Towards a Systemic Model for Terminology Planning

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PREFACE

I started Terminology when I did an MA in Iran and I chose it as a topic for my dissertation, and then I continued it at the Academy of Persian Language and Literature (APLL) where I arrived at the conclusion that a model for terminology planning is necessary. When I began my Ph.D. at the University Institute of Applied Linguistics (IULA), Barcelona, I decided to follow this line as my thesis topic.

The more I studied, the more I became sure that this issue is a global one since planning for promoting languages of science, employing linguistic potentialities for exploring unknown aspects of the world, is, in fact, a path that can foster scientific thinking methods experienced by other peoples over the world.

On the other hand, human beings live in a world of interwoven conceptual systems created by their own experience. Therefore, it seems it is a universal duty to discover the relationship between language and the world generally, and how different languages interpret the world specifically.

For this reason, there is a need to set up a world organization, somewhat like the World Trade Organization, to deal with language and its related issues (see Fettes 2003; Tonkin 2003). Because of some political and social changes and the issues shared among nations, we have finally decided to establish the organization. Now we can think of

- the decline or death of languages and world language system;
- ecology, peaceful co-existence, extremism, health care, economic crisis and language;
- categories like minority, revitalized, official, co-official, immigrated languages and linguistic situations in newly-independent countries; and
- world scientific communication and language.

The results may lead us to ask why we do not have a World Language Organization (WLO), as there is the International Center for Lexicography and Language Planning or Linguapax, based in the Basque Country and Barcelona, respectively. This is where I stand, looking at the topic in a global scale.

However, whatever has been done until now for terminology planning can be, more or less, divided into general guidelines, local planning and translation-based activities. Although Bhreathnach's Ph.D. thesis (2011) in Ireland is an endeavor to build a model, it is again a set of guidelines, a list of dos and don'ts. This book avoids this line and any kind of prescription in an attempt to fill a gap. It is not going to give orders, for instance, for definition writing or whether to start from concepts or terms, since each depends on specific visions and missions. The situation in Sweden, as an industrial country, is different from Iran, and it, in turn, is different from African countries. If modeling is understood as a list of orders, the list could include an infinite number of items and still not help us progress to theorizing the language of science planning. But the present research attempts to move towards generalization as a prerequisite of theorization.

Back home (Iran), I was acquainted with the ABC of terminology by Dr. Shahin Nematzadeh. Then Professor Yahya Modarresi and Professor Reza Mansouri supervised my MA dissertation. I owe a great deal to them. I am deeply indebted to Professor Teresa Cabré, who was the supervisor of my Ph.D., which led to this publication. My thesis was financially supported by IULA. I express my sincere gratitude to the directors and staff of Termcat, the Swedish Center for Terminology (TNC) and the general delegation for the French language and the languages of France (DGLFLF) for their incisive comments when I made academic visits to their agencies. Last but not least, I thank the reviewers of the book manuscript and the editors at Cambridge Scholars Publishing for their expertise and professionalism.

INTRODUCTION

Among the reasons that persuaded this researcher to look for a model are

- the role of classification and then generalization in improving our knowledge of a phenomenon
- as a weather map, a model can represent the available information and adapt to a new situation when conditions change (Zarnikhi 2010).

The main intention of modeling, that is, terminology planning generalization, has been partly expressed in some other literature (Maurais 1993; Felber 1986). Felber (1990: 8) hoped that "a worldwide terminology planning policy is elaborated on the highest level, i.e., the United Nations, integrating terminology planning efforts of all levels." At the theoretical level, Cabré (1996) believes that behind the diversity, there is unity of discipline. At the same time of uniformity, theoretical principles can be formulated based on sociolinguistic necessities and motivations and adjusted to them as well (see Myking 2006; Costa 2006). Moreover, at the level of policy making, the goal of Guidelines for Terminology Policy (2005: vi) is to be "**useful for**…**developing countries and language communities with less mature terminologies to developed ones**...." (emphasis in the original)

In addition to the desire to unify different practices, real situations witness adopting and adapting the successful experience as a model; for example, Termcat in Catalonia was modeled on the Quebec Office of the French Language (Rey 1996; Laurén and Picht 2006; L'Homme 2006). In another corner of the world, as Myking (2006: 142) states, the Russian school "still facilitates cooperation among several Post-Soviet Countries, in spite of the considerable language differences...." Another example of a convergence among terminological activities at a regional level can be seen in Nordic countries. Elkhafaifi (2002: 260) concludes that if these countries, from diverse linguistic and ethnic settings, can collaborate on terminological activities "…then surely the Arab nations could make a similar attempt." These are encouraging signs in favor of generalization.

Therefore, it seems it is time to fulfill the dream. This research aims to create a model as a whole, free from sociolinguistic variables, by dwelling on elements and their interrelationships extracted from different situations.

To build a model, the research gains an advantage by employing literature, studying documents published by terminologists, language planners, and terminology agencies from a variety of linguistic communities, and through field research by examining four organizations involved in terminology work at the national level. Among them, Termcat, for Catalan[1] in Spain, TNC in Sweden and DGLFLF in France were visited. The researcher also has experience working at the APLL. To control the study in a systematic way, a list of questions (see chapter four) covering the focal points for much discussion has been prepared as a route map.

Finally, in the succeeding chapters, the book deals with an overview of terminology in chapter one. The review of literature on terminology planning to examine how other researchers have studied the topic comes in chapter two. The theoretical framework is presented in chapter three. Chapter four aims to describe methodology and to present the data gathered from four cases and the documents published by experts from about thirty linguistic communities; the data are classified thematically. Chapter five analyzes the data. Proposing the model and arriving at conclusions are included in chapter six.

CHAPTER ONE

AN OVERVIEW OF TERMINOLOGY

This book grapples with the figure of terminology planning. The configuration of terminology work is based upon universal principles varying according to sociolinguistic variables of a target context in the form of parameters. The hypothesis comes from my experience in terminology.

In Terminology and Knowledge Engineering (TKE) 2010, Zarnikhi (2010: 121) stated

> terminology planning can be envisaged as a bridge between theories and practices but it has not received attentions as (*sic*) it deserves... As planning is a framework for any activity, it would be better first to clarify under which planning and strategies technological capabilities should expand.

Using *train* as a metaphor for terminology planning, the author states that "the train…moves from the departure point to the destination and it depends on which station a traveler catches it." (122-23) Diagram 1-1 represents the terminology planning train.

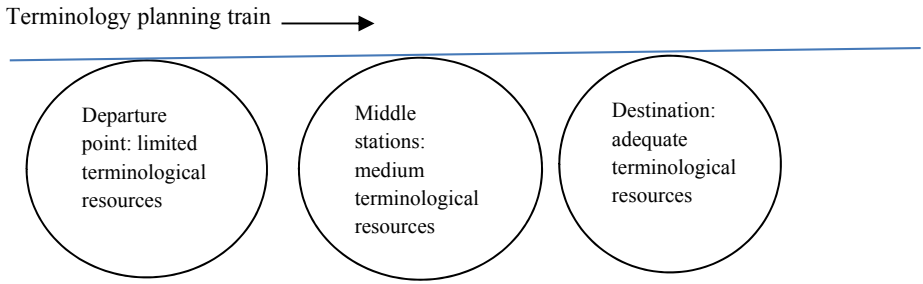

Diagram 1-1: Terminology planning train

1.1 Why terms?

What distinguishes terms from words and makes us formulate a plan, as corpus planning, for terms? Picht (2003: 105) justifies working on terminologies by stating that without terminologies there is no knowledge transfer, and then "there will be neither intellectual (e.g., teaching and research) nor material development". Some facts help to answer the question as follows:

- Specialized knowledge, resulting from the human experience of the world, has been encapsulated in the linguistic form as *terms* (see Albert Einstein's and George Orwell's opinions cited by Antia 2000). As terminologies form the main substance of knowledge, they are employed as one of the required "semiotic conditions," in Halliday's words (2004c: 123), for constructing a scientific theory.
- Another role terminologies play is in fixing knowledge. Grinev (1990: 125), referring to L. Olshki (1933: 48-49), states that "though Galilei's predecessors had the notion of inertia force, it became a concept, a conquest of science only from the time when Galilei created and defined term 'inertia'" (see Zarnikhi 2005 on language and knowledge representation).
- The influence of terminologies on the growth of knowledge is another story. Grinev (2004: 52) believes that introducing *chemical analysis* in the 17th century helped "understanding the manipulation of substances as a purposeful activity and contributed to establishing chemistry as a science." As one of the activities in the area of terminology is to organize knowledge in a systematic way, "the introduction of biological nomenclature in the 17th century led to an extraordinary flourishing of biological sciences and stimulated analogous activities in chemistry." (ibid.)
- Another facet of terminologies necessitating planning is their number, which is increasingly steadily growing. Leitchik and Shelov (2003b: 82) believe that "…80-90% per cent of new lexis entering developed languages…are terms and other special lexical units…" (see Grinev 2004).
- Not only do terminologies carry scientific values, clues of theoretical evolution or revolution, which may come within the interests of epistemology, they have cultural and social prestige. The language of science sows the knowledge seeds in a linguistic community and also, by moving up and down like a piston, covers both specialized and semi-specialized discourses to promote

people's awareness proportional to their cultural and social levels. Dealing with the function of a native language of science spreading elements of knowledge through different levels within a linguistic community, Antia and Yassin (2001) and also Yassin and Antia (2003) show how a native language and its terminologies play a crucial role in removing health problems as well.

1.2 Foundation stones

The philosophy behind the research is to view terminological activities on a global scale. This means that achieving welfare, peace, economic development and other concepts like these depends on culture and knowledge promotion, and language fulfills a specific function in this process. The details are listed below.

1.2.1 The power of language: categorization, meaning creation and its interaction with the material world

One aspect of the power of language can be seen in organizing concepts; for instance, *tree*, *shrub*, *bush*, and *hedge* "are not clearly distinct perceptual categories; they are constructs of the language" (Halliday 2004a: 10).

Language acts as a system of meaning creation, an essential part of phylogenetic and ontogenetic progress. Halliday (2004d: 94) explains its mechanism:

> Language…is a stratified system in which the content plane is split into a semantics, interfacing with the world of human experience (and of human social relationships), and a grammar, which is a purely abstract level of organization; the two are coupled through a relation of congruence, but they can be decoupled and recoupled in other ways….

He also believes that

> by calling 'move' *motion* [a grammatical metaphor], we have not changed anything in the real world; but we have changed the nature of our experience of the world...And this, in the long run, can open the way to changes in the material world: to the appearance of things like trains and cars and aeroplanes which had not existed before. (2004a: 16)

1.2.2 Language and science

Any scientific theory, as Halliday (2004c: 123) states, has two semiotic aspects: technicality, by creating terms, and rationality, by creating "a form of discourse for reasoning." The role of language in science teaching is another dimension of this issue. Lemke (1990a: 129-30, quoted in Halliday 2004e: 200) raises a question: "How does science teaching alienate so many students from science?....One way this happens, I believe, is through the way we talk science."[2]

Feist (2006: 194-95) believes that "scientific knowledge before language was implicit, immediate, sensory-bound, and did not accumulate in the species very rapidly." However, as the scholar argues, "during the verbal phase of science, language facilitated the addition of a few new components: *explanation*, *explicit theory*, and *attempts at controlling nature* (magic and shamanism)."

1.2.3 Knowledge spread amongst languages

Knowledge has never been in the hands of a limited group of people and it has widely traveled. Therefore, reality is not and has not been depicted by a single language/nation so people speaking different languages have to put their findings together to try to do the puzzle. Then the extinction of a language, as a container of the human heritage, even one with limited usage, means an intellectual property loss.

Looking from the angle of vocabulary enrichment, Mühlhäusler (2000: 333), referring to Lorenz (1989), states, "the poverty of expressions for being in Western languages has adversely affected the discussion of evolutionary theory." Carli and Calaresu (2007: 525) give an example of how Europe and the Anglo-Saxon world view the "object" of science and they conclude that in English, human and social sciences "are referred to with the single term 'humanities'…while in most of the other European languages expressions containing a term corresponding to 'sciences' are normally used…." If English were the only language of science, all people would follow the same categorization it imposes, that is, thinking in the same way as native English-speakers do (see Martel 2001).

Attaching importance to linguistic diversity, Citkina (1996: 333) believes, "this is why interdisciplinary and international efforts in science often bring about success—because they allow to view (*sic*) reality from different angles...." Another merit of keeping diversity is the role languages have as concept containers. Ammon (2006: 17) argues that

> the crucial question now is whether those structural linguistic differences really carry over to scientific knowledge, especially to advanced scientific knowledge, or whether the cognitive potentials of different languages… rather largely converge in their instrumental utility for the scientific search for truth….For the natural sciences and technologies, the latter seems more likely than the former. However, for the humanities, the social sciences and philosophy, or at least parts of them, some knowledge of the language in which they have been developed seems nearly indispensable (e.g. the philosophy of Georg W.F. Hegel, who uses the three different meanings of the German verb *aufheben* 'to raise', 'to abolish' and 'to preserve' to develop his theory of dialectics…).

Even in natural sciences, it can be measured whether term formation in different languages, for the concept of *gravity*, as an example, leads to the exploration of any new avenue in scientific progress. Then Ammon reaches the conclusion that "the maintenance of the scientific function of as many languages as possible would then of course be an important goal of language planning." (18)

Regarding the ethnobotanical knowledge extracted from endangered languages, Carlson (2001: 491) explains that "…approximately 20 percent of all pharmaceutical prescriptions written between 1959 and 1980 were pharmaceuticals derived from ethnobotanical leads" (see *Towards Knowledge Societies*, 2005, 151: Box 9.3., published by UNESCO;[3] Mühlhäusler 2000 for the intellectual property rights).

1.2.4 Language and environment

As Mühlhäusler (1995: 155) states, "Life in a particular human environment is dependent on people's ability to talk about it." When we cannot talk about or categorize or name the phenomena and species (animals or plants) around us, they will disappear (see Mühlhäusler 2000; Fill 2007). According to Wollock (2001: 255), "An inappropriate linguistic construct of nature will lead to inappropriate actions, like deforestation" (see Mühlhäusler 2000 for more examples). An example from Persian is that when the bird flu broke out, it was first called *ānfolānzā-ye morqi*, literally meaning "hen flu." This kind of term formation could mislead people into thinking that only hens suffer from the disease. But later it was renamed *ānfolānzā-ye parandegān*, "bird flu" (Zarnikhi 2006; see Section 3.4.1 on factors leading to such terms).

Another dimension of the relationship between language and the environment has been put forward by Maffi (2001: 8), who states that "a 1995 study…found that 10 out of the top 12 megadiversity countries (or 83 percent) also figure among the top 25 countries for endemic languages"

(see Lizarralde 2001 about South America; Maffi and Woodley 2010 for more case studies).

1.2.5 Native languages: communication

The role of a national/native language in determining a nation's faith is so strong that Ukrainian was forbidden to be used after 1932 (Rytsar and Shunevych 1999). Rabin (1989) explains why Ben-Yehuda tried to revitalize Hebrew:

> It is possible that the contacts Ben-Yehuda had with exiled intellectuals from several new nations fighting for recognition convinced him of the role that spoken language played in the process of 'national rebirth'. (p. 27)

Another capability native languages have is they can nativize new knowledge and then spread it easier than a foreign language. Djité (2008: 139), referring to less than 20 percent of the uptake in Africa, states that "European languages are clearly not appropriate for first-time computer users who have not had much formal education" (see Webb 2002 about South Africans' proficiency in English). From another point of view, Pope Paul II believed "*A faith that does not become culture is not fully accepted, not entirely thought out, not faithfully lived*" (italics in the original; cited in Djité 2008: 137). For this reason, Christian missionaries encouraged Africans to translate the gospel into their own languages (Djité 2008). This point should be taken into consideration—when religious concepts deeply rooted in a specific culture (Western) can be implanted in a new ground (African countries), scientific and technological concepts can also become assimilated into another community (see Ohly 1997; Antia 2000 about adapting software in Africa; Nekvapil 2006).

The significance of native languages in working places, in Lara's words (1986: 96), is that "once a worker has no way of understanding what he is doing…he has no way of developing his own interpretation and his own skill; work becomes an alienatory practice..." (see Nedobity 1989; Sager and Nkwenti-Azeh 1989; Teubert 2000).

1.2.6 Native languages: socio-economic development[4]

In this section, the research is concerned with the role of native language, in comparison with dominant language, in the development process (see Grin 2003 about the history of the economics of language from the mid-1960s), considering that development has been defined from different aspects. It also examines the relationship between language and economy,

which is a controversial issue because these categories are under the influence of many factors and vary from one linguistic community to another (see Arcand 1996, quoted in Walsh 2006: 139; Djité 2008: 146, notes 1 and 2 about linguistic homogeneity, heterogeneity, and economic development).

The role of language in the development process, as Djité (2011: 52) states, is that "an articulate multilingual citizenry is a prerequisite for development and a country may not be able to develop until all of its people can take full advantage of opportunities to improve their lives" (see Maurais 2003a for the inextricable connection between information, economy, and language). Fóris (2010: 37) specifies that "In the 17th – 19th centuries, one of the priorities of intellectual life in Europe was to develop national languages that met the challenges of science, industry and economic development" (see Teubert 2000). Dealing with language and national development in Japan, Bamgbose (1991: 51) argues that "the economic miracle achieved by countries such as Japan…is the result of…the translation of the processes into terms that the ordinary factory hand can understand." Webb (2002: 239) stresses the role of the Bantu languages in economic development, expressed in *The RDP Quarterly Report* in June 1996, and states that its aims "can only really be achieved…if the Bantu languages are formally used in the economy of the country" (see Mazrui 1996 for the role of language in Africa for moving towards democracy).

Classifying 197 countries of the world into twelve types of language policies and using a chi-square test, Grzega (2011) comes to the conclusion that there is a positive correlation between the type of language policy and socio-economic development. The policy is having one or two supraregional/state-wide official languages plus several regional official languages. This language policy has been pursued in countries such as Austria, Bolivia, China, Colombia, Germany, Guatemala, India, Iraq, Italy, Mexico, Nicaragua, Peru, Russian Federation, Spain, and United States of America.

Language affects development indirectly. It impacts some variables that, in turn, influence socio-economic factors; as stated by Walsh (2006: 127), "Irish affects social and economic change through its influence on factors such as identity, self-confidence, self-sufficiency, character, cohesion, and innovation."

1.2.7 Native languages: globalization and glocalization

There are signs that globalization is not equal to a monolinguistic world; one of them is *identity*. By concentrating on Sweden, Oakes (2005: 151) considers "the renewed sense of national identity that has arisen in the more advanced era of globalisation" as an element that should be taken into account. Maurais (2003b: 16), referring to David Graddol, argues that "English will not hold a monopoly by the middle of the twenty-first century, but…it will be part of an oligopoly with a few other languages…." Adopting language planning laws in some countries can be seen as "an advanced sign of the possible reduction in political visibility of English" (Barbaud 2000: 65 cited in Oakes 2005: 157; see *The Handbook of Language and Globalization*).

Raising the question of "how to use the processes of globalisation to redefine the global purpose of languages," Tonkin (2003: 330) believes that "a first step is to acknowledge the desirability of linguistic diversity."

An indication of glocalization in the 17th century is Leibniz's language planning activity as explained by Antia (2000: xx):

> Leibniz did not only cultivate a *universal* symbolic language but also a natural one, his native German, which was then an impoverished and *restricted* language….Leibniz was concerned about language-based social stratification within Germany (the learned people spoke French—oft badly—while the common people spoke German). He deplored the fact that 'few straightforward books are written in Germany' in contrast to the situation in England, France or Italy where 'the splendor of wisdom is not reserved to learned men only but has trickled down to the mother tongue'.

Why did glocalization happen? Will it remain unchanged or is another process on the way?

1.3 Core concepts

This part is devoted to the concepts on which the research is based. These are: terminology, terminology planning, systems theory, systemic terminology, systemic planning, model, and terminology principles and parameters.

1.3.1 Terminology

Although specialized knowledge is distilled into terms and, for this reason, terms have their own morphological and pragmatical features, they do not

form an isolated system (see Cabré 1998/1999). Leitchik and Shelov (2003b: 84), after giving the definition by Lotte that "...the *term* is a special *word*," and by Vinokur that the term is "not a special word/words, but only a word/words with the (*sic*) specific function," express their ideas about terms that they can "designate a specific general concept in the system of all concepts within a special area of knowledge or activity." (ibid.)

That a lexical unit is considered a term, that is, its degree of expressing a specialized concept, depends on some variables: socio-economic and political development level, demography, degree of industrialization, social welfare, etc. Many computer vocabularies may be considered general words for English people but not for aboriginals. Therefore, defining *term* depends on criteria that vary from one linguistic community to another. Criteria should be determined before extracting terms from corpora (see Alexeeva 2004 about *term*).

From where do terms come? For instance, Antia (2000: 212) defines terminologization as a process "whereby an existing LGP [language for general purposes] word is used to designate a concept in a given LSP [language for special purposes] field…." The reverse process is to move from special to general language (determinologization). Some neoterms (newly built terms), such as *quantum* and *ballistics*, may not be from the general language. Neoterms can also be created as a text progresses; it is a clue as to how terms and grammar are interrelated. I would like to call this process *logogenetic terminology*. Halliday (2004d: 88) believes that

> any wording that is introduced discursively as a resource for reasoning may gradually become **distilled**; and in the course of this distillation out of successive instances of its occurrence, it becomes a new 'thing', a virtual entity that exists as part of a theory. (emphasis in the original)

An example is:

> some halophiles…can tolerate high concentrations of salt
> the tolerance of high osmolarity
> Osmotic Tolerance (ibid.)

Another source terms spring from, in Alexeeva's words (2003: 67), is the "interpretation of previous scientific theories." The author refers to the evolution of the concept *light* (ancient scientists), the *ether* light theory in 1690 by Huygens, and *quantum* in 1900 by Planck. A collection of terms formed the body of a scientific theory called a paradigm by Kuhn, but as Ahmad (1996: 2) states, Kuhn "now much prefers to talk about *lexicons* of

science that help him to understand the cognitively significant language changes in the development of science."

1.3.2 Terminology planning

Terminology planning in Felber (1986: 10) is "measures to be taken with a view to develop coordinated terminological activities aiming at the preparation of terminologies." But terminology planning borders are more extended and they are not only limited to term preparation. According to Hermans (1991: 688), "terminology planning is often the rationalisation and legitimation of decisions that are taken elsewhere by politicians, and takes part in the power play." A point shared between Felber and Hermans is that terminology planning is at the level of performance. On the other hand, Guidelines for Terminology Policy (henceforth referred to as GTP (2005)) and Antia (2008) view terminology policy as an activity at the level of decision making.

Regarding explicit and implicit language policies, different scenarios can be painted: a language policy embedding a terminology policy, an integrated scenario, like Catalan in Spain; a terminology policy implied in terminological activities, without a written language policy, for instance, Persian in Iran; for an explicit terminology policy, Antia (2008: 11) alludes to France, and states "perhaps no more than a handful of the 192 member states of the United Nations would qualify for certification indicating that they possessed a terminology policy."

Nedobity (1990: 655) considers terminology planning as "an integral part of special-language planning." To be more precise, it is part of the language of science planning. GTP (2005: 8) describes terminology planning as an endeavor that "consciously and systematically develops special language according to the needs and requirements of domain communication." We must bear in mind two points from the above-mentioned quotations:

1. Terminology planning is embedded in a broader framework of the language of science planning.
2. Terminology planning is concerned with needs.

As a corpus language planning activity and with regard to practical discourse problems in science and technology, terminology planning deals with terms and their related issues, mainly centralized to organize terms, ranging from creating new terms to standardizing the existing ones, and to present them in the form of terminological products to the target users

proportional to their sociolinguistic needs and aims, from stable linguistic situations to lesser-used languages. Therefore, in each terminological work, as regards contributory linguistic and non-linguistic factors, *term* and, as a result, *terminology planning* should be first defined.

To learn how to look at term and terminology planning in a holistic way, it is necessary to first learn about the systemic approach.

1.3.3 Systems theory

Based on Newtonian science, as Laszlo (1996: 7-8) states, "Complex sets of events could be understood…only when broken down to their elementary interactions." But at the beginning of the 20th century, "sets of interacting relationships came to occupy the center of attention…." As an example, regarding the problems of the mind, according to the systems view, "it is the health of the whole system that is to be maintained by attention to psychic and interpersonal as much as to physical and physiological factors." (ibid.,12)

Living organisms, according to Capra (1982: 291), are open systems and this "allows the system to remain in a state of nonequilibrium…." Another feature is that

> most living systems exhibit multileveled patterns of organization characterized by many intricate and nonlinear pathways along which signals of information and transaction propagate between all levels, ascending and descending….As a real tree takes its nourishment through both its roots and its leaves, so the power in a systems tree flows in both directions…. (ibid., 305)

The system the language of science planning is involved in is, in fact, a sociolinguistic complex system, taking on both social and language systems. It differs from both a human-made system (a machine) designed and operated by human beings and a natural system (a plant). It is a complex adaptive system because of its many agents (dynamic forces) and networks, and their complicated interactions and, at the same time, it is not inflexible to changes. As a result, by developing a systemic model, the research is going to consider, as far as possible, linguistic and non-linguistic variables and the interactions among them.

1.3.3.1 Systemic terminology

By *systemic*, the research adopts a holistic approach to terminology as a sector of the language of science. Systemic terminology consists of two parts:

- Internal system of terms, which refers to their form (morphological, phonological, orthographic…aspects) and content (semantic, cognitive …aspects).
- External system of terms, which refers to their sociolinguistic contexts. Since the final terminologies' destination is a physical context, that is, a linguistic community **in which** they should be implanted, systemic planning deals with target users and terminology settings, such as education, industry, etc. Linguistic contexts, as another aspect of the external system of terms, are systems **in which** terms are living (written or spoken discourses), **within which** they can be generated (*logogenetic terminology*) and **from which** they are extracted and receive their validity. Furthermore, systemic terminology deals with how complex terms in the form of collocation and phraseology (see Picht 1987 for phraseology) influence their neighborhood and finally their environment/the whole text. A good example of this effect, from another point of view, is amalgamated texts where a combination of, for instance, Persian and English terms in a Persian text delays comprehension of the text.

To justify the importance of the linguistic environment of terms (linguistic section of their external system) and to show terms are not enough by themselves but they have to be viewed in a holistic approach, some citations from the experts follow in chronological order:

- Vanèura (1936: 161, quoted in Hübschmannová and Neustupný 2004: 84) states that "a technical language, such as the language of commerce, has nearly always been identified with special terms and formulas employed (**and not with the whole speech or text for technical purposes**)" (emphasis added).
- Rabin (1989: 36) believes

> besides vocabulary extension, the adaptation of a language to a new or enlarged world of thought also brings with it an extension of syntax, and new ways of expressing logical connections, of grading claims of the truth

> of assertions (hedging), and of assessing the truth or probability of assertions made by others.

- Erelt and Saari (1991:8), describing Estonian LSP planning, state that "since good terms alone may not suffice to make good LSP, very often, the use of lexical variants, the wording of sentences, systems of abbreviations, etc., require attention far more urgently."
- Jernudd (1994:73) criticizes Sager's definition of terminology (1990) and argues that his definition only deals with creation and presentation and not to other parts of terminological work. Then the author considers it as "an insufficiency in term theory and term management."
- Cabré (1998/1999: 12) explains that

> since terms occur naturally in discourse, they vary with different types of discourse and also have a syntagmatic dimension. The description of terms ...must include their usage in discourse such as their argument function (e.g. function as predicate or argument in a predicative structure) and their collocations and occurrence in phraseological units.

- Hübschmannová and Neustupný (2004: 85) state that "language in general is much more than a static configuration of words, and this must apply to our thinking about terminology as well."
- Halliday (2004e) gives an example of the complexity of the language of science that does not result from its terminologies. For example, despite the fact that the following quotation does not include specialized words, it is complicated because of its structure.

> Our work on crack growth in other solids leads us to believe that the general conclusions developed for silica can explain the strength behaviour of a wide range of brittle materials. The actual crack tip reactions appear to vary from material to material and the chemistry of each solid must be considered on a case-by-case basis. (Michalske and Bunker 1987: 81 quoted by Halliday 2004e: 201)

- Carli and Calaresu (2007: 530) believe that the lexical aspect should be taken into account "with regard to other aspects of scientific language, such as grammar and textual organization."

The reasons for some shortcomings in terminology planning may come from the point that planners concentrate only on internal system of terms and not on other dimensions of scientific discourse. A systemic point of

view on terms means to take both internal and external systems into account.

1.3.3.2 Systemic planning

Stakeholders and constituents should, as far as necessary, be involved in terminology work in the form of networks (see Nedobity 1990; Cabré 1996 about the importance of networks). This kind of planning is also sensitive to variables changing systems (see Maurais 2003b about sociopolitical changes in USSR). As a result, various aspects of systemic planning should be considered; for example:

- Identifying driving forces and their relationships. Cluver (1991: 49) states that positivists "identify fairly simplistic linear cause-and-effect relationships between elements." The author continues that they thought "changes to language (for instance in its status) could lead to changes in society such as increase in the growth of feelings of national unity…." (ibid.) In this approach "…the loyalty of minority groups towards their own language is ignored…." (ibid., 50)
- Identifying governmental and non-governmental constituents (agencies), even supranational/regional (Spolsky 2009) and international organizations, and individual stakeholders (editors, translators, teachers, and authors) with different degrees of specialty, cultural and economic levels then creating networks for collecting data from them and spreading the products in a systemic approach among them. The further a layer (constituent) is from the core of the terminology planning work, the lesser effect it has (see Cluver 1991 about networks in Namibia for using Afrikaans).
- Considering the relationships among languages, for instance, at a national level between an official language (Spanish) and its co-official languages (Catalan, Basque, and Galician), between an official language (Persian) and other minority languages in Iran, or between an official language and minorities, minoritized, dominated, and immigrated languages; at a supranational level, for example, between French in France and French in Quebec; at the regional level, Arabic in Arabic countries, as an example. Languages of the world are being formed into a system that can be divided into many subsystems (see De Swaan 1998a). Kaplan and Baldauf (1997: 321) state that "any attempt to manage one

language in the system inevitably has implications for all the other languages in the single system (and in proximate systems as well)."

- Considering the language of science planning (terminology) related to the general language planning. Erelt and Saari (1991: 8) stress "the unity of general and special language planning" in Estonia as one of its permanent features. There is an interaction between terminology planning, a kind of corpus planning, status, acquisition, and diffusion planning (see Diagram 3-2).
- Identifying domains in which planning is applied, such as education, industry, science and technology, economics, legal system, and so on.

1.3.4 What does *model* mean here?

Model is used in a wide variety of meanings. Some of them are

based on similarity:

> …one might model the behaviour of sound waves upon that of waves in water, or the behaviour of a gas upon that of a volume moving billiard balls. (*The Oxford Dictionary of Philosophy* 2008)

based on simplification:

> Euclid's geometry, which models spatial relationships, and Newton's theory of mechanics, which models the interaction of physical objects and forces operating on them. (*A Dictionary of Psychology* 2009)

based on guidelines:

> A set of guidelines or criteria for a specific activity or service. There are several examples in public health. For instance, a detailed set of specified health objectives for the United States is one of the initiatives of Healthy People 2000 and 2010. (*A Dictionary of Public Health* 2007)

based on exemplification:

> An organism used in research to exemplify its type and to represent more complex organisms in which similar phenomena are thought to or do occur. Examples include the bacterium Escherichia coli, the yeast Saccharomyces cerevisiae, the worm Caenorhabditis elegans, the fruit fly Drosophila melanogaster, the flowering plant Arabidopsis thaliana, and the rodent Mus musculus. (*The Oxford Dictionary of Biochemistry and Molecular Biology* 2008).

based on experiments:

> The model of an atom put forward by Ernest Rutherford in 1911 on the basis of experiments on the scattering of alpha particles. The model consisted of a very dense positively charged nucleus, with electrons orbiting round the nucleus. (*A Dictionary of Chemistry* 2008)

based on generalization/explanation:

> A generalized picture, analogy or simplified explanation of reality; a theoretical reconstruction of a set of phenomena, devised to visualize them or understand them better. Archaeological models can be descriptive or explanatory and vary greatly in their complexity and the degree to which they can be tested with archaeological data. (Darvill 2008)

Modeling terminology planning, however, means what it looks like; it is a kind of visualization of a phenomenon occurring in real situations, from four case studies and information extracted from materials of around thirty linguistic communities based on simplification and generalization.

Regarding the relationship between model, theory and practice, Chumbow (1987: 21) believes "efforts should be made to implement the ideal planning model since 'model' by definition has empirical validity." The scholar also states "the practice of language planning should, wherever feasible, be made to fit the model and not the model to fit practice" (21-22). It appears that Chumbow contradicts his claim. When a model is built from practices and supported by empirical evidence, in fact, it fits practices in some way. In other words, a model results from practices. Cole (1991: 19) emphasizes that theoretical terminology is not "for the restructuring of reality merely to accommodate its current methodological or philosophical presuppositions." Korkas and Rogers (2010: 130) argue "terminology theory providing the background for solving a practical problem or that of terminology practice giving rise to issues which terminology theory will need to adjust to…." Although the authors deal with terminology theory, their opinions can hold true for models as well. Therefore, a model not only represents real practices (what is happening) but also benefits from theories/approaches (what is expected to happen). Then more practices make the model develop. In this way, models and practices feed each other.

As the differences among practices lie in linguistic factors, especially their linguistic features related to the length of time involved in expressing scientific concepts, and non-linguistic ones, such as language consciousness, policy, and human language technologies, the next section

introduces *principles* and *parameters* to show that it is not expected that a model embodies all practices.

1.3.5 Terminology principles and parameters

This research is based on the hypothesis that all terminological activities are founded upon some fundamental *principles* that, at the same time, can be applied in different forms according to sociolinguistic contexts. I call these variations *parameters*. Myking (2006: 151) raises the following questions about the possibility of generalization:

> Is it possible to calculate linguistic and sociolinguistic factors of acceptance? If so, to what extent and within what limits? Can such calculations be generalised across languages? To what extent can principles of term formation, term selection, and recommendations of terms be generalised across languages?

"To what extent" and "within what limits" can be replaced with *principles* and *parameters*, respectively.

Principles can be categorized into two groups: universal and restricted. Universal principles, such as dissemination and language technologies, are available in every ecolinguistic situation, for instance, all terminological products need to be disseminated, but the methods of spreading terms are subject to change and they manifest themselves in the form of parameters depending on linguistic variables, for example, a term's gender, and extralinguistic ones, such as type and number of the target audiences, economic level, and technological capabilities, affecting the form and content of a database.

Although for term formation some universal principles (criteria) have been discovered, they follow conditions imposed by linguistic and extralinguistic factors. Wüster[5] (1985: 82) illustrates the point under discussion by stating "It is well known that concise transferred designations are used a great deal in technical English, **whereas lengthier compounds are preferred** in German" (emphasis added). This parameter (long compounds) which seems to come from the German linguistic structure is actually rooted in a terminological favorite with the users—a non-linguistic variable. Therefore, it is against scientific method to lay down a stringent rule, such as *the shorter*, *the better*, and to prescribe it for all situations. An example of linguistic constraint is that

> in Sango, the official language of the Central African Republic, along with French, the borrowed English term 'computer' is recognizable in the

> neologism ‘kombûta’. It is hard to imagine the integration of the French word ‘ordinateur’…into the Sango phonetical system. (Galinski 1993: 15)

Due to a lack of abstract nouns, Tetun, in East Timor, uses verbs (Williams-van Klinken 2004). It is also a parameter determined by a linguistic factor.

An example of the influence of a social context is that

> French speaking European countries use the spontaneous equivalent of *charter* with a French pronunciation, whereas in Canada, *vol nolise'* has been substituted for this word because the use of the Anglo-American written form would have lead (*sic*) to an Anglo-American pronunciation. (Galinski 1993: 15)

But restricted principles belong to some situations. For example, standardization of synonymous terms for a single concept is not related to languages without any experience in science beginning from scratch.

Hence the research is going to mine principles and parameters and measure to what extent the latter can be generalized then finally put them into planning circulation to arrive at a model for terminology planning in the context of language planning.