TOTh 2009.

Christophe Roche

Président du Comité Scientifique

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Following the path between conceptual maps and visual thesauri

Olga Bessa Mendes

Abstract : One of the challenges in digital libraries is to give access to more efficient ways of information retrieval. In the environment of special information in digital libraries there is a demanding for a new approach of information management because terminology is a *unit of information* and also the *access point to information*. Facing the context of special libraries in digital environment and focusing on the confront of schemes for information classification, we propose using a *visual thesaurus* as guide at a search engine as means for comprehension of information. The relevant issue is about the classification structure needed to offer a frame of reference of information which can be built in a conceptual map. The goals of the visual thesaurus within a special library are to offer a more dynamic search of information to users, as well as to guide them on searching and also to contribute to special information literacy.

Keywords : Information Science, digital special library, information literacy, visual thesaurus, Terminology

1. Introduction

The library social and pedagogical mission that combines information preservation and dissemination turned out to be more visible with current technologies. Considering digital library as a place of access to knowledge for users with different profiles, our concern is to know *how to improve access to technical and scientific information* to specialists and non-specialists users in digital special library.

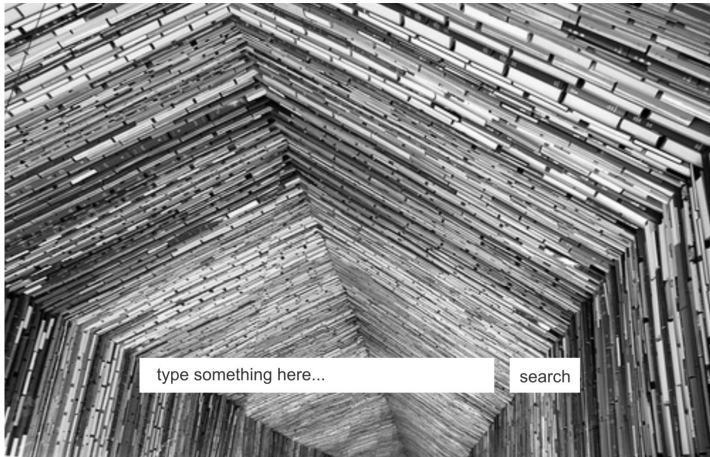
In a recent investigation work (Mendes 2008) we have analysed the procedures of information management in Information Science and methodologies for terminology organization, in Terminology.

In Information Science, librarian plays a role of mediation between information and users. In this context, of special information, we have realized that there is a complementary bond between terminology organisation, in Terminology, and information management, in Information Science, for *terminology* is the means of communication connecting user and information, or librarian and user or librarian and information.

In this article, we focus on some conclusions of the referred investigation work, underlying the *classification scheme* as the main issue to achieve information visualization and knowledge representation in digital library. Beginning with a synthesis of context and problematic on information retrieval in digital special library, we emphasize the need for improving criteria in thesaurus building; then, we analyse the common structure of some reference thesauri and the problematic of search and information visualization. The conceptual map scheme arises as contribute for the visual thesaurus architecture.

2. Digital special library

A digital library is, first, a repository of digital documents and/or digitalized. Contents and terminology organization for information access is an obstacle either to user or to information manager, because of information amount and diversity. The digital special library accentuates the need for specialized terminology use and classification instruments to establish a terminology connection for specialists and non-specialists users. In a technical and scientific domain, a vocabulary guide is considered an essential tool for search orientation.

Matej Krén - *Book cell*Figure 1. A *magic* search box in a digital library

2.1. Context & problem

Libraries, in particular of public access, undertake an ethical code of coherent and harmonized criteria use shared between affiliated institutions. In this context, we use normalization tools for information cataloguing and indexing. The librarian has to establish criteria for content analysis in a clear and consensual way between the existing collection in library and the community of practice.

Indexing is the action that consists in describing a document in relation to its content, representing it in a formal language, or documental language. The concern for a coherent practice of indexing based on the presentation and organization of preferred terms is the purpose to achieve effectiveness in information retrieval. The need for criteria normalization in thesaurus elaboration arises under the concern for a communication and share of controlled languages between libraries.

In order to use these principles which assist a thesaurus methodology, we have selected the standards currently used in libraries, namely - *ISO2788 1986-Documentation. Guidelines for the establishment and development of monolingual thesauri*; and *ISO5963 1985-Documentation. Methods for examining documents, determining their subjects, and selecting indexing terms*. However, we have identified some gaps on the methodology guidelines to elaborate controlled vocabularies and to organise information in the point of view of a special library. From this analysis, we focus the following aspects :

difficult reading of the graphical display of relationships between concepts ;

associative relationship lacks identification of the relationship typology ;

preparation and use phases of the thesaurus coexist and bring out ambiguity in content analysis ;

the *scope note* is not adequate for the technical and scientific information arrangement because it is not mandatory and also requires elaborating criteria.

2.2. Improving methodology

In the environment of technical and scientific information, we may conclude that criteria for content analysis and identification of terminology are the core work needing development on the standards referred above ¹.

Being a thesaurus a vocabulary of a controlled indexing language, formally organized so that the a priori relationships between concepts are made explicit (ISO2788 1986 : 5) and, considering that a vocabulary like a dictionary, is a product of Terminology work (ISO1087-1 2000 : 12), we have analysed the standards that present the course of actions for terminology organization. The ISO704 (2000) standard presents a description of the relationships between objects, concepts and their representation; furthermore it settles that a conceptual system performs for model concept structures based on specialized knowledge of a field (ISO704 2000 : 12). We find these orientations suitable to the work developed in Information Science on thesaurus elaboration to special information.

On one side, for there is the need to define all terms before the organisation of vocabulary for indexing language (choosing the *descriptor* and the *non-descriptor*). And on the other side, considering the progression of technical and scientific information a constant, the thesaurus of a specific domain may well be a tool of systematization of terminology evolution and of knowledge representation.

The presentation structure elected for a thesaurus provides a uniform use as information indexing tool. In general, thesauri are structured for indexer understanding and use with a special purpose. Nevertheless, each thesaurus has to be adapted to subject organization and dissemination as

1 Under development is the ISO/CD 25964-1 - Information and documentation: Thesauri and interoperability with other vocabularies - Part 1: Thesauri for information retrieval which revises the standards ISO2788 1986 and ISO5964 1985. Available from www : <URL:http://www.iso.org>.

required by information service. In our opinion, to a special library is recommended an information classification scheme focused on domain and built in user's perspective.

3. Visual thesaurus architecture

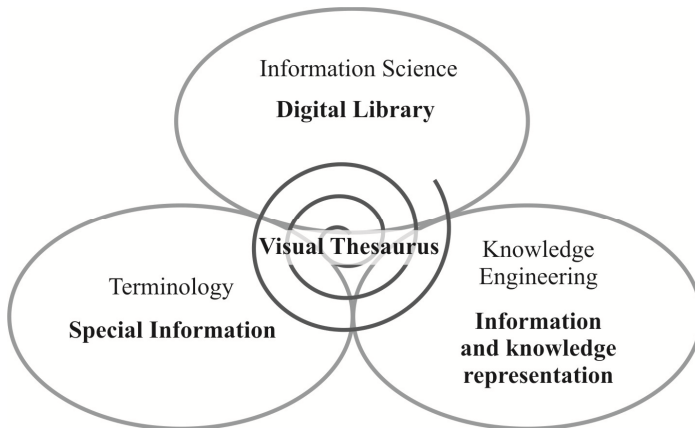


Figure 2. Visual thesaurus outline

Classifications are interrelated with the evolution of scientific knowledge and scientific concepts change as theories evolve. Therefore, special information management will bring in more coherence if terminology that evolves through time is incorporated in a classification system, according to demand.

To identify the relationships between concepts is a form of classification, since classifications are geographic elements of mind and *only them allow us orientation in the world around us, to establish habits, similarities and differences, recognize places, beings, events; to arrange them, group them, to draw near from each other, to keep them together or keep them away hopelessly* (Pombo 1998 : 1). To organize knowledge is, afterwards, a need for comprehension of a context which is accomplished through the association and distinction of concepts:

3.1. Thesaurus structure

Nowadays, some thesauri consent the navigation and visualization of terms and its relationships, however do not enable to identify the delimitation of concepts. The alphabetic presentation and identification of relationships between terms are confined to descriptor in hierarchical and

associative relationships. In the case of *NASA thesaurus*², the alphabetic and hierarchical presentation reflects the concern to present definitions (Figure 3).

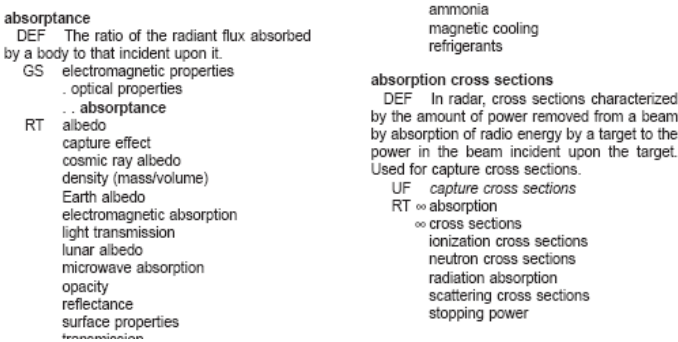


Figure 3. *NASA Thesaurus*

We choose *Thesaurus of Nations*³ as an example that combines image, equivalence and partitive relationships that allow us to *see the world* with other details. Its structure is based on ontological relationships: *is a*, *a division of*, *included in*, *country of*, *neighbour*, and includes also an alphabetic presentation of the equivalence and hierarchical relationships (Figure 4).



Figure 4. *Thesaurus of Nations*

These instruments constitute relevant sources of information, but in our opinion they still do not establish a good connection with user. These organization formats are not appealing and friendly in the perspective of an interactive access and elucidative about information/knowledge for

2 Available from [www: <URL:http://www.sti.nasa.gov/98Thesaurus/ vol1.pdf>](http://www.sti.nasa.gov/98Thesaurus/vol1.pdf)

3 Available from [www: <URL http://www.thesaurusbuilder.com>](http://www.thesaurusbuilder.com)

user. Even if combining various relationships, they do not offer yet a whole perspective of the universe, that is, of the domain under analysis.

3.2. Information search and information visualization

Nowadays there are several technological tools that allow constructing interactivity on digital library. Some reference thesauri⁴, from FAO, UNESCO, NASA, among others, which deal with specific domains but combining several sub-domains, already present changes on terms of organization and search. For example, the structure of UNESCO thesaurus⁵ permits *online* access for the theme *Performing arts* as micro-thesaurus (MT) and terms list in hierarchy (Figure 5).



Figure 5. *UNESCO thesaurus*

However, we have realized that the proposed presentation scheme for the elaboration of thesaurus, in ISO 2788 : 1986 standard, that these thesauri use, is insufficient to knowledge representation in special library perspective.

We consider that using the ontological relationships structure and combining orientations and also the relationships present on the referred standards, both for Information Science and Terminology, we can build a management instrument for information and knowledge representation to assist the information indexing and classification as well as the search guide.

Founding on available technologies, and also depending on purposes, we can mention either information visualization or knowledge visualization.

4 FAO-Food Agriculture organization; UNESCO-United Nations Educational, Scientific and Cultural Organization; NASA-National Aeronautics and Space Administration.

5 Available from www: <URL : <http://databases.unesco.org/thesaurus/>>

3.3. Conceptual map

The infrastructure of conceptual map and its graphic display allow having the interactive visualization of conceptual relationships that provides the understanding of concepts/terms.

We can use a conceptual map in different stages of information arrangement (Novak 2008 : 2)⁷.

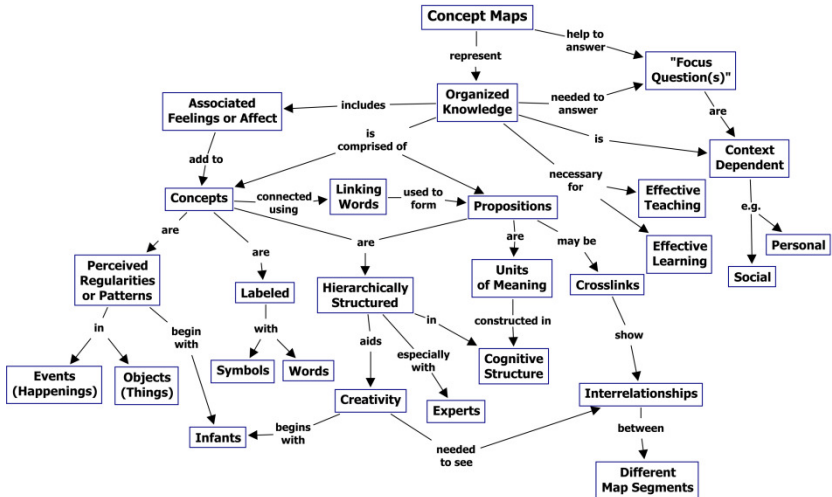


Figure 7. Conceptual map of conceptual map

First, when we build a conceptual system to systematize and communicate the relationships between concepts, and later too we use it to navigate among concepts of a certain domain, in order to search and apprehend information. As Tricot (2006 : 50) suggests *les cartes conceptuelles sont généralement utilisées pour organiser des idées, concevoir et communiquer une structure complexe et résoudre des problèmes.*

The conceptual map may constitute a visual guide for searching information joined to communication and knowledge discover for user. The intended hypertext organization of terminology management, which offers search dynamism, is close to the organization of our own conceptual model of knowledge representation. The advantage for representing ontological relationships stands in the guidance offer to user and to indexer of the connecting lines between concepts.

⁷ Available from www:

<URL:<http://cmap.ihmc.us/Publications/ResearchPapers/TheoryCmaps/TheoryUnderlyingConceptMaps.htm>>.

In this context, the architecture structure of knowledge organization is built with complementary traces from Terminology, Information Science and Knowledge Engineering. Taking into account the contributions of these sciences we gather some elements for a work methodology on controlled vocabulary organization which combines the information organization and the knowledge representation.

4. Special classification schemes

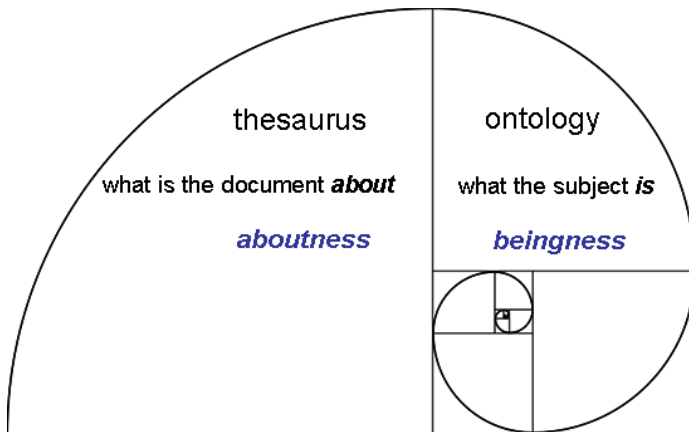


Figure 8. Classification framework of the visual thesaurus

Considering that ontology is a structure applied to information management providing information representation through the established relationships, we might have this same structure tailored to special information management needs in digital library. We are facing a thesaurus evolution form and we consider that an ontology synthesis might be a *special classification* of a domain, which can be presented in a dynamic form and online access.

Beyond hierarchical and associative relationships, different researchers refer the relationships that provide *faceted classification*, or by classes, or by categories, that allow a specific domain organization. In fact, we recall that Otlet (1934) and Briet (1951)⁸ made reference to information classification into *information nodes*. Might we be under the same question about the knowledge organization structure? Can it be *only* the use of distinct terms for a similar need of information arrangement?

⁸ Otlet, P. *Traité de documentation: le livre sur le livre, théorie et pratique*. Bruxelles : Editions Mundaneum, 1934. Briet, S. *What is documentation?* [online]. 1951 [Cited 20-05-2008]. Available from www <URL:http://ella.slis.indiana.edu/~roday/what%20is%20documentation.pdf>

Thesaurus and ontology are structures to describe formally information and to represent knowledge, although thesaurus' formal language is not sufficiently formal to computer system.

In building an ontology for thesaurus we may achieve a balance between a conceptual scheme and a presentation scheme of information (Smith, 2001:63), where descriptors stand for the identification of *document's subject* which are complemented by the concept map display as access to *what the subject is* (Figure 8).

In this approach the *visual thesaurus* is a controlled vocabulary of an *indexing language* [i. e. thesaurus] that establishes formal links to *language in speciality* displayed in a concept map.

The need for special classification structures was referred a long time ago for various researchers like Vickery (1960) who gives accent to faceted classification preparation, and recently a group of researchers gave a renewed attention to this debate (Gnoli 2008) underlying the need for a broader understanding information universe.

However, their relevant reflections about classifications created by Ranganathan, Bliss and Dahlberg are concerned with generalist libraries arrangement. Nevertheless, these methodology discussions are an incentive to compare efforts and create synergies between disciplines that deal with classifications and knowledge representation.

Future steps on this path between conceptual maps and visual thesauri, will take place on analysis of faceted classification perspective in Information Science and its contribute to visual thesaurus structure.

5. Conclusion

*All concepts have at least one documental sense (civilization) and one expressive dimension (cultural)*⁹

In digital special library, the technical and scientific terminology performs a borderline and development role for information access.

Before the question of *how to improve access to technical and scientific information in the digital library*, we suggest the conceptual map as new feature on thesaurus structure for information and knowledge representation.

Thesaurus is a tool that can combine two functionalities: as controlled vocabulary, to indexing, and as guide to assist on information searching.

9 Prado Coelho (2003 : 4). Available from www: <URL : www.ciberscopio .net>.

The classification particularity and demand that we find in the specialized library require specificities in content analysis and greater terminology actualization. To access the term as an isolated form, in a thesaurus, is not sufficient. To understand the use and application of technical and scientific information we need to have a whole perspective of the nearest related axes of concept/term to see its position in conceptual system.

Classification particularity and demand founded in the special library require specificities in content analysis and greater actualization of terminology. The conceptualization of thesaurus organization, while intellectual creation valid to indexing and to information retrieval, does not comprise with the absence of harmonized criteria for terminology management.

Current technologies allow creating information visualization but comprise only a part of solution. To digital special library, the information retrieval ought to be more complete on identification of relationships between concepts for which definition is essential. The information representation and knowledge representation are graphic or visual forms, with the objective of exposing information and turn it evident.

In this context, the architecture structure of knowledge organization is built with complementary traces from Terminology, Information Science and Knowledge Engineering. Considering the contributions of these sciences we gather some elements for a work methodology on controlled vocabulary organization which combines the information organization and the knowledge representation.

The visual thesaurus may have the conceptual map structure combining descriptors, as categories of concepts, with specific terms of a certain subject and it will permit to organize and to represent knowledge of a domain. At the information retrieval level, the thesaurus selection as search filter may allow crossing several vocabularies (involving document, librarian and user) and to create a more coherent search expression.

The purpose is to offer a global as well as particular perception of information to user in digital special library.

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