Programme « AGORA »

End report – part « Summary of the research project »[1]

RESEARCH CONTRACT: AG/LL/169

ACRONYM OF THE PROJECT: **MULTITA**

TITLE OF THE PROJECT: **MULTILINGUAL TERMINOLOGICAL RESEARCH (FRENCH, DUTCH AND ENGLISH) FOR THE DEVELOPMENT AND INTEGRATION OF SEMANTICALLY ENRICHED SCIENTIFIC THESAURI (MULTITA)**

RESEARCH TEAM:

COORDINATOR: **EVA COUDYZER (KMKG)**

PROMOTOR(S): **ERIK BUELINCKX (KIK)**

RESEARCHER(S): **VERONIQUE LHEUREUX, EVA COUDYZER, ERIK BUELINCKX**

DATE: 30/01/2015

---

[1] See art. 5.5.2 of the research contract.

Links to websites where the activities, reports... produced by the research team within the research contract are mentioned:

- Website KMKG: KMKG-MULTITA

- Website KIK: KIK-MULTITA

- Linked Heritage, Seminar Multilingual Terminologies, April 13 2013 (Paris, France), presentation " Recommendations and Guidelines for Terminologies": MULTITA-Linked Heritage

- AthenaPlus, Access to Cultural Heritage Networks for Europeana (Rome, Italy), Signed Memorandum of Understanding between MULTITA and AthenaPLus: MULTITA-AthenaPlus

- FRANTIQ, Fédération et Ressources sur l'Antiquité (Nanterre, France), PACTOLS-thesaurus:

  - FRANTIQ_01
  - FRANTIQ_02
  - FRANTIQ_03
  - FRANTIQ_04

- Mémoires des archéologues et des sites archéologiques (MASA-consortium), Réunion de travail « Ontologies et redocumentarisation » , October 13 2014 (Nanterre, France) : MULTITA-MASA

- RKD, Rijksbureau voor Kunsthistorische Documentatie (Den Haag, Nederland),   Art and Architecture Thesaurus Nederlandstalig: MULTITA-AAT

- Getty Institute,(Los Angeles, USA), Art and Architecture Thesaurus. Mention of MULTITA-project in presentation RICH: MULTITA-Getty Institute

- l'UMR8546 CNRS/ENS Archéologie et Philologie d'Orient et d'Occident – AOROC, Presentation project MULTITA (meeting November 13 2013): MULTITA-AOROC

- Fédération Wallonie-Bruxelles, AICIM-thesaurus: MULTITA-AICIM

- University of Savoie, TOTH-workshop, December 5 2014 (Brussels, Belgium), presentation and paper project: MULTITA-TOTh

- VIAA, Vlaams Instituut voor Archivering, Unified Thesaurus Haalbaarheidsstudie uitgevoerd door iMinds (Media Innovation Center), Eindrapport, augustus 2013-januari 2014: MULTITA-VIAA

****

Summary

MULTITA
Multilingual Terminological Research for the Development of Semantically Enriched Thesauri

Véronique l'Heureux, Eva Coudyzer
Royal Museums of Art and History
Brussels, January 2015

Abstract

MULTITA is a project on thesauri and multilingualism that grew from the need for standardized, enriched and multilingual thesauri for the cultural heritage sector in Belgium. Many Belgian cultural institutions use their own terminologies, whether a simple word list or a full thesaurus. These thesauri are often tailor-made for the collections of the institution and do not always converge with those of other institutions – which means that their collections cannot be attuned. The main goal of the MULTITA project was to enrich and align the terminologies of the project partners and to create multilingual, scientific micro-thesauri about a specific domain, developed according to international thesaurus standards. The project has learned us about difficulties and challenges that occur when translating or developing thesauri.

Key words: thesauri, multilingualism, thesaurus management tool, SKOS

1. Introduction

MULTITA was funded by the Belgian Science Policy, a department for scientific research within the Belgian Federal Government. The project started in June 2012 and finished at the end of 2014. The project was co-ordinated and promoted by two federal scientific institutions: The Royal Museums of Art and History (RMAH) and the Royal Institute for the Cultural Heritage (RICH), both in Brussels.
Several Belgian and international institutions collaborated, including: The Royal Museum of Fine Arts (Brussels), the terminology service and the Board of Cultural Heritage of the Fédération Wallonie-Bruxelles (Brussels), the Museum of Lace and Costume (Brussels), the Rijksbureau voor Kunsthistorische Documentatie (The Hague) and the Fédération et Ressources sur l'Antiquité (Paris). The project was supported by a guidance committee with members Jef Malliet (Provincie Limburg, ErfgoedPlus), Els Angenon (Digital Collections, RMAH) and Bert Lemmens (PACKED).
The idea behind MULTITA grew after the Royal Museum of Art and History had started their first genuine digitization effort some years ago. It became important for cultural institutions to manage and expose their collections online. When the museum purchased a collection management system (CMS) and started encoding the collections, they realized they needed a thesaurus to use within their CMS in order to make their collections searchable. As they started looking at existing thesauri in the field of cultural heritage, art, art history and archaeology, it became clear that the available vocabularies varied tremendously.

2. The data

The MULTITA-partners use controlled vocabularies mainly to manage their collections, but these vary drastically in structure, scope, content and degree of multilingualism. Whereas some institutions have clearly made an effort in the past to establish a structured, at least hierarchic, thesaurus that follows existing standards like ISO (International Standard Organization), others have no more than a simple word list without conceptual relations, mostly structured only alphabetically. Often, these terminologies are available in just one language.

The vocabularies we worked with in the MULTITA project, are:

- Thesauri of the Royal Museums of Art and History (RMAH): materials, techniques, object names and geographical references. The musical instruments thesaurus was not included.
- Thesauri of the Royal Institute for the Cultural Heritage (RICH): materials, techniques and object names.
- PACTOLS-thesauri of FRANTIQ: personal names, chronology, places, art works, people (nations) and subjects.
- AICIM-thesauri of the Fédération Wallonie-Bruxelles: materials, techniques and object names.
- Thesaurus of the Royal Museum of Fine Arts (RMFA): object names, materials and techniques.
- Dutch Art and Architecture Thesaurus (AAT): associated concepts, physical attributes, styles and periods, agents, activities, materials and objects.

The Art and Architecture thesaurus was used as a reference thesaurus, while the other thesauri could be imported/exported and manipulated in the project.

3. Project results

3.1 Alignment of concepts from different thesauri

We aligned as much as possible concepts between the different thesauri. We chose the Art and Architecture Thesaurus, developed by the Getty Research Institute, as a reference for this work, as it is widely considered as a standard in art historical thesauri and is translated in a number of languages, including Dutch. This Dutch translation is managed by the RKD, the Dutch partner in the MULTITA-project.
Example of alignment: the object names, materials and techniques thesaurus of the RMAH were aligned as much as possible with the AAT. The individual concepts were compared to the concepts in the AAT - if they were available in both resources - on structure level, scope note and translation. The URIs - the unique identifiers assigned to each concept online - were copy-pasted into an Excel file to ensure further linking of the data (the actual linking was not part of the project). Where applicable, AAT scope notes were adopted in the CMS used in the RMAH.

3.2 Enrichment of local thesauri

Often, the thesauri of the partners lacked certain information, such as scope notes, translations, alternative terms and relations (hierarchical, associative or equivalent). Part of our job was to enrich these thesauri by providing and adding relevant information.
Example of enrichment: the AICIM-thesaurus and the PACTOLS-thesaurus were translated during the alignment phase into Dutch. In the PACTOLS-thesaurus these translation could be done directly in the CMS of the institution. This means that the translations are immediately visible in the online thesauri on the website of FRANTIQ. The thesauri of the Royal Museums of Art and History were enriched with scope notes of the AAT. When concepts or scope notes from the Belgian thesauri were not available in the AAT, which was e.g. the case for many archaeological concepts, these were directly imported as candidate terms via the webservice of the RKD into the Dutch Art and Architecture Thesaurus.

3.3 Exchange of expertise

In enriching the different thesauri, we were also looking at ways to enlarge the network and to obtain the knowhow and insights necessary to create or maintain a semantically and structurally sound thesaurus.

Example of exchange of expertise: The project took on partnerships with AthenaPlus, a European project that creates and gives access to digital cultural content, which made it possible for MULTITA partners to participate in meetings and to be informed through mailings. The partnership also allowed us to access a thesaurus management tool (xTree), a tool indispensable in the creation of semantic thesauri. xTree is a tool where thesauri can be created, linked, edited and exported in SKOS, a format that makes it possible to publish and exchange the thesaurus on the web.

3.4 Reuse of URIs

We could reuse the URIs (*Uniform Resource Identifier*) of the AAT and implement them in our own thesauri, thus ensuring a link of corresponding concepts between the different thesauri. *Example of reuse of URIs*: the RICH-thesaurus and the RMAH thesaurus (object names) saved the URI of the AAT for each thesaurus concept. This was done directly in the CMS of RICH and in an Excel-file for the RMAH. The URIs of the AAT were also added to the "URI"-field in xTree. This means that the concepts of our micro-thesauri in xTree will be provided directly with the URIs of the AAT.

3.5 Creation of micro-thesauri

Lastly, we aimed at creating our own structured, standardized and multilingual micro-thesauri on certain specific themes, which could be used by all partners.
The creation of a standardised, multilingual art historical and archaeological thesaurus in English, Dutch and French was one of the main goals of this project. By creating our own thesaurus, we could answer the needs of our partners and provide them with a model of a well-made, properly organized and multilingual scientific thesaurus that holds up to all norms and standards. Of course, it would have been impossible to create an all-inclusive thesaurus such as the AAT. Instead, we decided on two specific fields of interest that would be useful for all partners and created two 'micro-thesauri' to showcase solid thesauri:

a. *Textile techniques, materials, actors and objects:* Textile is a complicated, technical field. All thesauri showed a great deal of variation in how textile was represented or categorised and included mistakes and inconsistencies.
b. *Styles and Periods:* None of our partners seemed to dispose of a comprehensive, well-structured terminology on art historical styles and periods. Moreover, beyond our project, we could not find any satisfying styles and periods-thesaurus either.

To compile these thesauri, we tried to include the most relevant terms/concepts, relations and scope notes from the terminologies of each partner to end up with an enhanced, richer and more 'holistic' version of all of these. Aside from the partner thesauri, we also included terms from the Textile Museum in Tilburg (Netherlands) in the textile micro-thesaurus. The AAT served as the benchmark, although some mistakes or inconsistencies were detected there as well and corrected or improved on in our version.
At the time, the German terminology management tool xTree proved to be the best tool at hand to create the thesauri we desired. Some of the functionalities of xTree include:
- Creation of new thesauri or import of existing thesauri
- Preferred and non-preferred terms for each concept, in any language desired
- Labelled concepts: concept, guide term (node label), hierarchy, facet
- Unique IDs for each concept + the possibility to add URIs from other sources (AAT)
- Hierarchical structure and relations: generic (kind of), partitive (part of) or instancial (instance of)
- Mapping of concepts of different thesauri

- Notes: editorial, historical, scope notes, definitions

The creation of these two micro-thesauri has been completed and can now offer a guideline to all partners, free and ready to use. The thesauri, in Dutch, French and English, are also available in SKOS-format.

4. Standards and models

Various standards were studied in the MULTITA project, more importantly **SKOS** and **ISO 25964-2**.

Simple Knowledge Organization System or SKOS is an exchange standard developed by the World Wide Web Consortium (W3C) to represent thesauri online, more specifically the semantic information inherent in thesauri. SKOS uses the *Research Description Framework* (RDF), allowing information to communicatie through computer applications. The main principle of SKOS/RDF is the use of URIs instead of hypertext (HTML) to represent information online.
SKOS is built around classes and properties defined in a SKOS primer. *SKOS:concept* , for example, was developed to represent thesaurus terms. *Property:prefLabel* was developed to represent the *preferred terms* in a thesaurus. The MULTITA micro-thesauri were developed in SKOS in xTree.

The ISO 25964-2 standard was also consulted in the project. This ISO publication offers guidance on the development and management of thesauri and offers advice for improving the interoperability between different thesauri.

Some findings concerning the use of these standards:

- The ISO 25964-2 standard is not always clear and can be interpreted in different ways. An example is the difference between a *micro-thesaurus* (p. 8) and a *facet* (p. 5). *A micro-thesaurus* is defined as a « designated subset of a thesaurus that is capable of functioning as a complete thesaurus ». A *facet* is a « grouping of concepts of the same inherent category ». According to these definitions the concept "architecture" could equally be a facet or a micro-thesaurus.
- Even though ISO makes a difference between a *facet* and a *micro-thesaurus*, SKOS does not propose a property to represent both information structures separately.
- According to the SKOS primer, *guide terms* or *node labels* can be mapped to *skos:Collection*. In reality however, *skos:Collection* is often used to represent *facets* or *micro-thesauri*.
- The Art and Architecture Thesaurus structures the thesaurus by means of *facets*, *hierarchies* and *guide terms*. However, *hierarchies* cannot be mapped to SKOS because this property is not available.
- In xTree the possibility exists to select the type of concept or structure: *category* OR *concept* OR *structural element*. Within the structural elements, a choice is proposed between *hierarchy labels*, *nonindexing concepts*, *node label* and *facet label*. It is not clear what the specific meaning of these labels is. The terminology is confusing.
- The ISO standard defines three types of hierarchical relations (p. 25): *generic* (book is "a type of" information artefact), *instance* (British museum is "an example of" a museum) and *whole-part* (Brussels is "a part of" Belgium). These relations cannot be specified in SKOS because all relations are simple generic *broader* or *narrower*. This means that some information in thesauri is lost when converting to SKOS.

- It is not possible in SKOS to encode quotation of sources or acknowledgments. This can be important for the scope notes.

In conclusion we can state that it is not always easy to follow or implement standards. It occurs that subjective choices are made. It can be problematic when SKOS elements are interpreted in different ways, e.g. in applications where SKOS-files have to be automatically imported.

5. Problems and challenges of multilingualism

The creation of these multilingual thesauri and the translating work we did within our own thesauri faced us with certain problems and challenges specific to multilingualism. It is important to be aware of these potential issues when translating a terminology, when creating a new, multilingual thesaurus or when mapping concepts from different thesauri. Some examples can help to illustrate:

Ex. *Entablature* can be translated by either *hoofdgestel* (KIK-IRPA) or *entablement* (AAT) in Dutch.

➢ A certain term might have several potential equivalents in a specific language. It is important to include the most applicable synonyms as *alternative terms*, so that end users will find what they are looking for whichever term they prefer to use.

Ex. *Pichet* in French cannot be translated by one equivalent term in English or Dutch.

➢ There is a lack of synonymy between these languages: the French term does not have an exact synonym or a translation in English or Dutch. The solution can be a translation by paraphrase: *small jug, kleine kruik*.

➢ Factoring or a combination of two or more concepts is also a possible solution, e.g. *gros bétail* (FR) is a combination of *cattle* (EN) + horses + goats etc.

Ex. *Cup, trophy, bowl, champagne glass* can all be translated by the word *coupe* in French.

➢ This situation creates ambivalence in a terminology. It is important to avoid that one term is used to describe multiple concepts. In this case, some creativity goes a long way: *trophy* can be translated as *trophée, champagne glass* becomes *coupe à champagne*, etc.

These problems and discrepancies between languages are intrinsic to them and can also be attributed to the nature of culture in general. A language always reflects the outlook on the world of a certain culture: an object that is used in one culture, and have a name there, might be completely strange to people of another culture, who don't have a name for it.

Ex. *Daubière* in French: This is a type of cooking pot, used specifically to cook *daube*, a typical Provençal stew. As this typical dish and pottery was only used France and is unknown to people in other cultures, so there is no translation for the word *daubière* in other languages. In this case, it is wisest to simply adopt the French term in the translation of the thesaurus concept.

Related to this, cultural concepts often lack the precision and clarity of concepts from the (exact) sciences. A mathematical concept, for example, has a very clear limit to its meaning. Its definition is a logical one and one which can only be interpreted in one way, and one way only. One concept corresponds to one term. Cultural concepts are, on the other hand, very hard to define and their boundaries are not at all clear. Not to people within one cultural domain, and even less between different nationalities, cultures or languages.

Ex. *Trapezium*. The term 'trapezium' refers to a certain geometric figure that answers to a number of criteria:

- It has two adjacent angles that are supplementary, that is, they add up to 180 degrees.
- The angle between a side and a diagonal is equal to the angle between the opposite side and the same diagonal.
- The diagonals cut each other in mutually the same ratio (this ratio is the same as that between the lengths of the parallel sides).
- The diagonals cut the quadrilateral into four triangles of which one opposite pair are similar.
- The diagonals cut the quadrilateral into four triangles of which one opposite pair have equal areas.

A figure cannot be more or less 'trapezium-like'. Either it meets all the requirements and it is a trapezium, or it does not meet all requirements and it is not a trapezium. There is no grey zon, the concept has very clear boundaries.

Ex. *Chair*. The term 'chair' refers to certain piece of furniture that is designed to sit on. It corresponds to a number of characteristics, but not necessarily to all of them:
- It is designed to sit on.
- It most often has four legs.
- It often has a back.
- It might have armrests.

A chair does not need to meet all requirements to be a chair. Some chairs might be more chair-like than others. There are no clear boundaries to this concept. Moreover, they might vary according to different cultures. What might definitely be a chair in one culture, might fall under sofas in another.

To conclude the problematic encounters concerning multilingualism and translation, a number of possibilities were described by Aitchison and Gilchrist (London, 1987):

- Exact equivalence between languages: *mosaïque (FR), mosaic (EN), mozaïek* (NL) OR *amulette* (FR), *amulet* (EN), *amulet* (NL)
- Inexact equivalence: *chapeau (FR),* **top hat** *(EN), hoed* (NL) OR *crucifix* (FR), **cross** (EN), *kruisbeeld* (NL)
- Single to multiple equivalence: *bol* (FR), **small bowl** *(EN),* **kommetje/kleine kom** *(NL)* OR *javeline* (FR), *javelin* (EN), **kleine werpspeer** (NL)
- Partial equivalence: *carriage* (EN)*,* **voiture** *(FR), rijtuig* (NL)OR **model** (EN), *mannequin* (FR)*, paspop* (NL)
- Non-equivalence : *statuette (FR), statuette (EN),* **beeldje (van bepaalde hoogte)** OR *figurine* (FR)*, figurine* (EN)*,* **(menselijk) beeldje***.*

6. Case study: *Kandelaar* (NL), *Chandelier* (FR) and *Candlestick, Candelabrum* (EN)

The four terms in the title all refer to a certain object that holds candles. However, there are two terms in English, and only one in Dutch and in French. *Kandelaar* in Dutch and *chandelier* in French can refer to holders that can either hold one candle or that are designed to hold two or more candles. The dictionary Van Dale states in its definition that a *kandelaar* in Dutch is: "A standard that can hold one or more candles". In English, there is not one term that refers to a candleholder regardless of how many candles it can hold exactly. Instead, English disposes of two words: a *candlestick* holds one candle, a *candelabrum* holds two or more.
The problem is a conceptual one. The fact that Dutch and French does not provide separate terms for the object that holds one candle and the one that holds more than one, shows us that

the speakers of Dutch or French do not perceive a difference: they identify a holder for candles as one object, one concept, regardless of exactly how many candles it holds. Since there is no difference, there is no need for a terminological separation either. One word/term suffices. In English, on the contrary, the two are perceived as different concepts, and thus each needs a distinct term.

When creating a multilingual thesaurus, or when translating an existing one, this conceptual difference can cause problems. Let's look at the AAT, a thesaurus firmly rooted in the Anglo-Saxon culture. As expected, the AAT proposes two concepts with two terms: *candlestick* and *candelabrum*. Their scope notes clearly state that one holds one candle and the other holds two or more. When translating to Dutch, you cannot simply use '*kandelaar*' for both. The Dutch AAT solved the problem as follows:

> ➢ Candlestick = Kandelaar
> ➢ Candelabrum = Kandelaber

This, however, is not fully correct. Firstly, the AAT chooses to simply ignore part of the meaning of *kandelaar*: in the AAT, it only refers to objects holding just one candle. End users, however, might not know the restricted meaning of the word in the AAT and might use this as a search term to look for all types of candle holders, also those that hold more than one candle.   The Dutch kandelaar is explained in the dictionary Van Dale as a hyperonym of a kandelaber. This means in a thesaurus: kandelaar NT kandelaber or kandelaber BT kandelaar. A kandelaar is after all a "standard for one or more candles". In the AAT however, both terms are equal narrower concepts of the concept candleholder. The term is also quite formal and maybe even antiquated in its meaning. It's not likely that end users will use this term to search.

In conclusion, it is important to keep two things in mind when translating a thesaurus:

> ➢ The discrepancy between concept vs term and the differences between languages: certain languages do not have terms to express a certain concept (there is no word in Dutch to refer specifically to a *candlestick*, i.e. a candle holder that holds only one candle). Or, vice versa, what is considered to be one concept in one language/culture, is seen as two different concepts by another language/culture, a difference that consequently shows in language (the English language perceives a difference between *candlestick* and *candelabrum*)
> ➢ It is crucial that the end user is considered when translating a terminology. It does not suffice to solve language issues with artificial constructs: the user will use a language as he does in daily life and might be confounded by the result of his search.

7. Conclusion

In the MULTITA-project we enhanced and enriched the local thesauri of the project partners. We also created two micro-thesauri on textiles and styles/periods. The project entailed a preliminary phase, which consisted of analysing the local thesauri and the search for a thesaurus management tool etc. In the content delivery phase, the thesauri were delivered to the project coordinator as a CSV or SKOS-format to be eventually imported (manually or automatically) in an Excel or in the thesaurus management system xTree. The terminological research phase, which coincided largely with the implementation phase, consisted of tasks such as: comparison and alignment of concepts, translation of concepts, semantical enrichment etc. New scope notes were created and exchanged with the AAT. In the content aggregation phase two micro-thesauri were created in xTree based on the content (concepts) from the partner thesauri. The project also investigated the problems and challenges of multilingualism.

MULTITA signed a memorandum of understanding with the European best practice project

AthenaPlus and established close collaborations with FRANTIQ-CNRS (Paris), RKD (The Hague) and the Belgian partners. A total of twenty-eight meetings took place, five of them with all national and international partners. The guiding committee assembled three times during the project. On December 15 2012 a symposium was organised for all MULTITA partners and on December 5 2014 the results of the MULTITA project was presented at the scientific TOTh-workshop on the subject *Terminology and Multilingualism*.

The tangible results of the project include:

- Dutch translation of the PACTOLS-thesaurus (over 5000 concepts)
- Dutch translation of the AICIM-thesaurus (over 5000 concepts)
- Delivery of 200+ candidate terms to the AAT, in French, Dutch and English
- Enrichment of the RICH-thesauri: addition of scope notes (AAT or own), missing translations into Dutch and French, structural and hierarchical improvements, addition of AAT-URIs directly into CMS
- Enrichment of the RMAH-thesauri: addition of scope notes, missing translations into Dutch, French and English
- Creation of textile thesaurus (objects, materials, techniques) in English, Dutch and French, available in SKOS
- Creation of styles and periods thesaurus in English, Dutch and French, available in SKOS

Ultimately, while MULTITA was not able to solve all problems faced by the partner institutions, it did offer them new insights on thesauri-building in the cultural domain and significantly improved each controlled vocabulary worked on, making them more multilingual, more standardized and ready to be further enlarged and reused in the future.

8. References

Books and articles:
AITCHISON et al. 1987
Jean Aitchison, Alan Gilchrist, *Thesaurus Construction*, London 1987².

AITCHISON et al. 2005
Jean Aitchison, Alan Gilchrist, David Bawden, *Thesaurus construction and use : a practical manual*, London 2005.

CAGNOT et al. 2011
Stéphane Cagnot, Johann Holland, Marie-Véronique Leroi, Michael Culture Aisbl, *Your Terminology as Part of the Semantic Web. Recommendations and Guidelines for Design and Management*, Linked Heritage 2011.

DE BOER et al. s.d.
Victor de Boer, Jan Wielemaker, Judith van Gent, Marijke Oosterbroeck, Michiel Hildebrand, Antoine Isaac, Jacco van Ossenbruggen, Guus Schreiber, *Amsterdam Museum Linked Open Data*, EuropeanaConnect research project, s.d.

HUNTER 2001
Jane Hunter, *MetaNet: A metadata term thesaurus ton enable semantic interoperability between metadata domains*, Journal of Digital Information, 1(8), 2001.

MAY et al. 2011

Keith May, Ceri Binding, Doug Tudhope, Stuart Jeffrey, *Semantic Technologies Enhancing Links and Linked Data for Archaeological Resources*, United Kingdom 2011.

MILLER 2003
Miller U., *Thesaurus and new information environment*. In: M. Drake and M. N. Maack (Eds.); Encyclopaedia of library and information science, 2nd ed. Boca Raon: Taylor & Francis Group.

MORSHED et al. 2011
Ahsan Morshed, Caterina Caracciolo, Gudrun Johanssen, Johannes Keizer (2011), *Thesaurus Alignment for Linked Data Publishing*, Proc. International Conference on Dublin Core and Metadata Applications 2011.

SHIRI 2012
Ali Shiri, *Powering Search. The Role of Thesauri in New Information Environments*, New Jersey 2012.

SOERGEL 2003
Dagobert Soergel, *Functions of a Thesaurus/Classification/Ontological Knowledge Base*, University of Maryland 2003.

VAN DALE, Elektronisch Woordenboek, versie 6.10/14.10, Van Dale Uitgevers 2014.

Standards:

ANSI/NISO Z39.19-2005, *Guidelines for the Construction, Format, and Management of Monolingual Controlled Vocabularies*, 2005.
ISO 25964-1, *Information and documentation —Thesauri and interoperability with other vocabularies — Part 1: Thesauri for information retrieval*, Geneva 2011.
ISO 25964-2, *Information and documentation — Thesauri and interoperability with other vocabularies — Part 2: Interoperability with other vocabularies*, Geneva 2013.

9. Relevant websites:

AICIM-thesauri: AICIM thesauri
Art and Architecture Thesaurus: AAT Getty
Art and Architecture Thesaurus Nederlandstalig: AAT Ned
AthenaPlus: www.athenaplus.eu
British Museum Object Names Thesaurus: British Museum
Carmentis: www.carmentis.be
Erfgoedplus: Erfgoedplus
Inventarisatie Terminologiebronnen, DEN (Digitaal Erfgoed Nederland) 2010, Inventarisation terminology sources DEN
Glossarium CEST: www.projectcest.be
Mondeca – Linked Open Vocabularies: MONDECA
Multilingual websites and multilingual thesauri, Minerva survey 2004-2005, Minerva survey
PACKED: PACKED
PACTOLS: PACTOLS
TextielMuseum-TextielLab Tilburg: TextielMuseum
TOTh-workshop 2014: TOTh-2014

10. Contact

e.coudyzer@kmkg-mrah.be
erik.buelinckx@kikirpa.be