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European directives and ontologies for terminology and translation

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1. Introduction: European directives, terminology and ontologies 1.1. European directives and terminology

International law and particularly European Union law can be a valuable resource for translation and terminology, as they provide us with thousands of (parallel) texts from which we can build corpora, translation memories and other terminological resources. Among these texts we find regulations, directives, decisions, agreements, etc., and all these texts occur in a number of languages¹. In this paper we will be dealing with a directive, which is a legislative act of the European Union that requires member states to achieve a particular result without dictating the means of achieving that result.

Specifically, the study presented in this paper is based on the *Council Directive 90/314/EEC on package travel, package holidays and package tours* (European Council, 1990). This act is designed to protect consumers who contract package travel in the European Union: for instance, it regulates the contents of package travel brochures and contracts. A *package*, as defined by the directive, is a:

1 We can find these documents in EUR-Lex, a database that provides free access to European Union law. See reference in bibliography.

(...) pre-arranged combination of two or more of the following elements when sold or offered for sale at an inclusive price and when the service covers a period of more than twenty-four hours or includes overnight accommodation: (a) transport; (b) accommodation; (c) other tourist services not ancillary to transport or accommodation and accounting for a significant proportion of the package (European Council, 1990).

Taking into account the multiple benefits offered by European law documents (i.e. the fact that they are published in different languages), our hypothesis is that if we combine the knowledge contained in the directives with the principles and methods of ontological engineering, we can obtain ontology-based terminology resources which could become a valuable means for conceptual and terminological documentation for the translator. These resources would be capable of providing unambiguous information about the concepts of a domain, and about its corresponding terms in several languages, thus facilitating information transfer worldwide. In this way, we could build a resource which provides translators with a) the translation of a term; b) information on how that term is related to others from the same domain; and c) information on its properties and characteristics. Works such as the *Dictionnaire Analytique de la Distribution* by Dancette and Rhétoré (2000) have applied this approach.

1.2. Ontologies

Before continuing our presentation, it is necessary to explain some of the basics of ontologies and why they can be closely related to terminology.

Ontology, according to the *Longman Dictionary of Contemporary English*, is a "subject of study in philosophy that is concerned with the nature of existence" (Summers, 1995: 989). In the field of Knowledge Engineering, a discipline where ontologies are a means to create knowledge-based systems, so that knowledge can be codified and processed by computer, Gruber's definition (1993: 199) is usually cited: an ontology is "an explicit specification of a conceptualization". Weigand, for his part, offers a more specific definition: "an ontology is a database describing the concepts in the world or some domain,

some of their properties, and how the concepts relate to each other" (1997: 138). Another definition which is worth citing is Studer *et al.*'s, who expanded the well-known definition by Gruber and consider that an ontology is a "formal, explicit specification of a shared conceptualisation" (1998: 25). In order to explain their definition, the authors specify the meaning of each of its elements:

A 'conceptualisation' refers to an abstract model of some phenomenon in the world by having identified the relevant concepts of that phenomenon. 'Explicit' means that the type of concepts used, and the constraints on their use are explicitly defined. For example, in medical domains, the concepts are diseases and symptoms, the relations between them are causal and a constraint is that a disease cannot cause itself. 'Formal' refers to the fact that the ontology should be machine readable, which excludes natural language. 'Shared' reflects the notion that an ontology captures consensual knowledge, that is, it is not private to some individual, but accepted by a group (Studer *et al.*, 1998: 25).

It becomes clear that any ontology consists of a series of components. Noy and McGuinness (2001) mention and define the following:

- Classes, sometimes called *concepts*, make up a domain of discourse.
- *Properties* of each concept, also called *slots*, describe various features and attributes of the concept.
- *Restrictions* on slots, also called *facets*, specify the values and the type of values that the properties can take.
- *Instances* are individual elements of the ontology.

Corcho *et al.* (2005: 144-145) propose a wider composition and distinguish among concepts, relations, instances, constants, attributes, axioms and rules. Below is a summary of what these authors propose as elements belonging to an ontology²:

- *Concepts* represent ideas about the physical or abstract objects that constitute a domain. As the authors point out, concepts "are usually organized in taxonomies through which inheritance mechanisms can be applied" (2005: 144). In this way, a class can be divided into subclasses that represent more specific concepts: for instance, in the domain we are dealing with, an ontology on package travel

2 We have provided our own examples.

can contain the class “transport”, and this can further contain the subclass “plane”.

- *Relations* represent a type of association between concepts of the domain. The majority of relations link two concepts, so they are called binary relations.
- *Instances* represent individuals or specific elements of an ontology. So, for example, the concept “hotel” can be instantiated as “Four Seasons Hotel”.
- *Constants* are numerical values that do not change during much time. For example, the minimum number of nights in a package travel is one.
- *Attributes* describe properties of concepts and of instances. The authors distinguish two types of attributes: “class attributes” and “instance attributes” (2005: 145). The former describe concepts and take their values in the concept where they are defined. The latter describe instances and take their values in them.
- *Formal axioms* are logical expressions that are always true and are normally used to specify constraints in the ontology.
- *Rules* are generally used to infer knowledge in the ontology, such as attribute values.

On the other hand, ontologies can be classified according to several criteria. In what follows we will present Gómez-Pérez *et al.* (2004), Guarino (1998) and Steve *et al.* (1998), since these authors have offered clear and widespread definitions regarding this subject.

According to Gómez-Pérez *et al.* (2004: 8), ontologies can be classified into two groups, which they call “lightweight” and “heavyweight” ontologies: the former group includes concepts, concept taxonomies, relations between concepts, and properties that describe concepts; while heavyweight ontologies include the previous elements and also contain axioms and constraints, which clarify the intended meaning of the terms gathered in the ontology.

Guarino (1998: 7-8) distinguishes four large ontology groups, according to their level of generality: “top-level ontologies”, “domain ontologies”, “task ontologies”, and “application ontologies”. We offer below a summary of the description provided by the author:

- *Top-level ontologies* describe very general concepts like space, time, matter, object, event, action, etc., which are independent of a particular problem or domain.
- *Domain ontologies* describe the vocabulary related to a generic domain (like medicine or automobiles).
- *Task ontologies* describe a generic task or activity (like diagnosing or selling).
- *Application ontologies* describe concepts depending both on a particular domain and task, which are often specializations of both the related ontologies.

Steve *et al.* (1998: 1-2) propose a similar classification to Guarino's; they also mention domain ontologies, but they divide top-level ontologies into “generic” and “representation” ontologies:

- *Domain ontologies* “concern specialised knowledge in a domain or subdomain: medicine, cardiology, clinical administration, protocols, etc.” (p. 1).
- *Generic ontologies* “concern general, foundational aspects of knowledge: processes, part/whole structure, kinds of objects, quantities” (p. 1).
- *Representation ontologies* “specify the conceptualisations that underlie knowledge representation formalisms” (p. 1), so they are also called “metaontologies” (p. 2) (*meta-level* or *top-level ontologies*).

Finally, we would also like to take into consideration the relationship between ontologies and terminology, since, as Vargas (2007: 50-51) explains, they have certain points in common, given that a substantial part of the terminologist's work needs a conceptual approach. In this way, she points out that it is necessary to understand the area being explored in order to be able to structure it, classify it and define it. In this respect, Vargas (2007: 51) states that a conceptual structure must allow for the following³:

1. To circumscribe the research, since the fields and subfields the area is divided into will be considered.
2. To anticipate both the set of relevant terms of the domain being explored, and those that belong to related areas.

3 My translation.

3. To determine the relevance of the terms in the domain; by dividing them into groups related to a certain subfield, it is possible to establish which ones are really interesting, based on the goals and the prototype user of the terminological application to be created (database, dictionary, vocabulary, etc.).
4. To construct a more controlled and coherent terminology, given that structuring makes it possible to treat an area of specialty in a more systematic way.
5. To define terminological units in a logical and systematic way.

Several projects have taken into account the relation between ontologies and terminology. Vargas (2007: 48-49) mentions some of them: for example, the COGNITERM Project on terminological knowledge bases, developed at the University of Ottawa and described in Meyer *et al.* (1992), can be considered as the pioneer in addressing the interaction between terminology and knowledge representation through ontologies. In Spain the ONCOTERM Project was among the first to address this approach, as it combined techniques for information analysis and representation based on ontological semantics (see Nirenburg and Raskin, 2001) with corpus linguistics (Faber, 2002), in order to structure the oncology sub-domain and create a multilingual information system.

2. Building an ontology on package travel

2.1. Introduction to ontology building

In order to demonstrate our hypothesis, we will build an ontology for translation and terminology purposes. To do so we will use the METHONTOLOGY methodology (Gómez-Pérez *et al.*, 2004). This methodology was created by the Ontological Engineering Group of the Technical University of Madrid (Universidad Politécnica de Madrid) and provides guidance on how to develop an ontology carrying out the following series of activities: specification, conceptualization, formalization, implementation and maintenance. We provide below a summary of the description of the activities proposed by Gómez-Pérez *et al.* (2004: 109-111):

- The *specification* activity consists in determining why the ontology is built, which uses it will have, and who the final users will be.

- The *conceptualization* activity involves organizing and turning an informal perception of a domain into a semi-formal specification. The authors propose to use a set of intermediate representations based on tables and graphics which can be easily understood by both domain experts and ontology developers. The result of this activity is a conceptual model of the ontology.

- The *formalization* activity is aimed at transforming that conceptual model into a formal or semi-computable model.
- The *implementation* activity builds computable models through ontology languages (for example, Ontolingua, RDF(S), OWL, etc.). Most ontology tools can carry out this activity in an automatic way.
- The *maintenance* activity consists in updating and/or correcting the ontology, if necessary.

METHONTOLOGY also identifies management activities (scheduling, control, and quality assurance), and support activities (knowledge acquisition, evaluation, integration, documentation, merging, configuration management, and alignment).

We will now focus on the specification, conceptualization and implementation activities carried out to build our ontology.

The first step in the construction of an ontology involves specifying its goals, applications and final users. In this respect, it is worth citing Noy and McGuinness (2001), who propose some questions to answer prior to the creation of an ontology:

What is the domain that the ontology will cover?

For what we are going to use the ontology?

For what types of questions the information in the ontology should provide answers?

Who will use and maintain the ontology? (Noy and McGuinness, 2001)

The domain will be package travel, covering general concepts extracted from the corresponding European directive. In this way, it will be a domain type ontology as defined above by Guarino (1998) and Steve *et al.* (1998). The ontology will be used for terminology, translation and documentation purposes and will thus answer questions that translators and terminologists could ask when working with texts from the domain of package travel (e.g. contracts, brochures, etc.). In Gomez-Pérez's terms, it will be lightweight, in the sense that it will

contain concepts, attributes, taxonomies and *ad hoc* binary relations. It will also include linguistic realizations, or lexicalizations, in English, German and Spanish. Its maintenance will be initially undertaken by the researcher responsible for this study, but this task could subsequently be carried out by translators and terminologists, with appropriate training.

The conceptualization stage, on the other hand, involves carrying out a series of steps, each of which specifies a different element of the ontology: building a glossary of terms, building concept taxonomies, building a concept dictionary, and defining the following elements in detail: *ad hoc* binary relations, instance attributes, class attributes, constants, formal axioms, rules, and instances. Since we plan on creating a lightweight ontology, we will leave out constants, formal axioms, and rules. Given below are the steps that we have followed to develop our lightweight ontology.

1) *Building a glossary of terms.* First we made a glossary of terms about package travel. We extracted the most relevant and frequent terms from the texts of the directive in Spanish, English and German. Those terms correspond to concepts, attributes, relations, etc. Then we specified data such as their description and their typology. We carried out this procedure first for Spanish, and then for English and German. This allowed us to complete the glossaries at a later stage by adding equivalents in the other languages. Those terms were introduced in the column corresponding to "Synonyms"⁴. Below is an extract of the English glossary of terms (table 1):

Name	Synonyms	Description	Type
package travel	(ES) viaje combinado (DE) Pauschalreise	Pre-arranged combination of not fewer than two of the following when sold or offered for sale at an inclusive price and when the service covers a period of more than twenty-four hours or includes overnight accommodation: (a) transport; (b) accommodation; (c) other tourist services not ancillary to transport or accommodation and accounting for a significant proportion of the package.	concept
organizer	(ES) organizador (DE) Veranstalter	Person who, other than occasionally, organizes packages and sells or offers them for sale, whether directly or through a retailer.	concept
contract	(ES) contrato (DE) Vertrag	Agreement linking the consumer to the organizer and/or the retailer.	concept

Table 1: Extract of the English glossary of terms

2) *Building concept taxonomies.* Secondly, we selected the concepts from the previous list and defined concept hierarchies. METHONTOLOGY distinguishes four types of taxonomies: Subclass-Of, Disjoint-Decomposition, Exhaustive-Decomposition, and Partition. Figure 1 shows an example of partition, which consists of a set of subclasses that does not share common instances but that covers all the possible subclasses of the main concept from which they are derived (in this case, "consumer"). Therefore, there are no instances of "consumer" that are not instances of one of the subclasses in the partition.

⁴ METHONTOLOGY and its associate computer tool WebODE do not provide the option of including lexicalizations in other languages, but we decided to use the synonym space to record those terms.

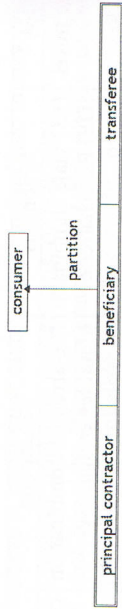


Figure 1: Example of partition

3) *Building ad hoc binary relation diagrams.* The goal of these diagrams, according to Gómez-Pérez *et al.* (2004: 135), is to establish *ad hoc* relations between concepts of the same (or different) concept taxonomy. These are exclusive relationships in a certain domain. Figure 2 shows the relation “organized” and its inverse, “is organized by”.

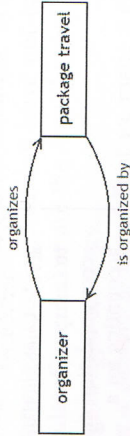


Figure 2: Example of *ad hoc* relation

4) *Building the concept dictionary.* The concept dictionary contains all the concepts of the ontology as well as the properties – both on a concept level and on an instance level – and the relations that describe them. It is possible that some concepts do not have class or instance attributes. Table 2 is an extract of our concept dictionary.

Concept name	Class attributes	Instance attributes	Relations
package travel	inclusive price	departure date return date	includes
transport	--	category	subclass-of: plane, ship, train
accommodation	--	category location	--

Table 2: Extract of the concept dictionary

5) *Defining ad hoc binary relations in detail.* This step involves taking all the *ad hoc* binary relations included in the concept dictionary and detailing the name of the relation, the names of the source and target concepts, the cardinality – in this case, the number of elements that can act as a source concept – and the possible inverse relations (see table 3).

Relation name	Source concept	Source cardinality (max.)	Target concept	Inverse relation
organizes	organizer	1	package travel	is organized by
buys	consumer	N	package travel	is bought by

Table 3: Extract of the *ad hoc* binary relation table

6) *Defining instance attributes in detail.* In this step we describe all the instance attributes included in the concept dictionary (see table 4). The value type refers to whether the value is a string, an integer, a boolean-type, etc. The range of values stands for the minimum and maximum values which the numerical attributes can take. The cardinality stands for the minimum and maximum number of values the attribute can take.

Instance attribute name	Concept name	Value type	Range of values	Cardinality
category	Transport	string	--	(1, 1)
category	accommodation	string	--	(1, 1)
location	accommodation	string	--	(1, 1)

Table 4: Extract of the instance attribute table

7) *Defining the class attributes in detail.* At this stage we describe the class attributes reflected in the concept dictionary (see table 5).

Class attributes	Concept name	Value type	Cardinality	Values
inclusive price	package travel	Yes/No	(1, 1)	Yes
copy for consumer	contract	Yes/No	(1, 1)	Yes

Table 5: Extract of the class attribute table

8) *Defining the constants in detail.* At this stage we define the constants which appear in the glossary of terms (see table 6).

Name	Value type	Value	Measurement unit
Deadline for the application of the directive	date	31 December 1992	--

Table 6: Extract of the constant table

9) *Defining instances.* Finally, we defined some relevant instances from the package travel domain, which will serve as examples. Table 7 includes an extract with two examples:

Instance name	Concept name	Attribute	Values
Travel 08-345	package travel	Departure date	12 June 2010
		Return date	18 June 2010
Four Seasons Hotel	hotel	category	3 stars

Table 7: Examples of instances

This conceptualization is likewise applicable to other countries belonging to the European Union, since the directive is the same for each country.

The next step is implementation. When an ontology computer tool is used, it is not necessary to perform the formalization activity, so implementation is directly carried out. The tool chosen to implement the conceptual model we have just devised is WebODE (Corcho *et al.*, 2002)⁵. This web application, which was also created by the Ontological Engineering Group, is based on METHONTOLOGY and thus allows to build ontologies following all of METHONTOLOGY's premises. We have in this way implemented our conceptualization by using the web forms provided by the application: they allow us to first establish all classes and subclasses which can later be linked by means of *ad hoc* relations. Other elements such as attributes, synonyms, descriptions, instances, etc., can be easily added by using the drop-down menus that appear when a class is selected.

WebODE also provides a graphical editor that allows to view the concepts and relations in a more visual and clear way. Once the ontology is built, we can export it to a number of ontology languages, such as XML (WebODE format), OWL, RDF(S), Prolog, etc.

2. 2. Use of Termonotography

We would like to incorporate into the ontology concepts which feature in the directive, as well as some different concepts which appear in the national legislations of Spain, the United Kingdom, and

5 We can find the URL to access this application in the bibliography.

Germany, where regulations are slightly different. This poses a new challenge and new possibilities for research, as ontologies are usually based on one single conceptualization which reflects a common and shared view of a given domain. It would therefore be interesting to look into the way conceptual divergences could be tackled within an ontology. That is why we consider that, in addition to METHONTOLOGY, there is another methodology which suits our goals and could also be useful for building our ontology-based terminological resource: Termonotography (Temmerman and Kerremans, 2003).

Termonotography is an approach which was developed by the research group Centrum voor Vaktaal en Communicatie (CVC), in the Erasmushogeschool Brussels and which combines ontologies with the theories and methods for multilingual terminological analysis of the socio-cognitive approach (Temmerman, 2000). This theory stands out because of its capacity to represent the lexical gaps of certain languages, as well as the concepts that are particular to one language only. With this aim, "the termonotography method works middle-out" (Temmerman and Kerremans, 2003: 4), that is, it combines top-down and bottom-up approaches. The approach proposed by Temmerman and Kerremans (2003: 4-8) can be summed up as follows: firstly, in close collaboration with experts of the domain in question, an initial framework of categories and inter-categorical relationships is developed top-down. Next, this categorization framework serves as a template for the manual and semi-automatic extraction of knowledge from a corpus. Afterwards, as the textual information is extracted from the corpus and this is compared to the categorical framework, the categories, including the culture-specific ones, are gradually expanded, as are the semantic relationships among them, and a bottom-up analysis takes place. In this way, we can observe the cultural, conceptual and linguistic differences that may exist within the same domain. The results of this analysis are finally reflected in a termonotological database.

Termonotography, together with METHONTOLOGY, suits our goals completely: it starts from premises compatible with ours and presents some techniques that allow us to create an ontology for terminology and translation. Thus, in order to combine both approaches, we will make use of the lightweight ontology we have built using METHONTOLOGY and WebODE, turning it into our initial framework of categories and inter-categorical relations. Our ontology is in fact an

initial structure which contains the main concepts of the domain that we are studying, namely package travel. It is at this point that we start applying the Termontology approach: our categorization framework (basic travel package ontology) will be applied as a template for the manual extraction of concepts from a corpus containing national laws, contracts and brochures about package travel. Thus, the existing concepts in the framework will help us to find other related concepts, as well as new relations and attributes. In this way, the categories will be gradually expanded and we will be in position to create a better ontology-based terminological resource.

Conclusions

Although this research is still being developed, we consider that it could lead to the creation of a highly valuable resource for translators: given a term, it could provide information about the corresponding concept, as well as about its characteristics, relations, and lexicalizations in Spanish, English and German. This could be highly useful for the translator when it comes to understand the concepts of a certain domain and to finding the most appropriate translation for the terms of a source text. In this regard, European directives have proven to be an ideal source of information and texts from which to extract all the conceptual and terminological data needed to carry out this project.

Moreover, we have shown that METHONTOLOGY and Termontology are well-suited to our purposes: the former has proven to be a useful methodology for building ontologies which can be easily adapted for different applications, while the latter is based on ontology-based terminological methods and can help to incorporate conceptual divergences into our ontology.

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R&D Project *Espacio Único de Sistemas de Información Ontológica y Tesoros sobre el Medio Ambiente: Ecoturismo* [Common Space of Ontological Information Systems and Thesauri about Environment: Ecotourism]. Funding source: Ministry of Science and Innovation. Ref. no. FFI2008-06080-C03-03/FILO (2009-2011). Project leader: G. Corpas Pastor.

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La terminologie économique en français et les problèmes de sa traduction en géorgien

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Introduction

Ce travail est consacré aux problèmes de la traduction de la terminologie française en géorgien. Nous nous arrêterons sur la classification et la formation des termes économiques dans les deux langues. Nous mettrons l'accent sur le rôle du traducteur dans le choix des équivalences et expliquerons comment nous avons pu surmonter les difficultés afin de mettre en place un lexique de base de l'économie en cinq langues pour répondre à un besoin de formation et d'information. Pour traduire un texte économique, il faut maîtriser les termes pertinents. L'ensemble des termes est nommé la terminologie :

La terminologie est l'ensemble des termes, rigoureusement définis, qui sont spécifiques d'une science, d'une technique, d'un domaine particulier de l'activité humaine. C'est une discipline qui a pour objet l'étude théorique des dénominations des objets ou des concepts utilisés par tel ou tel domaine du savoir, le fonctionnement dans la langue des unités terminologiques, ainsi que les problèmes de traduction, de classement et de documentation qui se posent à leur sujet (Larousse, 2000:1001).

La terminologie consiste en l'étude du choix et de l'usage des termes faisant partie des vocabulaires de spécialité qu'on peut trouver dans tous les domaines de la connaissance. Les termes se distinguent