

Building to learn...
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BUILDING TO LEARN / LEARNING TO BUILD. BACUS-UAB: TERMINOLOGY TRAINING FOR TRANSLATOR TRAINEES¹

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Resumen: Este artículo describe una base terminológica elaborada teniendo en cuenta tres objetivos: I) capacitar a estudiantes de traducción en el área de la terminología; II) obtener información para la traducción especializada, y III) crear recursos tanto para legos como para expertos y mediadores (traductores y terminólogos) en el área lingüística. El trabajo que ha sido realizado durante más de una década nos permite sacar conclusiones respecto del factor humano, la ingeniería del conocimiento, el ámbito de aplicación de la terminografía y el poder del conocimiento de la lengua especializada.

Palabras clave: capacitación en terminología, terminografía, traducción, relaciones conceptuales, experiencia profesional, traducción especializada, lenguas para fines específicos (LSP)

Resumo: Este artigo descreve uma base dados terminológica desenvolvida tendo em vista três objetivos: i) o treinamento de tradutores em Terminologia; ii) a recuperação de informação para a tradução especializada; e iii) a elaboração de recursos para leigos, especialistas e mediadores (tradutores e terminólogos). O trabalho, desenvolvido por mais de uma década, permitiu-nos chegar a conclusões quanto ao fator humano, à engenharia do conhecimento, ao escopo da terminografia e ao poder do conhecimento da linguagem especializada.

Palavras-chave: treinamento em terminologia, terminografia, tradução, relações conceituais, especialidade, tradução especializada, língua para fins específicos

Summary: This article describes a terminology database developed with three goals in mind: i) training translator trainees in terminology, ii) information retrieval for specialized translation, and iii) resource building for laypeople and language experts and mediators (translators and terminologists). The work that has taken place during more than a decade enables us to draw conclusions regarding the human factor, knowledge engineering, the scope of terminography and the knowledge power of specialist language.

Keywords: terminology training, terminography, translation, conceptual relations, expertise, specialized translation, languages for specific purposes (LSP)

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1. Introduction

The BACUS terminology database project started in 1995 under the auspices of theorists like Arrant & Pitch (1989) with the aim of providing an electronic resource for storing and disseminating the terminology research done by fourth-year translation students taking the 'Terminology Applied to Translation' course as part of their Translation and Interpreting degree at the Universitat Autònoma de Barcelona, Spain. Since then, students have been feeding data on a yearly basis into this resource. This resource is deemed useful for laypeople, trainee specialists and specialists in a particular domain, as well as language mediators (in particular translators and terminologists) as a source for equivalents, corpora and conceptual networks.

Translator trainees conduct descriptive work to explore the basic terminology of an expert domain in at least three languages chosen from among the languages taught at the Department: Catalan, Spanish, English, French, German, Portuguese, Italian, Russian, Arabic, Japanese and Chinese. However, students could also select other languages such as: Basque, Bulgarian, Danish, Dutch, Galician, Greek, Norwegian, Latin, Pulaar, Slovak and Swedish.

All linguistic data included in the BACUS project are obtained from a corpus of original texts (oral –for Catalan, written –both paper and digital documents- for other languages) on the same specialized domain. The texts selected must be homogeneous in terms of language register (readers addressed and text function) and they must be recent texts. Students choose the topic of their work and select an expert for consultancy.

2. Academic Terminology frame

Until the 2011/12 academic year, the subject 'Terminology Applied to Translation' was compulsory for all Translation and Interpreting students. It was a two-semester course worth six ECTS credits (150 hours of work), with three of those ECTS credits devoted to terminography work. Until 2011/12, around 2,700 translators (around 180 per year) took the subject and BACUS contains now the work from people who are now aged mainly 22-43.²The graphics on the languages and subjects chosen thus give a snapshot of the interests and knowledge of this sector of the population.

Owing to changes in the curricula to adapt the degree to the Bologna Process, the compulsory Terminology subject was moved to the third year and the number of ECTS credits awarded was reduced to four (see section 6).

Students can attend now classes in person or take the subject through online learning. Many students choose online learning, especially in recent years, with many students spending time abroad as part of their Erasmus exchange program. The course content is available to students on two platforms: the

² In the first eight years of the programme (1993-2000) 5% of graduates from the old EUTI (School of Translation and Interpreting) diploma enrolled to earn the degree, which is a higher qualification.

subject directory on the shared drive that can be accessed from all computers at the faculty (intranet), and the Virtual Campus (Internet).

Students opting for online learning receive well-structured material on the basics of terminology, but they do not have access to classroom discussions that lead to critical thinking and deontological conclusions.

2.1. Procedure

The work is divided into the four typical stages of terminography research: i) documentation, ii) term extraction, iii) data entry, and iv) reporting conclusions. Students freely choose a domain they wish to study from the terminology point of view. They must then begin the documentation stage, which has two aims. First, students get to grips with their chosen subject so they can obtain an overall grasp of specialist texts in that domain. Students thus become pseudo-specialists. Secondly, students build a multilingual corpus of specialized texts in the reference language and other working languages according to the following criteria:

- Texts should be original, i.e. texts originally written in any of their working languages used in the study by an expert (signed by an author or institution).
- They should share the same register and other pragmatic characteristics, i.e., the same degree of formality.
- The authorship, precision, objectivity, date, ergonomics, information coverage and quality of the text must be evaluated.

During the terminology-extraction phase, students can use the theory acquired in class to formally identify terms in a text and how relevant they are to the chosen field. Before accepting a lexical unit as a potential term, students must search BACUS to see whether the concept has already been used in the database. If the concept is already in the database they must reject it as a candidate or add missing information to the existing BACUS record. An important aspect of this checking phase is that it enables students to understand the onomasiological nature of terminography: that instead of focusing on polysemy (one entry with several meanings), its focuses on homonymy (different entries with identical written form.)

When extracting terms, students should not just extract terms from the texts in their corpus, but should also identify other relevant data, such as the definition, usage and conceptual relations. A multilingual data-extraction template is used so students can record data that they will insert into the records of the terminology database.

Reference language	Lemma	
	Part of speech	
	Description	
	Ref. Description	
	Context	
	Ref. Context	
	Additional information (conceptual relations)	
	Synonym (if it exists)	These fields can be repeated as often as necessary with as many synonyms as exist
	Grammatical category	
	Context	
	Ref. Context	
Language of equivalence 1	Name	
	Part of speech	
	Context	
	Ref. Context	
	Additional information (conceptual relations)	

	Synonym (if it exists) Grammatical category Context Ref. Context	These fields can be repeated as often as necessary with as many synonyms as exist
Language of equivalence 2	Name Part of speech Context Ref. Context Additional information (conceptual relations) Synonym (if applicable) Grammatical category Context Ref. Context	These fields can be repeated as often as necessary with as many synonyms as exist.

Table 1. Data-extraction template

Once students have completed the terminology-extraction phase and their work has been reviewed by the teacher, they can begin creating terminology records using the program MultiTerm Online.

To ensure BACUS is homogenous, students work with a predetermined database structure and a template containing their working languages and a set of semantic fields enabling them to relate various concepts with each other through cross-references.

For their assessment, students must hand-in a report in which they reflect upon the characteristics of the terminology in their chosen field and discuss issues related to documentation, homonymy, the various conceptual relations, contrastive differences between languages and the structure of concepts, etc.

2.2. Group dynamics

Another important aspect of group work is the collaborative learning that takes place. Not only do students share knowledge among themselves, but they also share it with the domain expert they choose, the lecturer and former students, as well as the general public, since there is free open-access to the database. Students' names appear on each terminology record, making them personally responsible for the data they introduce.

The teachers support students in this cooperative process and assist with the teamwork (one of the subject's generic skills) by encouraging the students to share responsibilities equally for all forms and phases of:

- a) documentation
- b) editing records
- c) communication (between students and with the expert and lecturer).

Since a third of the students taking this subject choose to take the online learning option, the students must learn, work and communicate online, a professional competence that is becoming increasingly important in the globalized world.

2.3. Indicators of the work compiled

After a decade of academic work, BACUS contains 24,171 concepts.

Figure 1 shows the percentage of terms in each language (1995-2010):

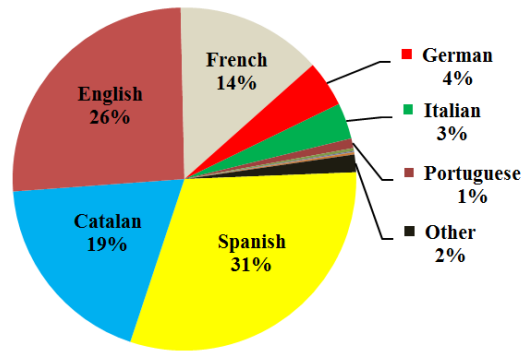


Figure 1. Languages represented in BACUS (1995-2010)

The “Other” category includes Basque, Galician and Latin, the latter being frequent because of students who chose a field from the natural sciences.³

As of 2003, the “Others” category contained the following languages:

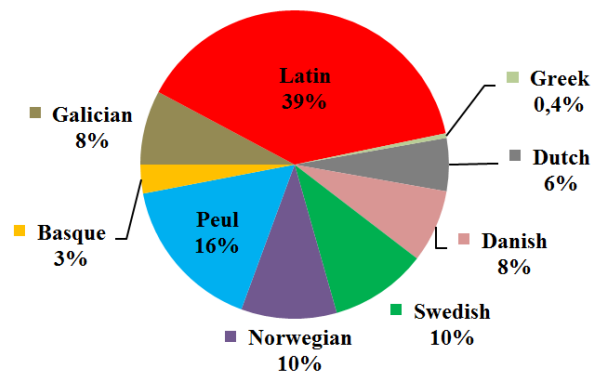


Figure 2. Other languages in BACUS (1995-2010)

If we place each of the 65 domains included in BACUS into one of the six major branches of knowledge used by our university to classify our courses we see the following distribution:

³ The strategic decision to include Latin as a natural (living) language makes it possible to identify and find biological species to match vernacular names. The rejected option was to include the Latin name as a synonym in each language, but then the Latin name would be tediously repeated three times on each record and would not help during the search query process.

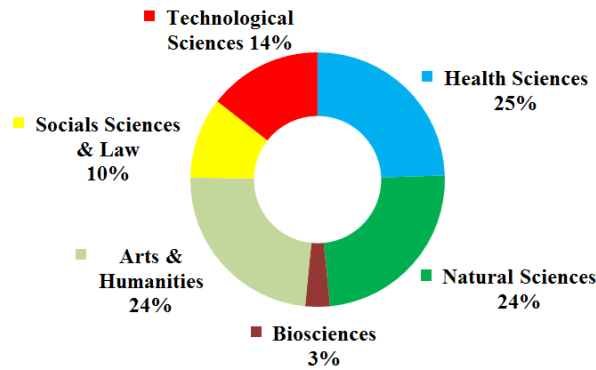


Figure 3. Domains in BACUS (1995-2010)

3. Knowledge engineering

BACUS is designed with conceptual networks based on the conceptual (or semantic) relations identified.⁴Table 1 shows the number of conceptual networks currently contained in the BACUS database:

<i>No. projects</i>	<i>No. concepts</i>	<i>No. terms</i>	<i>New terms proposals</i>	
727	24,171	247,206	557	
LANGUAGES				
<i>Spanish</i>	<i>Catalan</i>	<i>English</i>	<i>French</i>	<i>German</i>
75,635	46,109	63,470	33,893	10,722
<i>Italian</i>	<i>Portuguese</i>	<i>Japanese</i>	<i>Arabic</i>	<i>Russian</i>
8,384	2,247	671	199	86
<i>Chinese</i>	<i>Others</i>			
544	4,074			
LOGICAL CONCEPTUAL RELATIONS				
<i>Antonym</i>	<i>Hyperonym</i>	<i>Hyponym</i>	<i>Nearby</i>	
2,911	15,686	33,649	9,338	
ONTOLOGICAL CONCEPTUAL RELATIONS				
<i>Part</i>	<i>Whole</i>	<i>Cause</i>	<i>Effect</i>	
88,655	41,824	5,851	8,988	
INFRALOGICAL CONCEPTUAL RELATIONS				
<i>Location</i>	<i>Material</i>	<i>Shape</i>	<i>Color</i>	<i>Coord. with</i>
24,740	20,804	4,330	3,072	17,710

⁴ The relations described are those considered relevant by students based on the texts they worked with, and is not a list of all possible relations. A distinction is made between a conceptual relation, which refers to the relation between referents, and a semantic relation, which is the relation between terms in the same language.

<i>Enlargement</i>	<i>Abbreviation</i>	<i>Symbol</i>	<i>Previous</i>	<i>Subsequent</i>
6,271	2,385	2,154	2,647	3,379
<i>Producer</i>	<i>Product</i>	<i>Transmitter</i>	<i>Receiver</i>	<i>Used for</i>
2,046	7,045	2,639	1,718	5,997
<i>Argument of</i>	<i>Object</i>	<i>Agent</i>	<i>Agent of</i>	<i>Benefactive</i>
2,643	9,746	6,510	2,417	1,835
<i>Relevance</i>	<i>Salience</i>	<i>Instrument</i>	<i>Symptom</i>	<i>Component</i>
1,735	353	3,396	3,142	7,185
OTHER FIELDS				
<i>Etymology</i>	<i>Aphorism</i>	<i>Example</i>	<i>Note</i>	
1,808	1,877	2,430	8,645	

Table 2. Number of conceptual networks in BACUS (1995-2010)

Table 2 shows that as well as the fields typically found in any terminology database (term, context, definition), BACUS contains conceptual relations. We therefore believe BACUS is not a typical terminology tool for practitioners but rather a knowledge database. See, for instance, the following record:

Entry number 14687
Domain Industrial engineering, Energy resources
Work title L'energia solar tèrmica i fotovoltaica
Unesco codification 3322.02 Tecnologia energètica - Generació d'energia
Author Mesa Lao, Bartolomé
Assessor Eco Equip: Agència de Serveis Energètics de Terrassa (ASET)
Conceptual location 2. Mètodes de captació

Catalan

captació solar
Part of speech f
Definition Fenomen que consisteix en la transformació de la [radiació solar](#) en una forma d'energia útil.
Reference Blas, M.; Serrasoltes, J. Diccionari d'energia solar. Barcelona: Universitat Politècnica de Catalunya, 1992.
Context Per tal d'assolir la màxima [eficiència](#) en la captació solar, cal que el subsistema de captació estigui orientat al sud amb un marge màxim de +25°.
Reference COAC. Annex sobre captació solar tèrmica de l'Ordenança General del Medi Ambient Urbà. [en línia]. ICAEN. Barcelona: Col·legi d'Arquitectes de Catalunya, 2000. <http://www.coac.net/mediambient/documentacio/annex_cst.htm> [Consulta: 25 març 2001].
Coordinated with guany solar
Subsequent [conversió fotovoltaica](#)
Subsequent [conversió tèrmica](#)
Instrument [captador solar](#)
Hyponym captació solar directa
Hyponym captació solar indirecta

English

solar energy collection
Context The use of a control system to drain the system at low temperatures could increase [performance](#) by allowing more hours of solar energy collection.
Reference Dayan, M. High Performance in Low Flow Solar Domestic Hot Water Systems. Wisconsin-Madison: American Solar Energy Society, 1998. Pàg. 1.
Coordinated with solar gain
Subsequent [photovoltaic conversion](#)
Subsequent [solar thermal conversion](#)
Instrument [solar collector](#)
Hyponym direct solar collection
Hyponym indirect solar collection

French

captation solaire
Part of speech f
Context De nombreux systèmes passifs de captation solaire ont été expérimentés et sont basés sur les 3 principes suivants: capter, stocker et restituer (serre, veranda, atrium, double peau, [mur Trombe](#)...).
Reference Lachal, B. Potentialités et limites de l'énergie solaire pour un développement durable [en línia]. Ginebra: Centre universitaire d'étude des problèmes de l'énergie (CUEPE), 1995. <<http://www.unige.ch/droit/bios/sebes/textes/1995/95BLpotsol.html>> [Consulta: 15 març 2001].
Coordinated with apport solaire
Subsequent [conversion photovoltaïque](#)
Subsequent [conversion thermique](#)
Instrument [capteur solaire](#)
Hyponym captation solaire directe
Hyponym captation solaire indirecte

Spanish

captación solar
Part of speech f
Context La [eficiencia](#) de captación solar, del orden del 50% para una temperatura intermedia, va disminuyendo casi linealmente hasta tender a cero para la temperatura máxima.
Reference Muñoz, P. "El efecto invernadero en colectores solares planos". A: Avances en energía solar. Recopilación de artículos técnicos publicados en Era Solar. Sevilla: PROGENSA, 1998. Pàg. 33.
Coordinated with ganancia solar
Subsequent [conversión fotovoltaica](#)
Subsequent [conversión térmica](#)
Instrument [captador solar](#)
Hyponym captación solar directa
Hyponym captación solar indirecta

colección solar
Part of speech f
Context El [horno solar](#) es el sistema de colección solar por concentración más adecuado para la generación de energía eléctrica de elevada potencia, puesto que tiene capacidad para proporcionar potencias del orden de 100 megavatios, lo que lo hace especialmente apropiado para aplicaciones industriales.
Reference Domínguez, A. Las energías alternativas - Horno solar de torre central [en línia]. Ecología educadora. Madrid: Ecoweb - Ecología educadora, 1998. <http://ecoweb.terrashare.com/energ_alternat_horno_solar.htm> [Consulta: 29 abril 2001].
Coordinated with ganancia solar
Subsequent [conversión fotovoltaica](#)
Subsequent [conversión térmica](#)
Hyponym captación solar directa
Hyponym captación solar indirecta
Instrument [colector solar](#)

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Figure 4. Example of a BACUS record

In addition to the relations described that allow a concept to be defined based on other concepts to which it is closely related, BACUS contains a set of attributive relations (attribute fields) that complete the linguistic and extralinguistic information. They are:

- *Part of speech* (*v, phr, m, f, neut, mpl, fpl, pl*) – indicates the grammatical category, with *noun* being the default category.
- *logic relation* (*generic, specific, similar sense*) – indicates the difference in specificity with the equivalent (the language that is not the reference language is marked).
- *analogic relation* (*metaphor, metonymy*) – indicates analogic uses.

- *style (colloquial, specialized...)* – indicates the record containing the synonym.
- *sex (female, male)* – describes the heteronomy.
- *source type (legal, journalistic, manual, etc.)* – indicates the type of source (patents, informative, manual, etc.).

4. Scope of terminography management tools

BACUS is designed to be used with the terminology database management system MultiTerm (initially the 95 version and currently the 2009 version – MultiTerm Desktop/Online).

Three different types of fields exist within the database: *a)* index fields, *b)* text fields, and *c)* attribute fields with default values. The *index* fields correspond to the languages in the database and allow direct searches for the terms contained in the BACUS database. The *text* fields allow any kind of textual data to be entered in the database. These data must be linked with the fields that describe each concept (definition, context, reference, hyponym, hyperonym, etc.). The attribute fields can be used to introduce data from closed lists.

We initially began using the demo version of MultiTerm 95, which was distributed for free by the former Trados company. This version allowed students to work locally, on computers either at the faculty or at home. The datasets were subsequently compiled by the teachers.

The main problem with the tool was that it did not accept non-Latin scripts, so the words in Arabic, Chinese, Japanese, etc. had to be scanned in as an image. This was a less-than-ideal procedure, and meant it was impossible to perform searches. Another problem was that it was easy to corrupt the records so they could not be viewed by introducing extra line breaks at the end of a text field, as often occurred when students copied and pasted from the data-extraction records prepared in a word processor.

Thanks to a grant awarded by the Catalan government and support from the Vice-Rectorate of Research, in 2007/08 we were able to overcome these problems by purchasing the online version of SDL MultiTerm 2007. That year we carried out a pilot test with a small number of students, before using it as our regular teaching tool in 2008/09. Previous data stored in the 95 version were converted to the new format (which was a very complex and arduous task).

The main advantages of the new version are:

- Databases are not stored on a local hard drive but on a server, which means they can be accessed from any computer connected to the Internet. This means we have been able to make the database available to all Internet users. Before data is imported into BACUS and made available to the general public, students are given a personal access code so they can access and edit their own database. The general public can only access BACUS to consult the database and apply filters.
- Back-up copies are automatically made every day to ensure students' work is never lost if they have problems with their database or accidentally delete data.
- Non-Latin scripts can be used, thus eliminating the problem with the earlier version whereby searches could only be performed in languages with Latin scripts. Currently one of the projects in Japanese is to convert all the terms in the database in the form of images into text format so that they can be readily accessed. This task has already been done for Arabic. Being able to work with different types of scripts is vital in a translation department.

- Apart from images, videos too can now be added to the database, and have been used to demonstrate processes or to introduce records with sign language.
- Students from the same group can work simultaneously on the same database (as long as they do not work on the same record), so they no longer have to merge their databases together.
- Teachers can monitor the databases online as they are being built and help students solve specific problems whenever they wish.
- The software includes a faster, desktop version for working on the intranet, and an online querying and editing facility for students to access their own database and make changes from any remote workstation connected to the Internet without needing any additional software.

But we have also encountered some problems we didn't find with the older version:

- A specific version of Java needs to be installed on a computer for it to access the online tool, and certain Java add-ons need to be disabled. This is an additional difficulty for those who are less technically proficient, since in some cases an old version of Java must be installed.
- The tool comes at a considerable cost and the faculty only has 50 licenses for around 200 students taking the course, plus external users.
- Server does not afford the simultaneous query of students at classroom when using filters.

There are also some problems that have remained since the old version. It is impossible to use superscript and subscript, which means mathematical formulas can't be used or need to be uploaded as images.

The software is not designed to work with such a large number of data, and using the "Full Text Search" mode or exporting data is very slow, often making the program crash. The administrator (the lecturers, in our case) need to be on hand to restart the server, remove users, or delete blocked records. Lots of patience is needed.

Some African languages like Pulaar (Peul) have no possible label.

5. The cognitive power of specialist language

The database was designed based on the following principles (see Aguilar-Amat et al, 1996):

1. Conceptual relativity
2. Atomization of knowledge
3. Exclusion of grammar
4. Conceptual navigation

In a forthcoming paper we will present the theoretical conclusions resulting from our observance of such a broad spectrum of work. In this paper we have focused on the process, not the product. But for now we will say that the conclusions are related to the nature of the concept diagram and the degree of specificity of terms, which require changes in terminology research and practice.

5.1. The concept and the reference language

One aspect within the learning process of our students is to conceive other possible ways of building the concepts they are dealing with, i.e. lexical selection in other languages. Frequently they look for concepts

in the same form that the one conceived in their own language rather than being open to other points of view⁵. As Maturana and Varela (1984) state, “in the cognitive process that contains the mark of our individual, social and cultural ideological structure, our perception of reality serves to stimulate our individual way of knowing and the process is not ‘objects out there enter my head’ but rather it is my head that goes out there”. The terminography work trains translator trainees to do the opposite, however educating ourselves cognitively to let go of our own conceptual system can take a whole lifetime.

For practical reasons, as a functional criterion for sorting, we use the concept of the “reference language” as a starting point. The reference language is that which is used to order the concepts in the conceptual diagram and in which we will make decisions. We decided that the reference language is not the student’s mother tongue but rather the language most intrinsically related to the specialized domain, the one with the higher level of specification.

This approach wants to produce a truly multilingual database where there is neither a commander source language nor a commander target language. There should be a rich set of concepts, since each language is predominant in the field in which it has most experience.

(In practice, however, the chosen reference language is often the language in which there is most textual content, the one considered to be most representative and that the students find easiest to understand as specialized knowledge. This obviously gives more emphasis to the languages that are most widely spoken.)

When a concept in one language is more specific than in another, the student must decide which of the two languages will set the criterion used for creating the terminology records. Here is one example:

ca. *pala* = en. *spade* (for digging), en. *shovel* (for moving sand or coal), en. *dustpan* (for picking up dirt)

The Catalan term is broader (applied to a much wider range of concepts), less intensive (it has less inherent characteristics), and therefore less specific than the terms in English. If this occurs with a significant number of terms in the same field, the terminographer will choose to take the language with the more specific terminology as the reference language.

Thus, the language with the greatest specificity in a field becomes the reference language for a student’s project. Catalan has a high level of specificity, for example, in the field of winemaking, French in ballet, and English in technology. Needless to say, English is the ‘source term’ in many fields because of its widespread use for disseminating information.

The reference language is also the language of the title of the project and the language in which definitions are written.

Besides these extensive or intensive definitions and the number of characteristics described, concepts defined in terms of conceptual relations will take into account the different types of relations between the concepts within a specific knowledge structure. In BACUS, this conceptual relation is determined by the forty or so semantic fields established on the basis of hypothetical logical, ontological, infralogical and argumentative relations (Aguilar-Amat et al., 1996).

5.2. Semantic and conceptual relations in BACUS

The initially proposed set of fields (Aguilar-Amat et al., 1996) has been broadened several times

⁵ Looking for ‘en.Forest regeneration’ from ‘es.Regeneraciónforestal’ instead of ‘en. Rebirth of a forest’.

following proposals made by students based on their chosen specialist field. For instance, the fields *instrument* and *component* have been added. See Sánchez-Gijón 2004 for a description of the final set.

The subject fields included in BACUS can be divided into three main groups: descriptive fields, which describe the characteristics and nature of the concept, conceptual relations fields, which link the concept to the other terms within the specialist field, and argumental fields, which link entities (nouns) to processes (verbs).

- Descriptive fields

These fields allow a detailed description of the characteristics of the concept and the way the term is used. When another term in the database is found in any of these optional fields, a cross-reference is provided to show the relations between closely related concepts and to describe the frame (Fillmore, 1977). The descriptive fields include:

- Fields that describe the essential characteristics of the concept and the use of the term in context:

<i>Definition</i>	This field includes a reference to the texts consulted to produce the definition
<i>Context</i>	This field includes a reference to the text cited
<i>Note</i>	Information on the use of the term and any pertinent conceptual data
<i>Relevance</i>	Used to give the reason why the concept is important within the field
<i>Aphorism</i>	Used to confirm whether the term is part of an aphorism in a language

- Fields related to term referents:

<i>Example</i>	Used to enter a referent of the term described
<i>Location</i>	Used to indicate whether the referent has a certain origin

- Fields related to the characteristics of the term:

<i>Material</i>	Used to enter the type of material of the concept, if applicable
<i>Shape</i>	Used to enter the shape, if applicable
<i>Color</i>	Used to enter the color, if applicable

- Fields related to the characteristics of the term:

<i>Enlargement</i>	Used to enter alternative, longer terms that are less common
<i>Abbreviation</i>	Used to enter abbreviated or truncated forms of a term
<i>Symbol</i>	Used to enter non-linguistic representations of a term (icons, formulae, etc.)
<i>Etymology</i>	Used to enter etymological information

-Fields of conceptual relations

These fields enable relations to be established between the different concepts included in the database. Some fields enable links between concepts and subject nodes or knowledge structures. Others enable direct links to be established between specific terms.

- Fields that link concepts with knowledge structures

<i>Domain</i>	Links the record with BACUS's own classification of domains
<i>Work title</i>	Links the record with all the records with the same Work title
<i>Unesco Codification</i>	Links the record with the corresponding Unesco code
<i>Conceptual Location</i>	Links the record with a branch of the conceptual diagram of the project

- Conceptual relations fields

<i>Hyponym</i>	Links the concept to its hyponym
<i>Hyperonym</i>	Links the concept to its hyperonym
<i>Co-hyponym</i>	Links the concept to its co-hyponym
<i>Nearby</i>	Links the record with records for closely related concepts that are sometimes used as synonyms
<i>Part</i>	Links concepts that form a unit composed of identifiable parts with the records for those parts
<i>Whole</i>	Links concepts that are part of a unit with the records for those units
<i>Component</i>	Links concepts that represent a unit formed by inseparable components with the original components
<i>Coordinated with</i>	Links the concept with other, very similar concepts, but without establishing the precise nature of the relations between the two
<i>Cause</i>	Links a concept with the concept that causes it or states the cause
<i>Effect</i>	Links a concept with the concept that is its effect or states the effect
<i>Symptom</i>	Links a concept with its symptom
<i>Previous</i>	Links a concept with the concept that represents the previous state or phase
<i>Subsequent</i>	Links a concept with the concept that represents the subsequent state or phase
<i>Producer</i>	Links a concept with the concept that it produces
<i>Product</i>	Links a concept with its producer
<i>Transmitter</i>	Links a concept with its transmitter
<i>Receiver</i>	Links a concept with its receiver
<i>Instrument</i>	Links a concept with the instrument necessary to make it
<i>Used for</i>	Links a concept with the task it is used for

Many of these relations function symmetrically so that the type of relations between term A and term B is the opposite of the relations between term B and term A. For example, if A is a hyperonym of B, B is a hyponym of A.

- Predicate-argument fields

There are around forty semantic fields, but just six of these describe the most frequent predicate-argument relations:

agent / agent of / object / object of / benefactive / used for

These fields enable users to link referents and the terms used to refer to them with processes and the terms used to refer to them. For example, *who carries out the action* vs. *what action does he or she carry out*, would be described in terms of the relations between *agent* and *agent of*:

ca. horse / es. caballo / en. horse	<i>agent of</i>	ca. renillar / es. relinchar / en. to whinny
ca. cantar / es. cantar / en. to crow	<i>agent</i>	ca. gall / es. gallo / en. cock

The symmetrical relation *agent / agent of* describes a subject/action relation, but in terms of the concept rather than the syntax. Let us look at the following example:

The key opens the door

In this sentence, the subject is the key, but the conceptual role of the key is that of an *instrument*, not an *agent* (someone opens the door with the key).

Predicate-argument relations enable verb/noun collocations to be described in the different syntactic patterns of the different languages. The *object/object of* relation describes the lexical combination of a noun in the direct-object position:

es. Miopia / en. myopia	<i>object of</i>	es. corregir / en. to correct
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The *benefactive* field describes the relation between one concept and another that receives the action or consequences:

es. prednisolona / en. prednisolone	<i>benefactive</i>	ca. pacient asmàtic / en. asthmatic patient
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The field *used for* enables the different names of the processes related to a concept to be described, for example:

prednisolone	<i>used for</i>	inhibit the inflammatory response
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Any predicate may be used with this type of argument, for example:

refractive surgery	<i>object</i>	myopia
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6. Terminology Applied to Translation in the new curricula

The characteristics of the Terminology Applied to Translation course in the new degree, in a single term with no other introductory courses, means we are unable to continue with the working method described above. We have already indicated that if the database grows much more (there is still one group from the old degree working on it), working with the data (full-text queries, exports) will become even slower and more problematic. Students of the new degree have begun reviewing the work done by their predecessors, working on a project from a field chosen by the teacher. If necessary, students rebuild the conceptual diagram and check the coherence of the data. Students are given a documentary introduction to the subject and they enter the data into open-access databases such as GesTerm (TermCat), more user-friendly than SDL Trados MultiTerm.

After the past experience we ask the students to collect terminology collocations on the form of a nucleus and a modifier (adjective or prepositional phrase) if possible, to ensure they are working within the maximum level of specification (genus species).

Then we also ask for an organized conceptual diagram with the minimum subsections, as a flat diagram allows a better multilingual bridge. (Those subsections only describing mental understanding but which remain empty should be removed).

In order for students to understand the scope of a given conceptual frame and continue reflecting on the equivalences of other concepts related to the concept at hand, we produce a diagram like the one shown below based on the data collected for a concept. We suggest they use freely available software such as <http://www.text2mindmap.com/>.

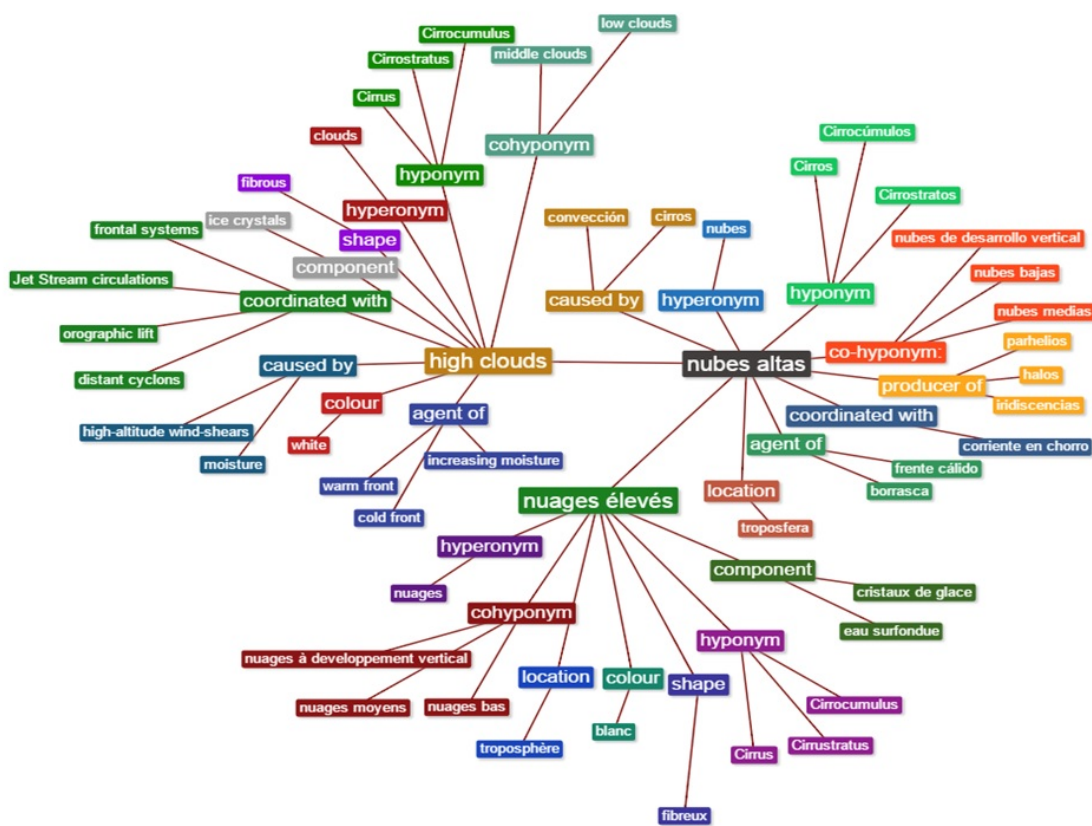


Figure 5. Conceptual network of 'high clouds' in Spanish, English and French

7. Addenda

How to consult BACUS:

<http://www.fti.uab.es/departament/BACUS/index.htm> or through our research team Tradumàtica
<http://grupsderecerca.uab.cat/tradumatica/content/bacus-base-de-coneixement-universitari>

Username: convidat, Password: convidat

Once you are logged in, select the language you wish to query.

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