

Towards a Model for Terminology Planning

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Abstract

This research is based on the hypothesis that all terminological activities are founded upon some fundamental *principles* which, at the same time, are manifested in sociolinguistic context-bound variations or *parameters*. Answering the research questions, the thesis gains an advantage of employing both field research and literature. The former deals with carrying out a comparative study and using a maximum variation sampling technique for gathering data from Termcat, TNC, DGLFLF and the Academy of Persian Language and Literature (APLL). To control the study in a systematic way, a questionnaire concentrating on macro- and micro-structures of the target organizations has been prepared as a route map. The research also derives benefit of literature from more than thirty linguistic situations. The data were first coded and then thematically categorized according to their major similarities. The results came within three components: planning theory, linguistics of science and implementation layers. In the next step, the thesis found the second level of similarities or universal principles. The data processing continued to arrive at minor (universal or restricted) principles. The final form of a terminology planning work is determined by parameters arising out of “values”, put under nodes of principles. The values are, in fact, sociolinguistic potentialities developed and limitations imposed by a specific ecolinguistic environment.

Resumen

Esta investigación se basa en la hipótesis de que todas las actividades terminológicas se fundamentan en algunos principios fundamentales, principios que, al mismo tiempo, se manifiestan en variaciones o parámetros relaciona con el contexto sociolingüístico. Para responder a las preguntas de investigación, la tesis utiliza tanto el trabajo de campo como la bibliografía. En relación al trabajo de campo, se ha realizado un estudio comparativo de cuatro centros de Terminología (Termcat, TNC, DGLFLF y la Academia de la lengua persa y Literatura (APLL), usando una técnica de muestreo de máxima variación para la recopilación de datos, Para controlar la sistematicidad del estudio, hemos elaborado un cuestionario centrándonos en la microestructura y la macroestructura de las cuatro organizaciones, presentado en forma de hoja de ruta. La investigación presenta además los datos de una treintena de otros casos, a partir de los datos aportados por la bibliografía. Los datos recopilados han sido codificados y luego categorizados temáticamente sobre la base de sus similitudes principales. Los resultados se han organizado en tres componentes: la teoría de la planificación, la lingüística de la ciencia y las fases de aplicación. A continuación hemos analizado el segundo nivel de similitudes o principios universales. A través del procesamiento de los datos hemos establecido a principios de importancia menor (principios restringidos). En definitiva, un proyecto de planificación teinológica se concreta a partir de los parámetros derivados de "valores" o principios. Los valores son, de hecho, potencialidades sociolingüísticas limitadas por el entorno ecolingüístico específico.

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Chapter 1: Introduction

The thesis grapples with the issue of terminology planning to depict its figure. 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.

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

In TKE' 2010 I stated:

Terminology planning can be envisaged as a bridge between theories and practices but it has not received attentions as 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 (Zarnikhi 2010: 121).

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

On the other hand, human beings are living 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, in my opinion, a need is felt for setting up a world organization to deal with language and its related issues, as it occurred in the development of the World Trade Organization (see Fettes 2003; Tonkin 2003). It could be in the service of resolving universal problems related to terminology in the areas of economics, peace, policy, physical environment etc. through paying attention to human linguistic rights, minority, minoritized and immigrated languages, educational-oriented policies and multilingualism. This structure could be called World Language Organization (WLO) as there are International Centre for Lexicography and Language Planning based in Basque or Linguapax in Barcelona. This is a place 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 PhD thesis (2011) in Ireland is an endeavor to build a model, it is again a set of guidelines, list of dos and don'ts. Filling a gap, the thesis avoids this line and any kind of prescription. It is not going to give some orders, for instance, for definition writing or whether to start from concept or term since each of them 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 can include an infinite number of items without helping us to progress to theorizing language of science planning. But the present thesis is trying to move a step towards generalization as a prerequisite of theorization. This is where I want to go.

1.1 Why terms?

What distinguishes terms from words and what makes us formulate a plan, as corpus planning, for terms? Some facts help to answer these questions come as follows:

Specialized knowledge, resulting from human experience of the world, has been encapsulated in the linguistic forms, *terms* (see Albert Einstein's and George Orwell's opinions cited by Antia 2000). As terminologies are forming the main substance of knowledge, they are employed as one of the required "semiotic conditions", in Halliday's words (2004a: 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 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 particular way. Grinev (2004: 52) believes that introducing *chemical analysis* in 17th century helped to “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 author continues that “the introduction of biological nomenclature in the 17th century led to an extraordinary flourishing of biological sciences and stimulated analogous activities in chemistry.” (p. 52)

Another facet of terminologies necessitating planning is their numbers which are increasingly steadily growing. Leitchik and Shelov (2003b: 82) believe that “One should reckon 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 evolution or of revolution in theories, which may come within the interests of epistemology, they have cultural and social prestiges. The language of science sows the knowledge seeds in a linguistic community and also by moving up and down as a piston covers both specialized and semi-specialized discourses to promote people’s awareness proportional to their cultural and social levels and, at the same time, to bring deficiencies in front of policy-makers' eyes which could be studied by the sociology of science. Antia and Yassin (2001) and also Yassin and Antia (2003) deal with the function of a native language of science spreading elements of knowledge through

different levels within a linguistic community and also they show how a native language and its terminologies play a crucial role in removing health problems. Picht (2003) 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” (p. 105).

1.2 Foundation stones

The philosophy behind the thesis is to view terminological activities on a global scale. It means that achieving welfare, peace, economic development and concepts of these sorts depends on culture and knowledge promotion and language fulfils a specific function in the following ways:

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

One aspect of the language power can be seen in organizing concepts, e.g. a lexical set such as *tree/shrub/bush/hedge* “are not clearly distinct perceptual categories; they are constructs of the language” (Halliday 2004b: 10).

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

Language — every human 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 ... (Halliday 2004c: 94).

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 (Halliday 2004b: 16).

1.2.2 Language and science

Any scientific theory, as Halliday (2004a: 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: 129-130 quoted in Halliday 2004e: 200) specifies that “How does science teaching alienate so many students from science? ... One way this happens, I believe, is through the way we talk science.”¹

1. See also: Brookes, David T. 2006. *The Role of Language in Learning Physics*. PhD thesis. The State University of New Jersey. Available online at http://research.physics.illinois.edu/per/david/thesis_y2.pdf

Feist (2006: 194) believes that “scientific knowledge before language was implicit, immediate, sensory-bound, and did not accumulate in the species very rapidly.” Then the author continues that “it took upwards of two million years to go from simple vocabulary to grammar and syntax. When it finally happened, human knowledge and innovation changed forever.” The scholar also argues that “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).” (p. 195)

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, the whole reality has not been depicted by a single language/nation but languages have put their findings together to try to do the puzzle. Then the extinction of a language, even with a limited usage, as a container of the human heritage, 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) give an example that how Europe and the Anglo-Saxon world view the "object" of science and they conclude that:

In English these sciences [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 (*sciences humaines* in French, *ciencias/ciências humanas* in Spanish and Portuguese, *scienze umane* in Italian, *Geisteswissenschaften* in German, *gumanitarnye nauki* in Russian, etc.) (Carli and Calaresu 2007: 525-526)

If English were the only language of science, all people over the world should follow the same categorization it imposes, i.e. thinking in the same way as English does (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 reality from different angles,” Another merit of keeping diversity can be the role languages have as concepts containers as Ammon argues:

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; similarly, with other vocabulary, Martin Heidegger and numerous other thinkers) (Ammon 2006: 17).

Then Ammon concludes that “the maintenance of the scientific function of as many languages as possible, would then of course be an important goal of language planning.” (p. 18) Even on natural sciences, it can be measured whether linguistic labels in different languages for the concept of e.g. *gravity* have explored any new avenue.

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 UNESCO²; 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 can not talk about or categorize or name the phenomenon or species (animals or plants) around us, they will disappear (see Mühlhäusler 2000; Fill 2007). Wollock (2001: 255) believes “An inappropriate linguistic construct of nature will lead to inappropriate actions, like deforestation.” (see Mühlhäusler 2000 for more

2. <http://unesdoc.unesco.org/images/0014/001418/141843e.pdf>

examples) An example from Persian is that when bird flu broke out, it was first called as *ānfolānzā-ye morqi*, literally meaning “hen flu”. This kind of terminologization could mislead the audiences into thinking that only hens are suffering from the disease. But later it was renamed as *ānfolānzā-ye parandegān* “bird flu” (Zarnikhi 2006). (see Section 3.4.1 on factors bringing about such terms/expressions)

Another dimension of the relationship between language and environment has been put forward by Maffi (2001: 8) stating 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 to an extent that Ukrainian was forbidden to be used (Rytsar and Shunevych 1999). Rabin (1989: 27) sets out a reason why Ben-Yehuda tried to revitalize Hebrew and explains that “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’.”

Another capability native languages have is to nativize new knowledge and then to spread it easier than a foreign language does.

For this reason, Christian missionaries encouraged Africans to translate the gospel into their own languages (Djité 2008). Pope Paul II believed “*a faith that does not become culture is not fully accepted, not entirely thought out, not faithfully lived*” (cited in Djité 2008: 137).

This point should be taken into consideration that 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; Nekvapil 2006).

Science teaching through mother tongues is discussed by Djité:

Considering their low level of uptake in Africa today (less than 20 percent of the population), European languages are clearly not appropriate for first-time computer users who have not had much formal education. ... Software is first and foremost a tool. Therefore, it can be adapted to the user, just as the sacred texts of Christianity have been adapted to the faithful in Africa;... (Djité 2008: 139)

(see Webb 2002 about South Africans' proficiency in English; Antia 2000 about adapting softwares in Africa)

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 – and this is the advantage of a terminology in the corresponding mother tongue – 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^{3,4}

In this section, the thesis is concerned with the role of a native language, in comparison with a 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 spectacles and the relationship between language and economy is a controversial issue originating from the nature of these two categories which are under the influence of many factors, varying from a linguistic community to another one (see Arcand 1996 quoted in Walsh 2006: 139; Djité 2008: 146, notes 1 and 2 about linguistic homogeneity and 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 2003b for the inextricably linked among information, economy and language)

3. For the language and economics see *International Journal of the Sociology of Language*, 1996, issue:121.

4. See Zhang, Weiguo and Gilles Grenier. 2013. “How can language be linked to economics? A survey of two strands of research”. *Language problems and language planning*. 37 (3): 203-226.

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 was not based on a widespread dissemination of English, rather it is the result of the indigenisation of such technology in Japanese, and the translation of the processes into terms that the ordinary factory hand can understand.” Webb (2002: 239) stresses the Bantu languages’ role and states that “... the South African government's aims regarding economic development were expressed in an article in *The RDP Quarterly Report* in June 1996 ... these aims can only really be achieved in South Africa 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 12 types of language policies and using a chi-square test, Grzega (2011) arrives at this 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 has impacts on some variables which they, in turn, influence socio-economic factors as it is stated by Walsh (2006: 127) that “Writers, commentators and political leaders from a variety of backgrounds ... have argued that 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 indicating that globalization is not equal to a monolingual 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 which should be taken into account. Maurais (2003a: 16) states “David Graddol ... mentions that English will not hold a monopoly by the middle of the twenty-first century, but that it will be part of an oligopoly with a few other languages, each having its sphere of influence.” 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 Coupland 2010 about language and globalization)

Raising a question that “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. Antia explains that:

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” (Antia 2000: xx).

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

1.3 Core concepts

This part is devoted to the concepts on which the thesis 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 definitions by Lotte, that “...the *term* is a special *word*”, and by Vinokur, that “the term to be not a special word/words, but only a word/words with the specific function”, express their ideas about terms and state “the term borrows from the lexical unit of a natural language only what can be called its language substratum, and the most principal character of the term remains in its terminological nature, i.e. its ability to designate a specific general concept in the system of all concepts within a special area of knowledge or activity.” (p. 84)

That a lexical unit being considered as a *term*, i.e. 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 as general words for English people but not for aboriginals. Terms are even different from a social class to another one within a linguistic community. Therefore, defining *term* depends on criteria varying from a linguistic community to another one. Criteria should be determined before extracting terms from corpora (see Alexeeva 2004 about *term*).

From where terms come? For instance, Antia (2000: 212) defines terminologization as a process “whereby an existing LGP [Languages for General Purposes] word is used to designate a concept in a given LSP [Languages for Special Purposes] field” The reverse process is to move from special to general language (determinologization). In the case of neoterms (newly built terms),

they may not be from general language, e.g. *quantum* and *ballistics*. Neoterms can also be created as a text progresses; it could be a clue as to how terms and grammar are interrelated. I would like to call this process *logogenetic terminology*. Halliday believes:

... 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 (Halliday 2004c: 88).

An example is:

some halophiles... can tolerate high concentrations of salt

the tolerance of high osmolarity

osmotic tolerance (Halliday 2004c: 87).

Another source terms spring from is the "... interpretation of previous scientific theories." (Alexeeva 2003: 67) Then 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 was called by Kuhn as paradigm but as Ahmad (1996) 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." (p. 2)

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 terms 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 could be painted: a language policy embedding a terminology policy, an integrated scenario, e.g. for Catalan in Spain; a terminology policy implied in terminological activities, without a written language policy, e.g. for Persian in Iran; for explicit terminology policy, Antia (2008: 11) illustrates France and he continues that “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 a part of language of science planning. *GTP* (2005: 8) describes terminology planning as an endeavor which “consciously and systematically develops special language according to the needs and

requirements of domain communication’’. Two points from the above mentioned quotations are:

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, considering contributory linguistic and non-linguistic factors, *term* and, as a result, *terminology planning* should be first defined.

To learn how look at term and terminology planning in a holistic view, it is needed to know about 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 twentieth century “Sets of interacting relationships came to occupy the center of attention,” (p. 8) Therefore, regarding the

problems of the mind, for instance, 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.” (p. 12)

Living organisms, described by Capra (1982), are open systems and “It allows the system to remain in a state of nonequilibrium” (p. 291) 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... (Capra 1982: 305)

The system language of science planning is involved in is, in fact, a sociolinguistic complex system taking on both social and language systems, differing from 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 having many agents (dynamic forces) and networks and their complicated interaction and interconnection and, at the same time, it is not inflexible to changes. As a result, by developing a systemic model the thesis is going to consider as far as effective linguistic and non-linguistic variables and the interaction among them.

1.3.3.1 Systemic terminology

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

-- Internal system of terms refers to their form (morphological, phonological, orthographic ... aspects) and content (semantic, cognitive ... aspects).

-- External system of terms refers to their sociolinguistic contexts. Since the final terminologies' destination is a physical context, i.e. 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 external system of terms, are systems **in which** terms are living (written or spoken discourses), **within which** they could be generated (*logogenetic terminology*) and **from which** they are extracted and they receive their validity. Furthermore, systemic terminology deals with how complex terms in the form of collocation and phraseology (see Picht 1987 for phraseology) influencing 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 comprehending the text.

To justify the importance of linguistic environment of terms (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 come as follows 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**)” (bold is mine).

-- Rabin (1989: 36) believes that “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.”

-- Ereht 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) criticizes Sager’s definition of terminology (1990) and states that his definition only deals with creation and presentation not to other parts of terminological work. Then the author considers it as “an insufficiency in term theory and term management.” (p. 73)

-- Cabre argues 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 (Cabre 1998/1999: 12).

For example for *revitalization of, of* is its predicate.

-- Hübschmannová and Neustupný (2004: 85) state that “It is essential to widen the framework for understanding technical, scientific and other special languages beyond the registration and classification of lexical items. 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) argues that the problem of the language of science is not only from terms and he gives an example of the complexity of the language of science which 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 “It is thus necessary to put the lexical aspect into perspective with regard to other aspects of scientific language, such as grammar and textual organization.”

The reasons of some of shortcomings in terminology planning may come from this point that planners concentrate only on internal system of terms not other dimensions of scientific discourse. Systemic point of view on terms means to take both internal and external systems into account.

1.3.3.2 Systemic planning

Systemic planning means to involve stakeholders and constituents as far as necessary 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 system (see Maurais 2003a about socio-political changes in USSR). As a result, various aspects of systemic planning should be taken into account:

-- Identifying driving forces and their relationship. Cluver (1991: 49) states that positivists “identify fairly simplistic linear cause-and-effect relationships between elements.” They thought that “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... .” (p. 49) In this approach “... the loyalty of minority groups towards their own language is ignored” (p. 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, and then creating networks for collecting data from them and spreading the products in a systemic approach among them. The further a layer is from the core of the terminology planning, the lesser effect it has (see Cluver 1991 about networks in Namibia for using Afrikaans).

-- Considering language of science planning (terminology) related to general language planning. Ereht and Saari (1991: 8) consider “the unity of general and special language planning” in Estonia as one of its permanent features. There is an interaction between terminology planning, as a special corpus planning, and status, acquisition and diffusion planning (see Diagram 3.2) which should be taken into account in a systemic view.

-- Identifying domains in which planning is applied such as education, industry, science and technology, economics, legal system and so on.

-- Considering interrelationship among languages, e.g. 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, e.g. between French in France and French in Quebec; at the regional level, e.g. Arabic in

Arabic countries. Languages of the world are forming a system which can be divided into many subsystems (see De Swaan 1998a). Kaplan and Baldauf (1997: 321) state that "... we have tried to show that every language constitutes part of an eco-system, and 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)."

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 containing moving billiard balls. *The Oxford Dictionary of Philosophy*. Simon Blackburn. Oxford University Press, 2008. *Oxford Reference Online*. Oxford University Press. Universitat Pompeu Fabra. 19 July

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*. Edited by Andrew M. Colman. Oxford University Press 2009. *Oxford Reference Online*. Oxford University Press. Universitat Pompeu Fabra. 19 July 2011 <http://www.oxfordreference.com/views/ENTRY.html?subview=Main&entry=t87.e5153>

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*. Ed. John M. Last, Oxford University Press, 2007. *Oxford Reference Online*. Oxford University Press. Universitat Pompeu Fabra. 19 July 2011 <http://www.oxfordreference.com/views/ENTRY.html?subview=Main&entry=t235.e2900>

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*. Ed Richard Cammack, Teresa Atwood, Peter Campbell, Howard Parish, Anthony Smith, Frank Vella, and John Stirling. Oxford University Press, 2008. *Oxford Reference Online*. Oxford University Press. Universitat Pompeu Fabra. 19 July 2011 <http://www.oxfordreference.com/views/ENTRY.html?subview=Main&entry=t219.e12732>

based on experiments:

Rutherford model 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*. Ed John Daintith. Oxford University Press, 2008. *Oxford Reference Online*. Oxford University Press. Universitat Pompeu Fabra. 19 July

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. *The Concise Oxford Dictionary of Archaeology*. Timothy Darvill. Oxford University Press, 2008. *Oxford Reference Online*. Oxford University Press. Universitat Pompeu Fabra. 19 July 2011 <http://www.oxfordreference.com/views/ENTRY.html?subview=Main&entry=t102.e2590>

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.” and also “the practice of language planning should, wherever feasible, be made to fit the model and not the model to fit practice.” (pp. 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. Although Cole (1991) and Korkas and Rogers (2010) deal with “terminology theory”, their opinions can hold true for “model” as well. Cole (1991: 19) states 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” 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 are feeding each other.

As the differences among practices lie in linguistic factors, especially their linguistic features related to the length of time being involved in expressing scientific concepts, and non-linguistic ones such as language consciousness, policy, human language technologies and so on, the next section introduces *principles and parameters* to show that it is not expected from a model embodying 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* which, at

the same time, can be applied in different forms according to sociolinguistic contexts. I call these variations *parameters*. Hence the research is going to mine principles and parameters and to measure to what extent the latter could be generalized and finally to put them into planning circulation to arrive at a model for terminology planning in the context of language planning.

Principles can be categorized into two groups: universal and restricted principles. Universal principles, such as dissemination, language technologies, etc. are available in every sociolinguistic 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 variables such as terms' gender, as a linguistic factor, and types and number of the target audiences, economic level and technological capabilities a linguistic community possesses, as non-linguistic factors affecting form and content of a database.

Although for term-formation some universal principles (criteria) have been discovered, they follow conditions imposed by linguistic structures. Wüster⁵ (1985: 82) illustrates the point under discussion: “It is well known that concise transferred designations are used a great deal in technical English, whereas lengthier compounds are preferred in German”. This parameter (long compounds) comes from German linguistic structure and it must be a terminological

5. *Introduction to the General Theory of Terminology and Terminological Lexicography*, Eugen Wüster, 1985 (an English translation).

favorite with the users as well. Therefore, it is against a scientific method to lay down stringent rules such as *the shorter, the better* and to prescribe them for all situations. Another example of linguistic constraint is:

...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).

Galinski also states:

...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 to an Anglo-American pronunciation. (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.

But restricted principles are limited 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.

1.4 Objectives

Using *train* as a metaphor for terminology planning, Zarnikhi (2010: 122-123) states that “The train ... moves from the departure point to the destination and it depends on which station a traveler catches it.” Diagram 1.1 represents terminology planning train.

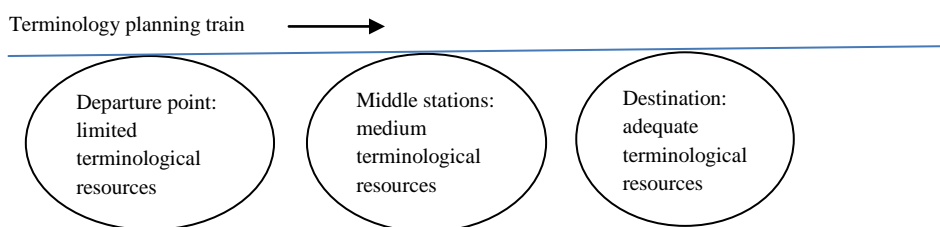


Diagram 1.1: Terminology planning train

The main intention of modeling, i.e. terminology planning generalization, has been partly expressed in some other literature (Maurais 1993; Felber 1986). Felber (1990: 8) hoped that “in the future, 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: 15-16) believes that “... what underlies terminology is nothing else but plurality, diversity and multifunctionality. However paradoxical this may seem at first sight, behind this diversity there is unity of bases, unity of scientific object and unity of field of research: in other words, 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 *GTP* (2005: vi) is that to be “**useful for all**

countries and language communities ranging from developing countries and language communities with less mature terminologies to developed ones’

About the possibility of generalization, Myking raises the following questions:

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? (Myking 2006: 151)

In his words, “to what extent” and “within what limits” can be replaced with *principles* and *parameters* respectively.

In addition to the desires to unify different practices, real situations witness adopting and adapting the successful experience as a model, e.g. Termcat in Catalonia was modeled on Quebec Office of the French Language (Rey 1996; Laurén and Picht 2006; L’Homme 2006). In the other corner of the world, as Myking (2006: 142) states “...the common theoretical and methodological framework provided by this school [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 is Nordic countries. Elkhafaifi (2002: 260) draws a conclusion from this ecolinguistic situation that “If the linguistically and ethnically diverse Nordic countries can agree on an agenda of collaboration

that transcends national boundaries and political and linguistic differences, then surely the Arab nations could make a similar attempt.” They are encouraging signs in favour of generalization.

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

Among the reasons that persuade the researcher to look for a model are:

- “classification and then generalization are two stages of improving our knowledge of a phenomenon.
- as an ideal, it could work as a weather map; not only representing the available information but also adapting to a new situation when conditions change.” (Zarnikhi 2010: 112 - 113)

To build a model, the thesis has to find solutions for the questions in the next section.

1.5 Research questions

The questions come as follows:

1. Can terminology planning, as the language of science planning activity, in different ecolinguistic situations be done under the same universal or restricted principles?

2. Why have different organizations set their own specific rules (parameters)?
3. Can parameters be generalized and inserted into terminology planning circulation?
4. Can terminology planning, as an activity in the language of science planning, be theorized under a certain approach?
5. Could a model for terminology planning be formulated by putting the principles and generalizable parameters?

1.6 Methodology

For answering the questions mentioned earlier, the research gains an advantage of employing both literature, by studying documents published by terminologists or terminology agencies from a variety of linguistic communities, and field research by examining four organizations involved in terminology work at the national level. Among them, Termcat, for Catalan⁶ in Spain, Terminologicentrum⁷ (TNC) in Sweden, *La délégation générale à la langue française et aux langues de France*⁸ (DGLFLF) in France have been visited. The researcher also has experience of working at the APLL. To control the study in a systematic way, a list of questions (see

6. Catalan is a co-official language in Spain and according to Fishman (1977b: 36) “The designation *national language* has been reserved for an indigenous language which is usually viewed as official, and/or co-official with others, for certain important symbolic purposes.”

7. Swedish Center for Terminology

8. the general delegation for the French language and the languages of France

Chapter four), covering the focal points for much discussion, has been prepared as a route map.

1.7 Organization of the thesis

In the succeeding chapters, the thesis structure is: Chapter two is devoted to state-of-the-art. It reviews literature to examine how other researchers have studied terminology planning. A theoretical framework for the thesis is presented in Chapter three. Chapter four describes methodology and presents the data gathered from four cases and the documents published by experts from about thirty linguistic communities. The data are arranged in a thematical classification. Chapter five analyzes the data. Answering the research questions, proposing the model and arriving at conclusions are included in Chapter six.

Chapter 2: State-of- the-art

This chapter deals with a chronological categorization of comparative studies and modeling concerned with language planning and terminology planning. They are more precisely focusing on the trends from Auger (1986 quoted in Quirion 2003), Felber (1986; 1990), Krommer-Benz (1990), Budin (1990; 1992; 1993), Antia (2000), Zarnikhi (2010) and Bhreathnach (2011).

The material is organized in the following way:

- comparative studies in language planning
- language planning models
- comparative studies in terminological activities
- studies on terminology planning
- terminology planning models.

2.1 Comparative studies in language planning

Showing that the idea of making a comparison among different ecolinguistic situations to arrive at similarities and then to generalize from them has a relatively long precedent, this section refers to the first researches done by Fishman and his colleagues in the area of language planning.

A classical work fallen into this category is a research by Fishman and his colleagues (see Fishman 1977a; 1977b; Jernudd 1977) to extract commonalities among different sociolinguistic situations

such as Israel, Indonesia, India, East Pakistan and Sweden. The research goals in Fishman's words (1977a: 195) are to know of "... the effectiveness of certain major aspects of language planning: (a) lexical elaboration for modernization and (b) influencing knowledge and attitudes toward the central agencies charged with responsibility for such elaboration." Another aim of the research was to know of the acceptance of language planning products.

2.2 Language planning models

This section is devoted to the language planning literature which has used *model* in their titles: Chumbow (1987), Bamgbose (1989), Cluver (1991; 1992) and Donnacha (2000).

For the African sociolinguistic situation, Chumbow (1987) is looking for a model including "universal aspects of the theory of language planning" and, at the same time, focusing on "peculiar problems of language planning in Africa". According to the core concepts of the present thesis, the former is equal to *principles* and the latter to *parameters*. As a step towards generalization, the author also claims that it can be modeled by other countries. His definition of planning model is that it "... relates language planning to all other forms of planning for national development." (p. 16) which can come within systemic planning whose elements are working together. Finally, after presenting the steps of language planning based on planning model from Haugen 1969, Jernudd 1973, Fishman et al 1971 and Chumbow 1982/1984, the researcher proposes an adapted model from planning model (p. 18, Table 1).

The model features the evaluation at every stage: policy formulation, policy implementation (standardization and dissemination) and language community (effective adoption of policy). It is clear that the author uses *model* as some stages in a linear sequence.

Bamgbose (1989: 24) puts forward the following issues influencing a model of language planning: “types of decisions, the planning mechanism, the role of fact-finding, levels of planning, and status versus corpus planning.” The author offers the model whose components can be arranged in the “four directional possibilities”:

- a) Fact-finding, Policy Formulation, Evaluation, Fact-finding, Implementation;
- b) Policy Formulation, Evaluation, Fact-finding, Implementation;
- c) Implementation, Evaluation, Fact-finding, Implementation;
- d) Implementation, Evaluation, Policy Formulation (p. 31, from Figure 1).

It is a non-linear model which can be applied from four directions.

At the end, he argues that although a *theory* of language planning does not exist, “there is a growing consensus on the elements that should go into a *model* of language planning.” (p. 32)

Employing concepts such as network, process, instability, non-linear relationships, ecosystem and flexibility, Cluver (1991) proposes a systems approach to the language planning in Namibia and emphasizes the two features of systems approach: processes

and network. The first character is exemplified in the substitution of English for Afrikaans which means “If we see language as a process, the replacement of Afrikaans by English should also be seen as a process in which the status of both languages are changed. In this approach the population will have time to adjust and acquire the new language.” (p. 57) By the second feature the scholar means “... the language planning agency should cooperate closely with other agencies that aim to bring about social change in Namibia.” (p. 58) It sounds that for the first time in language planning *model* is used in a systemic approach.

In his next research, Cluver (1992), classifying language planning models in South Africa from eighteenth century until 1980s, identifies five models: the government’s policy, Van den Bergh’s policy, Prinsloo’s policy, Steyn’s policy, and Alexander’s policy.” (p. 114) *Model* in the previous approaches represents a kind of method.

A model loaning the concept of “value chain” from industry is formulated by Donnacha (2000) introducing an integrated form. The model is founded upon two kinds of activity adding value “to the product or service and then passing it on to the next set of activities so that more value can be added.” (p. 15) These activities are called *primary* and *support* activities. The former deals with:

- The nurturing of positive attitudes towards the language
- Increasing the level of ability in the language
- Increasing the level of language usage

- Nurturing and strengthening the language community
- Increasing the level of organic intergenerational language transmission (p. 16, from Figure 2).

The latter includes:

- Organisational Infrastructure and Effectiveness
- The Language Planning Process
- Human-Resource Management
- Research
- Corpus Planning
- Convergent Planning in Other Areas (p. 16, from Figure 2).

An advantage of the model is that the researcher places priority on linguistic awareness as a solid foundation for building language planning. The next point is that Donnacha approves the existence of *principles* and *parameters* in language planning when the author states “the nature of the activities and the relative importance of each individual aspect of the model will vary from language to language depending on linguistic and other circumstances. However, the basic principles of the model and the linkages between the various sets of activities remain the same.” (p. 31)

It can be concluded that there is a hope to form a model from the existing similarities in the framework of systems approach by considering significant role of parameters in language planning. To

do this, promoting language consciousness is a base upon which language planning is built (see Hornberger 2006; Ricento 2007 on language planning models and approaches).

2.3 Comparative studies in terminological activities

This section is allocated to comparative researches in terminology exploring similarities and differences. As an attempt at collecting information from 73 bodies involved in terminology over the world, we can refer to *Entities Involved in Terminology Activities* (2005), a research by the European Association for Terminology (EAFT). But it could be done in a better way by classifying entities based on their sociolinguistic characteristics, needs and aims. This division can lead to a diagram whose major and minor nodes and their relationships picture a world map regarding terminological activities.

A comparison of terminological activities by adopting a regional approach for exploring the theoretical foundations was made by Pilke and Toft (2006) in Nordic countries and Laurén and Picht (2006) in Russia, Nordic countries, Canada, Romance language area, German-speaking area, Anglo-saxon area and Africa (Nigeria). Laurén and Picht (2006) justify their methodology: “From the literature it was possible to deduce focal points which, to a certain degree, were congruent with geographic areas.” (p. 163) Although they stress “to a certain degree”, the same problem of *Entities Involved in Terminology Activities* (2005) remains because two linguistic communities such as Swedish and Sami in a single

area (Nordic) have different sociolinguistic features and, consequently, different needs and aims.

A considerable point about their article is that the researchers do not make a conclusion from their comparison but only a description of situations. However, concerning theoretical frames the following salient approaches they recognize:

1. Concept-oriented, linguistic and cognitive approaches in Russia
2. Socioterminology approach in Romance language area
3. Vienna School in German-speaking area.

From their study, it can be understood that the variations of language and terminology planning in the mentioned regions are resulted from their sociolinguistic situations, e.g. in UK language and terminology planning is for other languages and there is a prescriptive bias to Catalan with the political changes in Spain after 1975.

Another aspect is that it seems terminology teaching and training has not reached the stage of having an independent department but it is an integral part of other disciplines such as translation studies and LSP, albeit a history of more than thirty years in universities. Concerning terminological approaches, both onomasiological and semasiological approaches have been considered in Russia, Nordic countries, Romance language, German-speaking and Anglo-saxon areas.

It appears that paying attention to sociocognitive aspects of terminology and corpus-based terminology, terms' behavior in texts, is increasing. The thesis deals with the former under linguistics of science (see Section 3.4.1) and with the latter in systemic terminology (see Section 1.3.3.1). The effective socio-cultural factors determining the forms of language and terminology planning, for instance, in Romance area, UK, and Canada will be discussed under planning theory layer (see Section 4.2.1).

Another study was conducted to compare Canadian and Bulgarian terminology research achievements, two entirely different ecolinguistic situations. Alexiev (2007) tries to find similarities as far as topic preference and approaches are concerned. The author first deals with commonalities of their objectives and structures:

Objectives: “(a) providing solutions to translation problems and (b) assisting in language planning, ...” (p. 128)

Structures: In Canada, there are two governmental organizations “the Translation Bureau within the Canadian Federal Government and the Office Que'be'cois de la langue française (henceforth referred to as OQLF), and two universities, the University of Ottawa and the University of Montreal, with other universities... .” (p. 130)

In Bulgaria:

1. A governmental unit “Department of Terminology and Terminography of the Bulgarian Language Institute at the Bulgarian Academy of Sciences”;

2. Universities also involved in this activity (p. 131).

Research topics: “(a) the relationships between special concepts, (b) the relationships between special concepts and their lexical expressions, and (c) methods for identifying and presenting the relationships formulated in (a) and (b).” (p. 133)

Approaches: In Canada, both onomasiological approach, at the university of Ottawa, and semasiological one, at the University of Montreal, are followed. In Bulgaria, however, “Until the mid-1980s, the approach to terminology ... was entirely *prescriptive, formal* and very similar to the GTT (General Theory of Terminology) in terms of preference for univocity (monosemy + mononymy), planning and control over the term formation process. Special attention was paid to uncontrolled borrowing, especially incorrect calquing.” (p. 134) But *complex approach* proposed by Popova “gives equal weight to both perspectives” (p. 136)

Finally Alexiev concludes that the differences between Canada and Bulgaria in terminology research lie in “the methods and techniques applied” (p. 136) and, as a result, terminologists from both countries can cooperate with each other and exchange their information.

In summary, in spite of a variety of terminological activities over the world, the bases they have been founded on are, more or less, the same.

2.4 Studies on terminology planning

Before dealing with literature concerned with how to manage terminology planning, it is required to refer to the scholars distinguishing between terminology planning in developing and developed countries. In Jernudd's opinion (1983), developing countries do not pay much "attention to term formation and term syst[e]maticity, definition" (p. 366) Their goal is only to publish "volumes of lists and perhaps texts". In developed countries, on the other hand, a goal of "coordination of usage and agreement on definitions dominate" which "will be achieved through intensive interaction between planner and user and careful preparation of highly specialized reference works" (p. 366).

Another researcher takes the same line as Jernudd does is Maurais (1993). The author designates *lexical modernization* and *terminology* for linguistic activities in developing and developed countries, respectively. He considers terminology as "a systematic activity in which subject-field experts or terminologists/linguists ... draw up a list of terms covering in principle a whole semantic field whereas in deliberate lexical modernization literate amateurs ... coin words piecemeal, with no systematic attempt at covering a whole semantic field"(p. 112).

Both scholars consider activities in developing countries as unsystematic terminology planning. The philosophy behind any terminological endeavor, however, is how to organize terms, whether originated in a developed linguistic community or created as equivalents in other parts of the world. Therefore, no

terminological work can be completed unsystematically; covering a conceptual field and arranging related terms should be observed even in developing countries (see Antia 2000; Antia and Kamai 2006 on knowledge as a conceptual system). Alberts (1999: 19) argues that “People of different nationalities and language groups should also be able to communicate effectively. It is therefore essential to document terminology in a **systematic way**” (bold is mine). Madiba (2001) discusses an advantage of indigenization, after borrowing, by stating that “borrowed words come into a language as individual words, and therefore do not systematically cover all the concepts of the subject field concerned. ... [so] indigenous terminology is developed by adopting a well-established conceptual framework.” (pp. 71-72). A considerable point is that the two last researchers are from African countries. Hence, if a systematic work is not available in developing countries, it is a shortcoming not a characteristic.

Returning to the studies on terminology planning, among few terminologists paid attention to this issue, irrespective of socio-economic development level of linguistic communities, we can refer to Auger considering terminology planning as a process consisting of six stages:

1. Research
2. Standardization
3. Dissemination
4. Implantation

5. Evaluation and measurement

6. Modernization (Auger 1986: 48 quoted in Quirion 2003).

It is worth mentioning two points concerned with his stages. First, not all activities aim to standardize their terms. As mentioned in Section 1.3.5, standardization can be a restricted principle. For example, the starting point for languages with no previous experience in scientific fields is to create or borrow terms. Another point is that he presents the process in a linear sequence.

Cabre, referring to Auger (1986), believes that:

We can identify the following eight successive stages in the process:

- a. Analysis of the terminological needs of a situation in accordance with the overall situation, and selection of the most suitable strategies for intervention
- b. Preparation of a terminological research plan adapted to the needs of the environment in question
- c. Preparation of the terminology with the participation of relevant users
- d. Standardization of the prepared terminology
- e. Choice of the most suitable format and presentation for the prepared terminology
- f. Implementation of the terminology in practice by suitable policies

g. Monitoring the use of the terminology

h. Constant updating of the terminology (Cabre 1999: 49).

Although Cabre, like Auger, adopts a linear approach by mentioning “successive stages”, her stages for terminology planning have an advantage over Auger’s. It is her attention to sociolinguistic situations and needs made manifest in using the keywords such as *terminological needs, suitable strategies, relevant users, suitable format and presentation* and *suitable policies*. Felber is another scholar whose works are focusing on sociolinguistic situations.

Felber’s contributions (1986; 1990) draw up some guidelines for terminology planning. The guidelines can be categorized in the following way:

1. Evaluating linguistic situation

1.1 Terminological need

1.2 Terminology documentation

1.3 Conceptual systems: unification and standardization

1.4 Existing models of terminological activities in other countries

2. Evaluating non-linguistic situation

2.1 Organizations and individual specialists

2.2 Science and technology transfer

2.3 National special conditions

3. Developing terminological infrastructures
 - 3.1 Terminology training
 - 3.2 Terminology research
 - 3.2.1 Basic research such as General Theory of Terminology
 - 3.2.2 Applied research
 - 3.2.2.1 On the terminology structure of a specific language
 - 3.2.2.2 On an individual subject field e.g. medicine in a specific language
 - 3.2.2.3 On the terminological system of an individual subject field in two or more languages
 - 3.2.2.4 On the handling and processing of terminological data by computer
 - 3.3 Terminological awareness
4. Preparing principles and methods
 - 4.1 Elaborating, regulating and standardizing terminology
 - 4.2 Coordinating terminology
 - 4.3 Setting up terminology commissions
 - 4.4 Establishing data banks
 - 4.5 Creating terminology networks

4.6 Disseminating terminologies

4.7 Participants: subject specialists, specialists of one language or more languages or linguists and terminologists (Felber 1986: 19).

He explains the implementation phase under the following items:

- a) Adaptation of models to reality
- b) Availability of the necessary know-how
- c) Interconnection of terminological activities to a functioning whole and
- d) International liaisons (Felber 1986: 30-31).

5. Presenting “a final report as result of an analysis and evaluation of the national terminological problem will serve as the basis for the formulation of an aim, which in turn is the starting point for the measures to be taken, such as training of specialists” (Felber 1990: 7)

Although terminology planning in Felber (1986; 1990) is presented in the form of guidelines, some points are worth taking into account. First, he distinguishes between linguistic and non-linguistic situations and starts planning from evaluating sociolinguistic situations. The author also considers terminological awareness as a necessary infrastructure for spreading terminologies. It is an indication of the importance of promoting linguistic consciousness in his planning. The third one is building networks and considering

target communities for dissemination. And the last one is evaluation and the use of its results in making a new policy.

After giving some guidelines for terminology planning in developing countries, more or less in a similar way suggested by Felber, Krommer-Benz (1990) proposes measures for implementation:

1) Source and target language(s) selection

2) Terminology building strategies

a) Loan words

b) Internationalisms

c) Transfer of meaning

d) Concept borrowing

e) Avoiding of faux amis

f) Amendment of the language

g) Usage of abbreviations

3) Staff and equipment

a) Staffing of projects

b) Establishment of networks

c) Technological equipment

4) Computerization.

These are some steps or suggestions for planners to follow, however they are not enough for building a model. Then it is needed to view the issue from a wider lens.

The first time of looking at terminology planning in a systemic way closely linked to other systems may be Budin (1990). He emphasizes on interdisciplinary nature of terminology planning, enjoying benefits of other related sciences such as information science, communication science, sociology, philosophy of science, linguistics and terminology research, on the one hand (see Leitchik and Shelov 2003a: 97, Figure 2 on “The place of terminology science in the system of contemporary sciences” in the Russian terminology school), and socio-cultural planning policies, science and technology planning policies and language planning activities, on the other hand. The last point, i.e. terminology planning by taking other policies into account, is similar to systems approach. Referring to language laws in Namibia, Cluver (1991: 58) states “The systems approach enables us to expect that the introduction of laws on language planning in Namibia will form part of other reform laws such as a land reform act, an educational reform act, a human rights declaration, etc.”

Stressing his holistic view, Budin (1992) states that “a meta-theory is required” (p. 87) and the philosophy of science can play this role “as a ‘melting pot’ in order to arrive at a coherent, yet flexible and comprehensive theory of language and terminology planning that is fully in line with practical experience” (p. 87). This model for language and terminology planning is based on two levels:

theoretical and practical levels. The former is linked to other related sciences and the latter is “a broad-based approach integrating existing methods of science and technology planning, evaluation and optimization cycles” (p. 90). The last stage (optimization cycles) improves both theory and practice. Budin (1993 fig. 2: 4) keeps his ideas on terminology planning and refers to some phases for multilingual terminology planning: research, policy- and decision-making, implementation and evaluation.

Based on Quebec’s Francization experience from the early 1970’s, Maurais (1993: 114ff) describes “seven observations”:

- 1) Symbolic role of terminology; “... terminology also serves as an evaluating tool indicating to which extent the target language is making headway in the workplace” (p. 115)
- 2) Linguistic borrowing
- 3) General language vs. LSP
- 4) Need for a communication strategy in language planning
- 5) Linguistic variation; “... it is a strategy the aim of which is to reorganize language variation around standard forms” (p. 120)
- 6) Multilateral cooperation in terminology
- 7) Need for evaluation.

The author also mentions that “It remains to be seen whether they hold true in every other context.” (p. 114) Except number 1 which

could be a strategy for number 7, all numbers are universal principles in language planning (Numbers are mine).

An example of measuring the success of a terminological activity in fulfilling its objectives is a research by Antia (2000). It is a translation-based terminology planning. He criticizes a terminological product prepared based on traditional terminology planning but it is not clear what are the characteristics of that planning.

Antia describes his second experiment for evaluating the quality of *Quadrilingual Glossary of Legislative Terms* in knowledge acquisition and transfer:

An experiment was conducted to assess the extent to which the quadrilingual glossary lends itself to structured knowledge retrieval. The glossary was given to an experimental subject who had to use it to produce a text on the legislative concept, *bill*. The cautious assumption was that the protocol (that is, the text produced) would give some insight into the retrievability of knowledge from the glossary. To have a basis for comparison, a control experiment was put in place. A trilingual glossary, the *Parlamentarische Terminologie*, produced by the Language Service of the German Parliament (Bundestag), was given to an English-German bilingual who was asked to write an essay in English on *bill*, the corresponding German term being *Gesetzentwurf*. ... Both test subjects are University students of literature and language (Antia 2000: 65).

It is obvious that these two dictionaries (*Quadrilingual Glossary of Legislative Terms* and *Parlamentarische Terminologie*) cannot be at the same level of knowledge since legislation development has not been the same in these two countries (Nigeria and Germany). Law is a discipline rooted in sociocultural and religious beliefs of a nation. It is also clear that these two resources in these languages are different from terminographical methodologies; lexicography or terminography methods and needs and aims cannot be compared between these two linguistic communities.

Since the subjects come from two different socio-cultural backgrounds, the results of such an experiment could be predictable in advance. He continues that “In comparison to the main experimental protocol, the control text is more *coherent* and has more inferences. In relating the number and quality of inferences to the glossary, it might be noted that all the terms in the control protocol are taken from just two consecutive pages of the 188-page resource.” (p. 71)

However, to know how the real users think about the terminological product and what are their experiences are ignored by Antia. Karabacak (2009: 146) criticizes his experiments and states that he “used translation and knowledge processing experiments to examine terminology resources designed for four languages in Africa without intending to evaluate the acceptance of the terms within the language.”

In spite of the fact that his research scope is confined to African context, Antia (2000: 228) claims that his work presents “a

methodology for terminology planning in languages with limited written specialised corpora”. It is another clue as to the possibility of generalization.

Overall, from Auger (1986) to Antia (2000), the issues like sociolinguistic situations and needs, terminological awareness, networks and systemic terminology planning through considering other related sciences and other socio-economic and technology planning have started to receive attention.

2.5 Studies on models for terminology planning

In this part we present scholars’ works using *model* in their articles’ titles. Some of them are concerned with local planning, e.g. in African situation. For instance, Madiba (2001) tries to develop a pragmatic model “for the modernisation of the indigenous languages of South Africa, and for Venda in particular.” (p. 54) This approach consists of two stages: borrowing and then indigenization. It is a model in the form of a statement.

Making a comparison between Termcat, for Catalan in Spain, and the Academy of Persian Language and Literature (henceforth referred to as APLL), Zarnikhi (2010) introduced his primary model in *Presenting Terminology and Knowledge Engineering Resources Online: Models and Challenges* (TKE'2010) in Dublin, hoping provoke a debate to shed new light on the situation to be more elaborated. Diagram 2.1 represents the model.

As a stratified model, it consists of three layers:

- making law from the top;
- compromising between description and prescription from the middle;
- promoting language awareness over a linguistic community from the bottom.

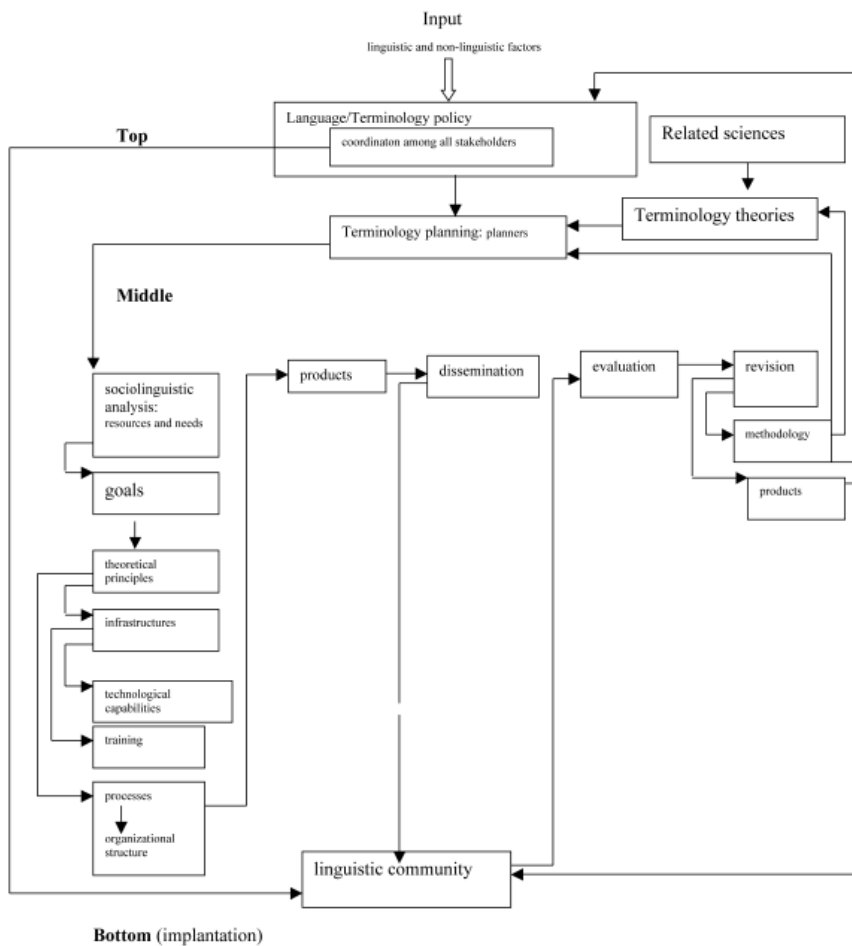


Diagram 2.1: A primary model for terminology planning

The strata affect each other. In fact, the type of policy-making (first layer) and how a project develops (the second layer) influence implantation (third layer) in a linguistic community, consisting of diverse scientific communities. The third layer also impacts on the first layer by feeding the policy-making through evaluation results and on the second one by helping to adjust the planning. Thus, it is suggested that both top-down and bottom-up approaches go hand in hand to bring success for terminology planning. The first layer touches the second one by the type of policies it announces. But the second stratum indirectly influences the first one because its achievements appear on the surface of the third layer.

It is an open system exchanging information with its environment. It analyzes the sociolinguistic needs, disseminate its products, receives feedback, revises itself and progresses. To do this, as a first step, a diachronic description of the existing linguistic and non-linguistic situations is required to see what are available and what are not. Then planners can decide what they want to gain, to whom and how. The next steps all result from motivations and objectives. For example, what makes a term *term* depends on areas which an organization wants to cover. Some factors are: target users, degree of industrialization and tourism industry. When Termcat is working on foods' names, although they are not scientific or technological vocabularies, it broadens its field of activity because of needs. It proves how motivations, needs and strategies determine theoretical principles and how they, in turn, influence processes and structures.

It is one thing to produce and then to spread terminological materials, but quite another to implant them. For implanting being successful, three major components are engaged: product quality, supplying methods and consumer confidence. The implanting device fitted in the model stresses using linguistic, social and cognitive strategies mapped out for increasing language consciousness among the intended users by focusing on their sociocultural levels and needs. For instance, if the target users belong to the working class, planners can explain the role terms and, generally, language, have in improving their knowledge and leading them to get a better position.

The evaluating device could be a kind of hidden camera to catch reasons of acceptance or rejection and to record sociolinguistic variables leading to parameters. Certainly the ultimate goal is not just to put terms into circulation but it bears something else, e.g. whether planning and equipping a language has any role in scientific growth. Although it may seem a long distance, it could be measured step by step in a period of a terminology planning implementation.

The final step is revision, a process of adjusting the planning to whatever gained from evaluation stage, which policy-makers, planners and also theorists all can benefit from this step. But the story does not come to a full stop here. Since human societies are dynamic, planning is sustained.

Although the model discussed above seems more systemic than the previous ones, it is in embryonic form which develops as the thesis

progresses by adding Terminologicentrum⁹ (TNC) and *La délégation générale à la langue française et aux langues de France*¹⁰ (DGLFLF) as two other cases and studying language planning literature and, at the same time, literature published by around thirty linguistic communities on terminology and terminology planning. But, at this moment, a lack of theoretical base covering language of science planning puts the model at a disadvantage.

The next attempt to build a model for terminology planning is Bhreathnach's PhD thesis in 2011 entitled "A Best-practice Model for Term Planning", Fiontar, Dublin City University. That Bhreathnach and the present author both have simultaneously dealt with terminology planning may be from the real situations they come from, the problems they have encountered and the gap they feel exist between theory and practice.

Bhreathnach first analyzes the literature by "The authors who have tried to categorise term planning ... Auger (1986), Quirion (2003a), Cabré (1999 and 1998), Santos (2003), Onyango (2005) and Fähndrich (2005), as well as UNESCO (2005) and the ISO standards." (p. 32) Then she arrives at eight stages in terminology planning:

1. Preparation/planning
2. Research

9. Swedish Center for Terminology

10. the general delegation for the French language and the languages of France

3. Standardization
4. Dissemination
5. Implantation
6. Evaluation
7. Modernization/maintenance
8. Training (pp. 36-37).

These stages are very similar to Auger's (1986 quoted in Quirion 2003):

1. Research
2. Standardization
3. Dissemination
4. Implantation
5. Evaluation
6. Measurement and modernization.

The researcher employs the eight stages for analyzing the literature “to establish general trends in the literature, if they exist, or to give an overview of the main discussions taking place.” (p. 38) The results are compared with Termcat, TNC, the Terminology Committee (Foras na Gaeilge) and Fiontar, Dublin City University (DCU) for Irish, in order to formulate the final model.

To find “the best cases of term planning” (p. 74), she did “A survey of experts”. Her question was “Which, in your opinion, are the two or three best term planning organisations worldwide, and why?” (p. 77) But here some questions arise: if they are “the best cases of term planning”, what is the reason of her research? The second one is that “the best cases” at which level (local, national, international and so on) and from which point of view? And “the best cases” for which sociolinguistic specification? In choosing “the best cases”, she confesses that “This is paradoxical in that cases must be selected as the ‘best’ before they have been examined or compared with other candidates.” (p. 73) For lack of criteria, the respondents sometimes refer to organizations whose functions are different from each other, for example, Termium and the Office Que'be'cois de la langue française (OQLF) both in Canada but with different aims. At the end, however, she randomly chose Termcat, TNC and Irish cases among them. So, what is the reason behind “A survey of experts”?

Bhreachnach's research is based on the following questions:

“1. Is there an existing best-practice model for term planning? If it has not been set out explicitly, can an agreed model be inferred from the existing literature on terminology?”

“2. Can this best practice model, if it exists, be expanded and improved by looking at how term planning work is carried out in real life situations?”

“3. Is the best-practice model for term planning, as derived from case study research, the same as that set out in the literature?”

“4. Is a socioterminological approach to term planning useful?”
(Bhreathnach 2011: 2)

What is the criteria for “a best-practice model”? How can she justify that X or Y is “a best”? Bhreathnach, remaining silent on Zarnikhi's model (2010), gives an answer to the first question: “There is no existing best-practice model for term planning at a management level.” (p. 174) The author continues that “In nearly all cases, there is simply not enough material to be able to say that the literature suggests a consensus or a model.” (p. 174)

Although the researcher concludes that there is no such “a consensus or a model”, she answers the second question. On the other side, how “this best practice model” (in the second question) can be improved if it is “the best”? It is a paradox. The author states “The proposition is that the best practice model for term planning is the same as that identified in the literature.” (p. 84) Thus, if this is true, why did she continue her research? Bhreathnach answers the second question:

By looking at term planning organisations in their daily work, some of the assertions made in the literature can be tested and their importance weighted, and the areas not discussed (dissemination and marketing of term resources, for example, as well as the organizational structures that work) can be expanded. The result is a much more detailed model, with a firmer basis in experience (Bhreathnach 2011: 175).

This question indicates that “best practice model” and “real life situations” cannot logically be the same because she wants to improve the former by considering the latter. Therefore, what is the reason for posing the third question?

Regarding the fourth question, Bhreathnach rejects linguistic, terminological systems, communicative and knowledge approaches and states they “are not very useful in a discussion of term planning studies.” (p. 21), without justifying her claim. The author also argues against socioterminology:

it is underdeveloped. There is no consensus on what it means exactly, and it does not tackle questions such as training, planning and preparation, *ad hoc* research, and dissemination, which all emerged in the cases. Many issues are not addressed in socioterminology and it is primarily focused on redefining terminology research methods (Bhreathnach 2011: 176).

Then she turns to “a sociolinguistic approach” and refers to its merits:

Seeing terminology as an aspect of language planning, and the importance of close links to other aspects of language planning ...

.

Close connection with language users in planning and in research/standardization work,

The importance of social aspects of term use ... (Bhreathnach 2011: 176).

She does not clarify in which way a sociolinguistic approach answers questions concerned with training, planning etc. which socioterminology approach fails to do. Bhreathnach's statements contradict each other. She believes that socioterminology emphasizes "terminology management as an aspect of language planning." (p. 5), on the one hand, and states that a sociolinguistic approach "Seeing terminology as an aspect of language planning", on the other hand.

Although the researcher focuses on sociolinguistic approach, her model does not show how it is connected with socio-economic political factors. Without considering that the object is a sociocomplex system influenced by non-linear relationships, Bhreathnach's Diagram (p. 142) represents a close system. She also counts "providing high-quality resources to the language user, and ensuring as far as possible that those resources are used." (p. 173) as two main features of a sociolinguistic approach but it is apparent that both of them are the goals of any terminological activity.

Discussion about the model

Bhreathnach presents "the best-practice model" for term planning in Table 8 (pp. 135-139). The simple difference between the model from literature and "the best practice model" is that the latter goes into details and provides some measures. But their principles (eight headings) are the same. The model is a series of do's and don'ts, a list of measures, sometimes expressed in imperative verbs (see below). She accepts that her model is similar to "Bowman *et al.*

(1997), which is a list of ‘Do’s and Don’ts of Terminology Management’ ... and Suonuuti (2001), which also gives a list of ‘Do’s and Don’ts’.” (p. 140)

As it is clear most parts of her model are related to implementation: a long list of instructions. Ignoring a world of difference among sociolinguistic situations and a broad range of conflicting forces at work, she falls into a trap of general prescriptions, e.g. a list of orders for dissemination without considering different demographics (measures such as 50: Develop a media contact network. 52: Have a communications department and a communications plan.) and technological development (like 41: Disseminate term resources online; make everything available online. 43: Monitor the user experience. 48: Develop resources for online publication first.) A list of suggestions such as disseminating online, in a printed format or using brochure and media can continue because they are context-bound strategies. It holds true in the case of necessary qualifications people involved in terminology planning should acquire, owing to very different sociolinguistic variables.

Therefore, modeling a sociolinguistic system is completely different from guidelines of how to use a device, e.g. an electrical apparatus, which requires ‘first do this and then do that’ in a linear way. When the model prescribes a list of orders, serious problems come up. Some of them are discussed below:

Issuing a decree

The following measures in the form of imperative verbs are axiomatic (bolds below are mine):

*Measure 7: **Have** a reliable funding source (p. 146);*

*Measure 41: **Disseminate** term resources online; **make** everything available online (p. 157);*

*Measure 26: **Set up** a project team [for a project based research] (p. 152);*

*Measure 42: **Make** the resource *easy* to use (p. 158);*

*Measure 45: **Keep** resources dynamic and modern (p. 158);*

*Measure 53: **Identify** target groups (p. 162);*

*Measure 63: **Evaluate** dissemination and implantation (p. 166).*

When the author uses “if”, it means that it is not a general fact but a context-dependent rule. For example:

*Measure 8: **Supplement** funding, **if** necessary, with charges and sponsorship (p. 146);*

*Measure 34: **Create** new terms **if** necessary (p. 154);*

*Measure 49: **Publish** paper dictionaries **if** necessary and **if** resources allow;*

*Measure 30: **Use** a database to organise the work, **if** practicable.*

She gives further details:

*Measure 58: Attend conferences and **publish** research* (p. 164);

*Measure 19: **Publish** responses promptly;*

Measure 20: Use an enquiry form;

*Measure 21: **Refer** general language queries to a separate service* (p. 150).

She continues that “In this sociolinguistic model, term implantation is the major goal of term planning work.” (p. 166) But is there any organization or terminology planning activity which does not want its terms to be implanted? The researcher gives a long list of many kinds of evaluation (p. 164-167) and of training (p. 167-171) again in imperative verbs and sometimes redundant information.

Implications for theory

Bhreathnach simply emphasizes the needs of research in different aspects of terminology planning:

... much more needs to be written about what factors favour term implantation among user communities, and how term resources can best be presented, disseminated and advertised. More research in this field would be extremely beneficial to term planning work. The use of online term resources, and how to measure aspects of this, is also an area for research (Bhreathnach 2011: 177).

But it is not clear how this thesis is useful for theorizing.

Limitations of the thesis

Although Bhreathnach believes “the model is designed to be very general, and none of the recommendations is language- or culture-specific.” (p. 179), many of measures, as mentioned above, refer to details which are specific for certain linguistic communities such as “if necessary” (measure 8), “if necessary and if resources allow” (measure 49) and “if practicable” (measure 30). In spite of her acceptance that “The findings of the research are ... rather limited, and assumptions are made for the purposes of the model ... are not valid in all term planning situations.” (p. 179), the author claims that the criterion for “a good term planning organisation” is to “cover all of the aspects above [measures], and not just some of them.” (p. 173).

Recommendations for further research

There is no new idea in her recommendations opening new avenues: “Research into aspects of term planning”, “Comparison with best practice in related fields” (p. 180) and “Testing of the model” (p. 181).

As a conclusion, Bhreathnach’s model includes the same eight stages, very similar to Auger's (1986), extracted from literature, except that she believes that implantation is not an active stage. The only difference is that she goes into details and gives some instructions/guidelines as measures.

2.6 A comprehensive summary

The above discussed researches have viewed the issue of terminology planning from various perspectives, ranging from focusing on a specific sociolinguistic context to dealing with the problem as a whole, both by stressing the possibility of generalization, and removed some barriers from the road by introducing concepts such as *systems approach* and putting emphasis on linguistic awareness. But none of them provides terminology planners with a coherent framework. Chapter 3 presents Linguistics of science as a theoretical base. What this thesis wants to add to the previous works reflected in the research questions (see Section 1.5), especially ones in regard with (universal or restricted) principles and parameters and theorizing.

Chapter 3: Theoretical framework

This chapter considers a theoretical framework in which the language of science planning is composed of two components (see Webb 2002): language of science, with a linguistic nature, plus planning, with a management nature. Attaching importance to the latter, Halliday (2003: 142) believes “The greater part of language planning activity is institutional rather than systemic: that is to say, it has to do with planning not the forms of a language but the relationship between a language and those who use it.” (see Jernudd and Das Gupta 1971)

Diagram 3.1 is an outline of the theoretical configuration of the language of science planning which at the first level formed by language of science and planning and, at the second level, by linguistics of science and planning theory as theoretical bases for the previous components respectively.

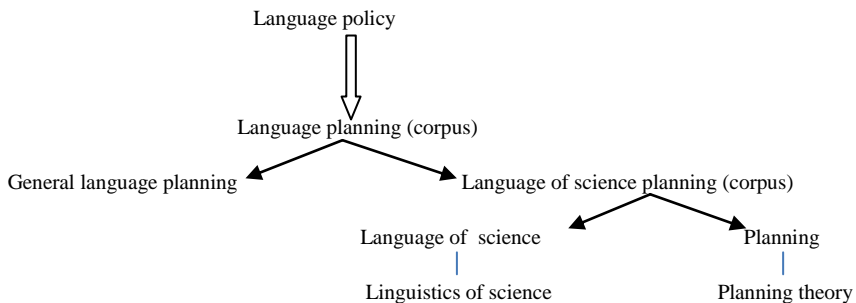


Diagram 3.1: Theoretical configuration

The thesis goes into details about the items of Diagram 3.1 in the following sections.

3.1 Language policy¹¹

In this part, language policy as the first step, represented by Diagram 3.1, will be discussed. Spolsky and Shohamy (2000: 3) provide language policy forms as “clear-cut, labeled statements in official documents” or “a clause in a national constitution, a language law, a cabinet document, or an administrative regulation”. The authors, illustrating France and Australia as countries with written language policies, give an example of a policy statement: “A specified group ... should use/acquire/have the ability to read/speak/write/understand a specific variety ... of L for at least one defined role or function” (p. 9). A language policy receives its raw material from linguistic and non-linguistic factors (see Diagram 3.2).

A policy is a decision, made by the sources of power at any levels, i.e. national, organizational or even family level, seeking to fulfil an aim. But how can the aim be furthered without establishing some procedures? Sociolinguists are not in a position to make law, although they could be considered as advisers. But where, when and how do they play their own roles? After deciding about, for instance, why a language should, or even should not, be an official language (policy), this is linguistic actors’ turn to assume their roles in *how* (planning).

11. For the history of the language policy see: Jernudd, Björn and Jiří Nekvapil. 2012. “History of the field: a sketch”. In Bernard Spolsky (ed.) *The Cambridge Handbook of Language Policy*, 16-36. Cambridge University Press.

3.2 Language planning

A seminal document in the field of terminology, *Guidelines for Terminology Policies* (henceforth referred to as *GTP*), defines language planning as an activity including “terminology and lexicography, terminology management, translation and translation management, and increasingly, corpus-based approaches (term extraction, corpus analysis for spotting neologisms coined in discourse communities, etc.).” (p. 34)

Language planning is generally regarded as *status*, *corpus*, *acquisition* and *diffusion* planning. Status planning, in Fishman’s words:

... encompasses governmental policy decisions concerning which language should be assigned or recognized for which purposes within a country or region, as well as the various implementation (enforcing, motivating, influencing) steps taken to support the policy that has been adopted (Fishman 1977b: 36).

A key point about the role of status planning is clarified by Jernudd (1993: 139) that “It is not that the French in Québec do have French – it is economic power and jobs that they do not have.” It means that this kind of planning is not for providing French-speakers with their language rather it is for promoting the position of their language and, consequently, their social development.

Spolsky and Lambert (2006), referring to Kloss (1969) making a distinction between status and corpus planning, define them as “the determination of the status and functions of a language in a community (such as ‘official’ or ‘national’)” and “the specification

of the proper form a particular language should take (such as writing system or spelling or approved lexicon or grammar)’’ respectively (p. 563). Gadelii (1999: 5) believes that Bamgbose (1991) “largely but not completely equates’’ status planning “‘with activities having to do with language policy’’ and corpus planning with ‘implementation’’. Status planning may be even in the form of language law (Spolsky and Shohamy 2000). Owing to this, an arrow, in Diagram 3.2, is drawn from *status planning* to *language policy* to show this planning can be a kind of policy.

As an example of status and corpus planning at a supranational level, it is worth mentioning the European Union whose implicit language policy is based on multilingualism and equality. The status planning at the European Union, according to Fischer (2010), means “to give an additional EU [European Union] status to the language(s) officially recognized at a national level.’’ (p. 23) and corpus planning is an activity for forming equivalents in all official languages.

In addition to status and corpus planning, two other kinds of planning have been introduced: acquisition and diffusion planning. Spolsky and Lambert (2006), referring to Cooper (1989) adding *acquisition planning* to the set of planning, define it as “the determination of which languages should be taught to those who do not speak them and how.’’ (p. 563) Furthermore, Spolsky and Shohamy (2000) introduce *diffusion planning* as a subcategory of acquisition planning for how to diffuse “a language beyond national boundaries’’ (p. 10).

On how the above mentioned concepts are interacting with each other, Fishman emphasizes the bilateral relationship between corpus planning and status planning:

Status planning without adequate corpus follow-up results in an inability to put the target language to use. Corpus planning without adequate status implementation becomes an empty, socially meaningless linguistic game. Nevertheless, status planning seemed to me to provide the social momentum and support that made the entire interaction between status planning and corpus planning possible and elicited whatever ensuing ‘corpus catch-up’ might come to pass. It is far better, and safer, that the corpus catch up with status advances, I thought to myself, than vice-versa (Fishman 2000: 44).

Regarding the relationship between corpus and acquisition planning with status planning, Spolsky and Lambert (2006: 563) spell out that “Making a language variety official usually involves standardizing it, writing it down, and modernizing it. It also requires teaching it to citizens who do not know it.” The results of corpus planning, e.g. from terminological activities, will be of tremendous help not only in status planning, to promote a language to an official position (Hermans 1991; Lasimbang and Kinajil 2004) but also in acquisition planning in teaching material. Diagram 3.2 represents core concepts in language policy and how they are related to each other.

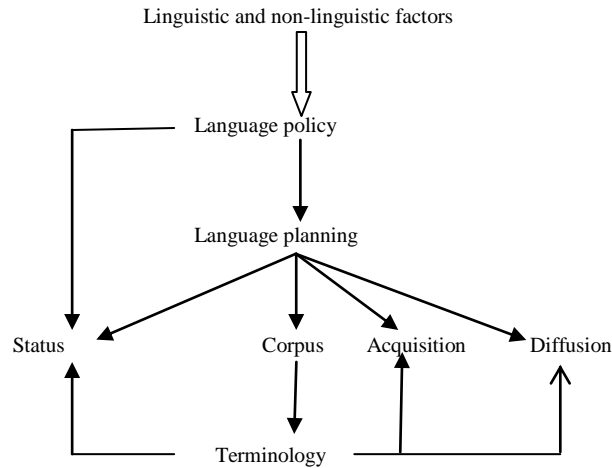


Diagram 3.2: Core concepts in language policy

3.3 Historical evolution of language planning theories

In this part, the thesis is going to analyze how language planning perspectives have evolved throughout history. For instance, Geeraerts (2003) describes rational and romantic models of language planning during 18th, 19th and 20th centuries and the tension between them (Figure 2, p. 55). Generally, the rationalist model, considering its linguistic-philosophical basis, focuses on language as a medium of communication and, about conception of standardization, considers standard language as a neutral medium of social participation. The model also treats language variation as an impediment to emancipation. However, the romantic model, in its linguistic-philosophical basis, believes that language is a medium of expression and standard language is a medium of social exclusion and language variation expresses different identities. The main point here is that how linguistic views (language as a medium of communication or expression) determine planning models.

The previous century witnessed multiple language planning activities. Ricento (2000) explains a study covering language policy and planning from the end of World War II until 2000, based on three factors which the author found from analyzing the language policy and planning literature as “instrumental in shaping the field, that is, in influencing the kinds of questions asked, methodologies adopted, and goals aspired to.” Then he divides them into three headings: “(1) the macro sociopolitical, (2) the epistemological, and (3) the strategic.” (p. 196) These three effective factors during 1960s, 1970s and 1980s, and from the mid-1980s until 2000 are summarized in Table 3.1.

	Macro sociopolitical level	Epistemological level	Strategic level
1960s	Decolonization and state formation	Structuralism	Pragmatism: solution of language problems through language planning, especially within the public sector
1970s and 1980s	Neo-colonialism (failure of modernization)	Critical sociolinguistics (the continuing challenge to autonomous linguistics)	The role of attitudes and beliefs of speakers and speech communities, as well as macro economic and political forces in linguistic behavior
Mid-1980s until today (2000)	The new world order: devolution of the Soviet Union, evolution of national identities in Eastern and Western Europe, penetration of Western culture and technology in the developing world	Postmodernism: language ecology and linguistic human rights	Preservation and revitalization of threatened languages and cultures

Table 3.1: Effective factors in LPP from WW II to 2000

The rising trend towards 1970s and 1980s is that language planning is not complete without an analysis revealing attitudes and economic-political forces as shown in Diagram 3.1. As a whole,

from 1960s until 2000, sociopolitical and philosophical changes have devised new strategies. For instance, the concept of *ecology*¹² was transferred to linguistics by Haugen in 1970. He ([1972] 2001: 57 cited by Fill 2007: 180) defines language ecology as “the study of interactions between any given language and its environment”. This new approach has exerted impacts on language planning in recent decades. As an example, Kaplan and Baldauf (1997) look at language planning in the frame of an ecosystem and 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).” (p. 321) In such a system, the ecological status planning aims at “achieving equitable status for a maximum number of diverse languages” and “ecological corpus planning will be concerned not so much with standardisation as with reflecting critically on the ways in which existing linguistic structures may distort perception of ecological processes.” (Mühlhäusler 2000: 331)

In the 1980s, as stated by Antia (2000), two language planning schools, rational and alternative models, emerged. Jernudd and Das Gupta (1971: 196) describe the first model: “The broadest authorization for planning is obtained from the politicians. A body of experts is then specially delegated the task of preparing a plan”. And the second one, explained by Antia (2000: 3), “takes issue with the rigid requirement of governmental sanctioning for all other aspects of language planning. It also quarrels with the expectation that the only level from which authorisation can be derived is *per*

12. For the language and ecology see: <http://www.ecoling.net/#>

force the central or federal government.” But the point both models share is that “the choice of a national/official language is properly a government decision” (p. 3). Alexander (1992: 145 quoted in Kamwendo 2005: 163) states that the ideal model “excludes all considerations of non-governmental agencies such as media houses, cultural societies, private business, and publishers from the realm of language planning”. It seems the ideal model is mainly concerned with centralization for granting authorization and the alternative models with decentralization and it is that marks their difference.

Another conception in the field of language planning brought into being by Jernudd and Neustupny¹³ in 1987 is “language management” (see Spolsky 2009 about language management; Jernudd 2010, a review of Spolsky 2009). Language management, as Jernudd (1993: 133) describes, “seeks to explain how language problems arise in the course of people’s use of language, that is, in discourse, in contrast with approaches under Fishman’s definition of language planning which takes decision-makers’, for example governments’, specification of language problems as their axiomatic point of departure.” The author gives an example that “Hebrew language managers were found to be successful in terminology expansion to the extent that they in fact responded to professions’ noting of terminological inadequacies.” (p. 134) A bottom-up

13. For “language management” see: Jernudd, B.H. and J.V. Neustupný.1987. “Language planning: for whom?” In L. Laforge (ed.), *Proceedings of the International Colloquium on Language Planning*. Québec: Les Press de L’Université Laval, 69-84.

approach suggested by Webb (2002), very similar to language management, is that "... the interests of the general public have to be served, and not just the interests of government." (pp. 42-43)

Categorization of language management into simple and organized management is done by Hübschmannová and Neustupný:

Simple management is management of language directly in discourse, while organized management means that more than one discourse is involved: there are several or many participants who share the management process, they have recourse to their previous knowledge, beliefs and attitudes, and communicate about the process. A typical example of organised management is a language policy of the state (Hübschmannová and Neustupný 2004: 91).

Jernudd and Nekvapil raise the possibility of connection between organized and simple management. Then they continue that some organizations

solve problems that have been brought to their notice as originating as inadequacies that were noted and evaluated by speakers in specific interactions; and after consultations and with the help of adequate measures, it recommends solutions that remove the speakers' problems or suits their needs in the case of gratification (Jernudd and Nekvapil 2012: 34-35).

Although the researchers refer to TNC, an organization concerned with Swedish terminology, as a language agency which has combined the two management approaches, they believe that this

kind of connection “is usually far from being the case in practice” (p. 35).

To sum up, reviewing how language planning theories have evolved over centuries, by changing the attitude towards *language*, from rationalism to romanticism, acknowledging non-linguistic environment (physical and socio-economic and political factors) and its interaction with language and, as a result, taking discourse problems from real contexts, indicates an upward trend in opening up a broader sphere of activity, i.e. ecolinguistic situation, in a systemic view. That is to say a move has started to a more realistic view.

3.4 Language of science planning

A brief history of policy for science and technology is introduced by Kaplan and Baldauf (1997) and Martel (2001). About emerging the language policy for sciences in Quebec, Martel explains that “... in 1969, the three French universities ... presented a brief to the Federal Senatorial Committee for Scientific Policy arguing that francophone universities were disadvantaged in obtaining research grants because they were not sufficiently developed to compete with anglophone universities. The Federal government allowed extra funds.” (p. 40) If the government did not allocate such a grant, lots of researches might have not been done or have been delayed. It shows how a linguistic factor could act as a barrier to scientific progress. It was not until 1981 when the *Conseil de la langue française* “began its reflections on the topic of the language of

science and technology through an international seminar and with publications called *Avis* (Advice) in order to guide government policy.” (Martel 2001: 42) Then the author continues that “Although policies on technology and science had not generally been concerned with language, the 1998 policy on the information highway, *Agir autrement*, is a notable exception perhaps because times have changed and the 1979 *Chartre* could not, nearly twenty years ago, foresee the importance of new technologies.” (p. 48) However, in Ireland as Walsh (2006: 142) states “language planning and socio-economic development policies have been pursued in complete isolation from each other.” Then he gives two examples of these development documents “the *National Spatial Strategy* and the *National Development Plan*”.

Martel (2001) suggests a “heuristic framework” (Figure 1, p. 34), in fact, representing variables influencing a language of science policy categorized into two groups: agents and sociopolitical and linguistic factors. Then she presents them in two axes: the first one is devoted to the subjects (the actors and the recipients of language policies) and the second is for the objects which are “four intertwining and inter-influencing spheres, from macro (context) to *meso*, or intermediary, levels of considerations (linguistic ideology, types of knowledge, states of scientific activity).” (p. 35)

Then the author tests the heuristic framework in the case of Quebec “to see if it can accommodate the description of situations.” (p. 37) After describing Quebec situation by observing this framework, the researcher chooses publications as an indicator to know to what

extent French, as a language of science and technology, is developed in Quebec. Analyzing statistics, she finally arrives at this conclusion that “French is not gaining grounds as the language of science and technology in Quebec, if we can judge from an indicator like publications.” (p. 52)

The language of science and technology policies and planning is a double-aspect problem. From one side, native languages should be promoted for research presentation. Teubert (2000: 19) believes that “French research and development will only be taken seriously internationally as long as it manifests and presents itself as genuine French research, in its independence, first and foremost linguistically, via texts written in French.” From another point of view, publishing research results in an international scale (in a foreign language, e.g. English) is a countervailing force leading to the creation of new concepts/terms in that language (e.g. English) which helps the language become more elaborated (see Sager and Nkwenti-Azeh 1989). In De Swaan's words (1998b: 113) “...one can become a small fish in a big pond, remaining all the while a big fish in a small pond.” Therefore, a language of science policy has to be formulated in such a way to keep a balance between promoting native languages and taking part in the international scientific communication (see Ammon 2006 for language planning for international scientific communication).

Language of science planning has two parts: *language of science* and *planning* (see Diagram 3.1). The former will be discussed under *Linguistics of science* and the latter under Planning theory as their

theoretical constructs. The next section is devoted to go into details about the left wing of the language of science planning: Linguistics of science.

3.4.1 Linguistics of science

Science has been studied as an object from different angles: history and philosophy, sociology, anthropology, psychology, and the relationship between literature and science¹⁴. But working on science from a linguistic view started in the 1920s-1930s by the Prague school (Gotti 2005). Nekvapil (2006: 2223) argues that for the authors from the Prague school “a special language should not be identified with” terminology but “the special-purpose discourse and texts should be investigated as a whole” However, this approach, as the author explains, “was not until about 1970”. Nowadays the language of science studies have been undertaken in centers such as Centro di Ricerca sui Linguaggi Specialistici (CERLIS) and Centre de recherches sur les discours ordinaires et spécialisés (Cediscor) in Italy and France respectively.

Linguistics and its related disciplines such as terminology, specialized discourse analysis and Languages for Special Purposes (LSP) have dealt with the language of science to such an extent that works such as *Reading Science*, *Writing Science* and *Talking Science*, (bold is mine) have been published, all concerned with

14. For the relationship between literature and science see: British Society for Literature and Science, Journal of Literature and Science and the 4th annual conference of the Australasian Association for Literature, University of New South Wales, Sydney, Australia, 5-6 July 2010.

language skills¹⁵. Even some of the topics in the philosophy of biology come within linguistic area, for instance “How might our biological understandings of race, sexuality, and gender reflect social values? How do medical doctors explain disease?”¹⁶

Making a distinction between the language of science and languages for special purposes (LSP), Carli and Calaresu argue:

If, for instance, scientific language is treated only as a professional jargon this implies: a) that there are no particular ontological differences in *status* between the specialized language of a biologist and the equally specialized language of a stockbroker; and b) that the group of its users/scholars is restricted only to those who have a specific working interest in it (scientists, science students, teachers of scientific subjects, translators and specialized journalists). ... It [scientific language] is indeed the language of “complex thought” which reconstructs experience and constructs knowledge ... (Carli and Calaresu 2007: 530).

In Halliday’s words, science and language are two sides of the same coin:

Major studies such as Bazerman's (1988) *Shaping Written Knowledge*, on the one hand, and Lemke's (1990a) *Talking Science: Language, Learning, and Values* on the other, have shown, with reference to English, the extent to which science is scientific discourse; instead of the old notion that science is a set

15. If learning a science means learning its language, it is needed to consider how to listen to this language, as a language skill. Thus *Listening Science* can be a potential area.

16. http://en.wikipedia.org/wiki/Philosophy_of_biology (Accessed 6/4/2014)

of ideas, a body of theory that has to be communicated in language but somehow exists independently of language, it is recognized that a scientific theory is itself a linguistic (or at least a semiotic) object — a 'system of related meanings', in Lemke's words (Halliday2004d: 182).

From the above discussions, the present author reached the same conclusion as Carli and Calaresu (2007: 526) did: why does not a “linguistics of science” exist? Interestingly enough, Nekvapil (2006: 2230) employs this term in another way when he states that “... by stressing the investigation of discourse, language management theory corresponds to the latest stage of the development of ‘**special-language linguistics**’ itself.” (bold is mine) In addition to science, socioeconomic issues have also been studied by linguistics as socioeconomic linguistics introduced by Joachim Grzega¹⁷.

Therefore, it appears that the time is ripe for putting aside the inverted commas from “linguistics of science” as used by Carli and Calaresu and announcing that linguistics of science, in its embryonic development, is an attempt to analyze science through its language to discover how language influences it. This new approach is a linguistic theory which could act a part like a mother discipline for the philosophy of science, psychology of science¹⁸, sociology of science and anthropology of science because the roads of analyzing science in these disciplines pass through language analysis. Although statistics on frequencies of specialized vocabularies or

17. <http://www.joachim-grzega.de/ASEcoLi/Home.html>

18. International Society for the Psychology of Science and Technology (ISPST): <http://www.ispstonline.org/>

structures in different disciplines are significant, especially important in scientific writing and pedagogy, linguistics of science is an endeavor to discover why and how science depends on language. It is trying to unravel mysteries of scientific thinking. From this aspect, activities such as rhetorics of science, text linguistics, terminology, LSP methodologies and specialized discourse analysis can come under the umbrella of linguistics of science, as a broader linguistic perspective. This approach also encompasses linguistic, social and cognitive studies on the language of science. It views language as a cognitive faculty and science as a cultural category.

To serve its functions, linguistics of science consists of two main components: theoretical and practical. The first one, regarding terminology planning, deals with how language plays a role in creating meaning and new concepts. The practical part considers terminology in a systemic way (see Section 1.3.3.1) and employs terminology argumentation¹⁹ for solving the discourse problems discovered by planning theory, a diachronic and synchronic sociolinguistic analysis.

It can be the responsibility of linguistics of science to look for answers to the following questions, among others, to show its contributions to pedagogy, knowledge management, knowledge transfer and so on:

19. *Terminological argumentation* was first used by Nematzadeh, Iranian terminologist, in Nematzadeh, S. 1999. “*estedlāl-e nahvi* (Terminological Argumentation)”, *Nāme-ye Farhangestān* (The Quarterly Journal of Iranian Academy of Persian Language and Literature). Vol. 4, No. 4 (Ser, No. 16), Winter.

-- Which role has language phylogenetically played in producing science, from the settlement period to traveling to Mars?

Explaining factors influencing our experience, Evans and Green (2006: 45) argue the embodied cognition thesis: “Having a different range of colour channels affect our experience of colour in terms of the range of the colours accessible to us along the colour spectrum. Some organisms can see in the infrared range, like rattlesnakes, which hunt prey at night Humans are unable to see in this range.” Another factor in their words is “the nature of our physical environment with which we interact.” (p. 45) Then they give an example that fish “experience very little gravity, because water reduces its effect.” (p. 45)

Among those factors, human physical structure is, more or less, the same over the world. But there are various types of physical environment influencing speakers' construal of the world. Apart from the embodiment and ecological factors, linguistics of science relies on cultural thinking/unphysical environment as a core stone on which cognition develops. It is a distillation of what has historically happened to a given linguistic community with regard to social, political, economic and religious conditions impacting upon conceptualization and categorization. Physical conditions (body), the world (physical environment), mind (unphysical/cultural environment) and language (a meaning-making system) are interacting with each other to produce knowledge.

A reciprocal relationship exists between cultural thinking and conceptualization and categorization; the latter is under the

influence of a certain condition of the former. Then the resultant conceptualization and categorization act again as a cluster of terms to form a cultural atmosphere where the people live; it is a vicious circle. However, how can an escape route be made from this circle?

Scientific revolutions spring from new panoramic view, represented in paradigm shifts and conceptual systems. On the interrelationship among man, his mind, reality and language, a tricky question is that whether language **determines** thought or **helps** human beings to construe the world in conceptualizing *time, space* ... in a variety of linguistic structures? If language does it by itself, the next question comes to mind is that is there anything, for example, in nature of Australian indigenous languages, e.g. in their grammar (see Lera Borosdtky's works²⁰), forcing their speakers to picture the world in this or that way? When a term such as *insecticide* is created, is it a pure linguistic issue or it comes from cultural thinking reflected in language? Consequently, it appears that the only solution for getting rid of the vicious circle is to change glasses as the West changed its view on *human being, world* and so on. For this reason, understanding the mechanism of cultural thinking to know how it **helps** a given language construe the world should be given precedence over understanding scientific thinking.

-- How does the language of science ontogenetically develop?

-- Do general and literary language development precede language of science development? (see Cabré 1995; Cabré 1998/1999 on how general and special languages are related to each other). Carli and

20. <http://www-psych.stanford.edu/~lera/>

Calaresu (2007: 530), referring to Altieri Biagi (1990: 192–193), argue that the language of science “should be defined in a balanced three-way relationship with common language on the one hand, and literary language on the other” Lauren (2007: 294) states that “The hypothesis that the literary text has played a primary role in relation to LSP texts - or should we rather say the scientific text - seems highly credible.” (see Lauren 2007 on comparison between non-linear Persian and Arabic poetry and linear Western thinking)

-- How literary concepts/thinking is different from scientific concepts/thinking? Although, for instance, Persian speakers have created and developed the world-known literary works, they have not played a leading role in science development, especially in the modern period. If only language shapes thought, why it did not work in scientific progress direction.

-- How can folk knowledge from the endangered or lesser-used languages be connected to modern conceptual systems? For example, Rousseau (1993: 40) believes that “In Québec we must continue our past tradition of assigning French terms to North American realities, especially in fields such as law, institutions, social life, technology and natural sciences.”

-- How can teaching technologies and techniques be created or improved in teaching science based on linguistic analyses?

-- Do linguistic restrictions act as a barrier for creating scientific concepts? If so, can they be removed by “genetically-modified” terms and constructions?

Some questions arising in terminology theory as Budin (2003) refers to can be put forward in linguistics of science as well:

“What is knowledge and how do we represent it in communication?

What is the role of language in epistemic progress and in the development of scientific knowledge?

What is the structure of scientific theories, of scientific knowledge and of scientific language?” (p. 72)

Considering Feist (2006) naming three stages (Isolation, Identification and Institutionalization) to explain the development of the disciplines such as philosophy, sociology and psychology of science and reviewing the history of the language of science studies, it can be concluded that, although linguistics of science seems to be in the initial stage, it has potentiality to go a stage further (Identification).

The two following sections deal with the application of linguistics of science in terminology planning and grammar planning (new grammatical patterns)²¹.

21. For other aspects of the language of science see: Baumann, Klaus-Dieter. 2009. “Specialist thinking strategies in LSP communication of the natural and technical sciences”. In Heine Carmen and Jan Engberg (eds.) *Reconceptualizing LSP*. Online proceedings of the XVII European LSP symposium 2009. Available online at:

<http://bcom.au.dk/research/publications/conferencepublications/extendedcontributions>

3.4.1.1 Application of linguistics of science in terminology planning

The story of terminology “theories” (see Cabre 1999; Temmerman 2000; Myking 2001; Picht 2007; *Journal of Terminology Science and Research* 2001, 12 (1-2), 2002, 13 (1-2), 2003, 14, 2004, 15) is an indication that there has been an attempt to study terminology from different views. Among them, Wüster has been sharply criticized, especially by Temmerman (2000). Myking (2001: 55-56) categorizes the critics of Wüsterian approach into three groups: “Moderate and ‘loyal’”, “Radical and ‘subversive’” and “Radical and ‘loyal’” (see Picht 2003).

Wüster's aim, in Cabré's words (1998/1999: 17), was to overcome “the problems of professional communication caused by the lack of precision, variation and polysemy of natural language.” The main point is to see to what extent his approach has satisfied his claim about unambiguous international communication rather than know whether it has been successful in something which is not included in his goals. Wüster did not claim that variation can be completely removed from language. He ²² (1985) accepts that “it is impossible to entirely suppress synonyms with differences of conceptual form”, e.g. de *Kochsalz* ‘table salt’ and *Natriumchlorid* ‘sodium chloride’ (p. 118). And also he states “in many cases, there is no exact correspondence between the concepts, because national systems of concepts indeed differ” (p. 129). Wüster does not reject

22. *Introduction to the General Theory of Terminology and Terminological Lexicography*, Eugen Wüster, 1985 (an English translation).

the effects of social and cultural factors like Chomsky, but they put these factors aside from their studies.

In spite of terminology approaches such as General Terminology Theory (GTT) by Wüster, Socioterminology (see Guespin 1990; Tkacheva 2004), Sociocognitive terminology by Temmerman (2000) and Communicative Theory by Cabré (2000) enumerated in the literature, some terminologists believe that terminology theories have not been evidenced by the history of terminology (see also Antia 2001; Laurén and Picht 2006; Pilke and Toft 2006). As an example, Budin, referring to Laurén and Picht (1993), explains their conclusion:

the theories and schools compared (the so-called Vienna school...the so-called Soviet school and the so-called Prague school, and several other research traditions such as Canada, Germany, Scandinavia...) have much more in common than commonly assumed ... and that the differences lie in different priorities and research interests (Budin 2001: 17).

Budin also assesses the quality of terminology approaches:

Applying the criteria from philosophy of science as they are usually accepted in scientific communities, all terminology theories we know of are on a relatively low level of theoreticity, usually introducing several hardly corroborated axiomatic assumptions and some descriptions of terminological phenomena (Budin 2001: 19).

Improving the theoretical base, by taking multidimensional nature of terminology into account, Cabré (1998/1999: 12) states that “a

number of integrated and complementary theories are required which deal with the different facets of terms.” But at the beginning of 2000s, she suggests:

only a cognitive and functional linguistic theory, i.e. a theory which, besides grammar, includes both semantics and pragmatics, is capable of describing the specificity of terminological units and, at the same time, their common elements with general lexical units. Besides, pragmatics is essential for explaining the activation of the terminological meaning of lexical units (Cabre 2003: 190).

From a philosophical point of view, Budin (2003: 76) looks at the issue: “The global nature of science will facilitate the emergence of a transcultural and global philosophy of terminology that is to able to integrate diverse theoretical elements, epistemological positions, and cultural traditions.” (see also Budin 2006 on how the history of the philosophy in German communities has affected terminology studies). Accepting this premise that a single theory can be formed dealing with different aspects of terminological units, the thesis in the next step lays its foundation.

Linguistics of science can be considered as a progress in this direction and terminology in this field can correspond with Alexeeva’s opinion:

In our view, modern terminology has taken a philosophical turn since its aims have been replaced by the questions of the relationship among mind, language and knowledge. ..., the object of terminology has been changed in such a way that it has become orientated to man, who is considered to be the creator of terms.

The theory of the term has also changed – **terminology comes close to a philosophical view of its role in the process of world cognition** (bold is mine.). Terminology starts to concern itself with such questions as *in what way is man connected with the world, how does he feel the reality of science?* Formal and logical aspects of terminology are gradually substituted by theoretical and cognitive ones (Alexeeva 2003: 65).

Linguistics of science views terms as components of the language of science, a larger framework. For this reason, it is the language of science that should be planned then its ingredients, including terminologies, are covered in relation with each other. In this approach, all aspects of the language of science such as linguistic, social and cognitive ones are taken into account. Since any scientific theory emerges and develops in the form of its terms and language grammar, language and science can be seen as form and content respectively. Therefore, from the linguistic level, linguistics of science analyzes terminologies within their linguistic contexts to understand what is occurring in scientific thinking. Even generative grammar can be used to learn how our minds move from the deep structure of *something which is not damaged by being heated* to arrive at the surface structure of *heath resistance*. This approach also keeps half an eye on socio-cultural context affecting terminology. Regarding the social discourse, Jernudd (1994: 72) argues that terminology problems “‘arise at least when individuals note deviations from expectation (the norm) of the well-formedness of a term ... of the relation between term and concept” The author mentions that some of these problems can be seen in the

questions the users ask. Cognitive dimension deals with the role of language (terminologies), as a cognitive faculty influenced by cultural atmosphere, in creating, evolving, learning and teaching science.

As a result, terminology planning under linguistics of science means analysis of the language of science at the level of terminology (product) to find out term creation mechanism in the human mind (process) by taking account of the intended audiences' (consumers) demands.

Linguistics of science regards lexical components of science from different lenses not only in theory but also in practice because sometimes in terminology argumentation (see Section 4.2.2) all of analyses are simultaneously needed and should be at terminologists' disposal.

Costa illustrates the point:

If the morphological, syntactic and lexical analysis of a terminological unit is a matter of linguistics, and knowledge organization is rather a matter of 'conceptology', then it seems to me that terminologists can gain the most if they become aware of this double facet, which they activate along the different moments of the development of their projects. This is the reason why, within my research group, we are not loyal to one single methodology or to a single theory; we appropriate them according to our objectives and according to the target public (Costa 2006: 84).

Terminology planning encounters a multidimensional object (term) which requires a multidisciplinary assessment. The horizontal and vertical rows in Table 3.2 represent different dimensions of terminology and different approaches respectively. For each analysis, for example morphological forms from cognitive approach, a group of variables such as users' degree of specialty (super specialist, specialist, semispecialist...), variation and so on have to be considered.

	Morphology	Semantics	Syntax	Discourse	Orthography
Functional approach					
Cognitive approach					
Sociological approach					

Table 3.2: A multi-faceted terminological analysis

The next section suggests a new line of research on grammatical aspect of the language of science to see the language of science planning can produce “genetically-modified patterns” for creating new meanings although it is beyond the scope of the thesis.

3.4.1.2 Application of linguistics of science in grammar planning (new grammatical patterns)

The language of science consists mainly of two entities: terminology and grammar. The former represents the gist of human knowledge and the latter is employed to create new meanings and they are interacting with each other through lexicogrammar.

One dimension of the relationship between science and language is that the latter is under the influence of the nature of the former. Sager and Nkwenti-Azeh (1989) provide examples from chemistry, biology and medicine:

The subject itself decides which method is most appropriate. Chemistry requires means for co-ordination of items of equal rank but different internal structure into new units which themselves become equal parts of larger units e.g. *pottasium hydrogen sulphate*. In biology the binomial code permits the expression of generic relationships. In medicine there is a need to relate states, conditions or operations to causes or parts of the body; this is done by determination e.g. *angina pectoris*, or affixation e.g. appendectomy (Sager and Nkwenti-Azeh 1989: 11).

In other words, *what to say* determines *how to say*. Halliday (2003) believes that “The grammar in its more hidden aspects was not planned; we can be virtually certain that neither Newton nor Galileo before him were at all aware of the important grammatical developments that characterized their work.” (p. 158) It does not matter whether they were aware or unaware of the role of grammar but the only thing that matters is that what they wanted to claim or put forward naturally directed how to say it; it was done unconsciously. Considering the role of language planners, in Halliday’s words, that “They are creating an active force which will play its part in shaping people’s consciousness and influencing the directions of social change.” (p. 161), the point the thesis is trying to draw attentions to is that whether a conscious effort in the area of grammar management can result in creating new meanings patterns,

a kind of genetically-modified meaning creation? Halliday also counts four periods (settlement, iron age, renaissance and information age) in human history having their own linguistic features. Now the question is have linguistic constructions just lagged behind these historical events or have they had any role in their occurrences?

Clarifying the role of grammar, Halliday explains that “It is grammar - but now in the sense of lexicogrammar, ... - that shapes experience and transforms our perceptions into meanings.” (p. 145) He believes that “the inner layers of the grammar” cannot be planned because “there is an inherent antipathy between grammar and design.” (p. 167) Then the author continues that “Although language is an evolved system, not a designed system, it may become necessary to manage it at certain times and places in history.” (p. 167) For this reason, he argues that:

we have to learn to educate five billion children ... - as such a time it is as well to reflect on how language construes the world. **We** cannot transform language; it is people’s act of meaning that do that. But we can observe these acts of meaning as they happen around us, and try to chart the currents and patterns of change (Halliday 2003: 171).

He also believes that “we have to theorize about how language constructs reality: how language evolved as the resource whereby human beings construe experience.” (p. 168) In his opinion problems such as “destruction of species and pollution” are not only problems “for biologists and physicists” but also for “the applied

linguistic community” (p. 172). Therefore, linguistics of science concentrating the linguistic bases of science, i.e. how language makes science possible (see Carruthers et al 2002 for the cognitive bases of science), can try to discover whether grammar can be planned.

3.4.2 Planning theory: a diachronic and synchronic sociolinguistic analysis

The right wing of Diagram 3.1, planning theory, is prioritized by a diachronic and synchronic sociolinguistic analysis. It identifies not only insufficiencies and conflicting forces but also socio-political attitudes towards *language* (as an instrument or a cognitive faculty) and *science*. The analysis result is the driving force behind linguistics of science in a linguistic community which, in turn, determines language of science planning strategies (implementation). For instance, Ricento (2007) explains how challenging “the idea that linguistic structures in a given language are fixed properties which obey detailed algorithms at a subconscious level” (p. 214) had implications for language policy and planning such as “(1) the naming of a language is more a political claim than a scientific label for an invariant semiotic system; (2) the status of English or any other language is not inherent in the code; (3) the functions and domains of a named language vary, historically, from society to society and context to context” (p. 215)

Knowing linguistic issues is not enough by itself because at the other pole lots of socio-political factors are working. Ammon (2006: 19) believes that “Unawareness of the intricate involvement of the potential objects of language planning and language policy in social structure implies, according to Bernard Spolsky (2004: ix), the danger of ‘linguicentrism’, the hopeless attempt at changing matters of language without regard to the social conditions which have caused and continue to cause them.” The importance of social factors expressed also by Ricento (2006: 10) is that “An important claim of this book is that there is no overarching theory of LP [language policy] and planning, in large part because of the complexity of the issues which involve language in society.”

The questions Donnacha (2000) raises can be considered as factors influencing language planning success:

Should the planning be bottom up or top down?

Who should be formally responsible for the planning process?

Who should be involved in the planning?

How should formulation and implementation be linked?

What time span should be involved?

By whom and how and when should monitoring and evaluation take place? How should goals and objectives be set?

Why have so many formal language-planning processes failed?

How formalised should the process be? (Donnacha 2000: 24)

A diachronic and synchronic sociolinguistic analysis is a prerequisite which helps to find answers for the above questions by knowing:

-- **what** kinds of language ecology, economic level, technological capabilities, discourse problems (in education, industry...) there are and how a linguistic community has looked at *language* and *science*.

-- **what** linguistic features are available regarding terminology resources, discourse development and so on.

-- **what** terminology planning wants to achieve.

-- **who** are agents, their quality, ideology etc. (see Kaplan and Baldauf 1997 for who are language planners and their role), **who** are addressees and **which** agencies exist.

-- **when** (time scale) terminology planning should be done to escape unexpected events. About the importance of time component in language planning, Mühlhäusler states that:

The number of contingencies that can impact on the development of any human system is too large for management and prediction and the seeming success of policies such as the status and corpus planning for Afrikaans or Yiddish ... can be overturned by the emergence of new parameters. Equally noticeable is the increasing rate of changes in language policy; Australian language policies since the 1970s for instance have changed at a rate which is a multiple of time it would take to implement any of these. (Mühlhäusler 2000: 357)

The analysis makes conflicting forces clear and leads to know needs and aims as well.

3.4.2.1 Conflicting forces

Owing to the complex nature of social systems, before starting language planning, recognizing driving forces and calculating their effects are required. In socioterminology “the *glottopolitical* question”, as stated by Guespin (1990), means “which forces are at work managing, regulating and enforcing linguistic uses, from families to working teams, and up to national linguistics policies.” (p. 643) In practice, Kaplan and Baldauf (1997: 311, Figure 11.2) show “various forces at work in a language planning activity.” In that Figure “the largest circle represents the linguistic eco-system that is being planned for.” And from two axes, one is for “the various forces impacting on the language eco-system” and the other one is for “the agencies and organisations that impact on the system.”

Two main groups of forces are introduced below:

1) From top²³ to down

Linguistic ideology: It shows how policy makers’ attitudes towards language, generally, and their own language, particularly, shape

23. For the role of the language academies and management agencies see *Journal of Language Policy*, 2011, 10: 4.

their policy and planning. Ruiz (1984), cited by Ricento (2007), compares the “language-as-problem” with the “language-as-resource” in United States and concludes that the former leads to the use of only English, not other languages, in education and public services. But the latter can ease “tensions between majority and minority communities” and support “the role of non-English languages in society.” (p. 216) Then the author continues that the “language-as-resource” orientation “has gained popularity among academics in LPP [language policy and planning] who advocate increased funding and support for the teaching and learning of foreign languages, and especially (in the wake of the attacks of September 11, 2001) of strategically important languages, such as (standard versions of) Arabic, Pashto, Urdu, and Farsi” (pp. 216-217)

Another example of linguistic ideology, in Ricento’s words (2007: 222) is that “... the recommendation of European languages as “neutral media” to aid in national development tended to favor the economic interests of the former imperial countries at the expense of national development.”

Language and policy: Kibbee (2003) refers to two different economic policies; they are “ ‘free-market’ theory of unfettered capitalism and ‘green’ theory of ecological protection” corresponding “to two linguistic geostrategies”. The first is for “the race for ‘market share’ among the governments representing the major international languages” and the second is for “the protection

of endangered languages undertaken by linguists and by those interested in linguistic human rights.” (p. 47)

2) From below²⁴ to up

Linguistic culture: Another effective factor is linguistic culture. Schiffman (2006: 112) defines linguistic culture as “the sum totality of ideas, values, beliefs, attitudes, prejudices, myths, religious strictures, and all the other cultural "baggage" that speakers brings to their dealings with language from their culture.” An example of linguistic culture can be seen in the United States where “... we have no explicit language policy, but we have a linguistic culture that supports the use of English to the exclusion of almost all other languages, so that an explicit policy that would officialize English is not necessary, and probably never will be.” (p. 121)

Identity: The existing of nationalism in Quebec resulted in success of language policy, in contrast with Africa where nationalism did not exist (Oakes 2005).

3.4.2.2 Needs and aims

Two goals of language planning, among others, as stated by Kaplan and Baldauf (1997: 61, Table 3), are “lexical modernization” and “terminological unification”. Fishman (2000) goes into details about two broad groups of corpus planning: independence (purification,

24. For language planning from below see *Current Issues in Language Planning*, 2010, 11:2 .

Ausbau, classicization and uniqueness) and interdependence (internationalization, vernacularization, *Einbau*, regionalization). Ricento (2007), based on “a content analysis of the scholarly literature” which he did in 2000 on language policy and planning, refers to the common goals of language planning as “a desire for unification ..., a desire for modernization, a desire for communicative efficiency, or a desire for democratization” (p. 220).

Because of the importance of terminology, some language planning models, as Antia (2000: 9-10) states, have dealt with it: Haugen “as a part of elaboration” (1966), Ferguson as “a part of modernisation” (1968), Garvin as “an aspect of intellectualisation” (1973), Neustupný as “a component in Neustupný’s cultivation approach” (1970 in (1974); 1983). One of the language planning goals concerned with corpus is policy making and then implementation for the language of science.

As it is obvious a group of objectives have been followed by language/terminology planning. But they are established through a sociolinguistic discourse analysis. One example of how a non-linguistic need was satisfied by a seemingly linguistic aim is in the case of Namibia under occupation of Germany and South Africa. Cluver (1991) explains that each of these countries “needed a single official language to govern the country efficiently and to draw Namibians into their cultural and economic spheres of influence. These countries had to establish some sense of loyalty and

dependence towards them to avoid continuous uprising and dissatisfaction.” (p. 44)

3.5 Conclusion

Diagram 3.3 illustrating a short summary has two axes: planning theory (a diachronic and synchronic sociolinguistic analysis) and linguistics of science. Discourse problems identified by a diachronic and synchronic sociolinguistic analysis determine needs and aims affecting solutions from the linguistics of science axis. Finally, the results from these two axes are directed at fulfilling aims along implementation axis.

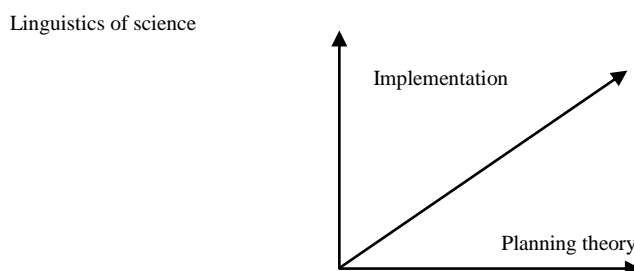


Diagram 3.3: Cooperation between linguistics of science and planning theory axes

Chapter 4: Methodology and Material

This chapter focuses on two main issues: methodology and material. Methodology deals with how the thesis progresses concerning its strategies, data collection and data organization. Material includes the data gathered from four case studies and information from around thirty linguistic communities through studying literature.

4.1 Methodology

The present research is a qualitative one by carrying out a multiple-case study and using a maximum variation sampling technique for data gathering from the following cases:

1. Termcat, for Catalan in Spain
2. Swedish Center for Terminology (henceforth TNC)
3. Délégation générale à la langue française et aux langues de France²⁵ (henceforth DGLFLF)
4. Academy of Persian Language and Literature (henceforth APLL).

The researcher is concerned with the APLL because of the experience he has from working there and also it is a non-European academy. The others were selected because of the reputation they have acquired and they were readily accessible. It is a comparative method for extracting striking similarities (principles) and detecting differences (parameters).

25. The general delegation for the French language and the languages of France

A multiple-case study leads to semi-structured interview. Terminologists, directors and the people responsible for help desk services were interviewed. To control the study in a systematic way, a list of questions based on the researcher's experience and studies, covering the focal points for much discussion, was prepared as a route map. However, the considerable experience the researcher has learnt from attending these language agencies is that the more unnoticable way of data collection, the more reliable data. Then the best is that first terminologists describe and explain what they do and provide researchers with documents. If some questions are left unexplained, they can be asked at the end of the event.

The questionnaire mentioned earlier concentrates on macro- and micro-structures of the target organizations. The macro-structure includes their linguistic and non-linguistic features: what they have, what they do not have and what they want to gain. The micro-structure considers how a terminology planning project is actualized in a real context.

Here is a sample of questions in the form of macro- and micro-structures:

1. Macro-structure of terminology planning embodies both linguistic and non-linguistic characteristics:

1.1 Linguistic features, e.g. language family, terminology resources, linguistic problems.

1.2 Non-linguistic features, e.g. language policy scenario,

language status, other recognized language(s), demographic information, coordination between terminology planning and other planning, motivation(s), infrastructures (training, research, technological capabilities).

2. Micro-structure of terminology planning includes:

2.1 Structure (organization chart): internal and external (national and international)

2.2 Theoretical and practical content:

2.2.1 Theoretical content brings to the fore questions related to theoretical points such as:

-- What is a *term*? How far its border can be extended, e.g. arts, literature, crafts, cooking...?

-- What is *Terminology*: a science, a discipline...?

-- Who is a *terminologist* (academic and professional qualifications)?

-- Who are planners and performers (academic and professional qualifications)?

-- From where does a terminology work begin: concept or term?

-- What is data gathering direction: from a source language or a target one?

-- Which strategy is adopted for source language polysemous terms, e.g. *dispersion*, *scanner*, whose semantic layers express closely related concepts, as far as interdisciplinary communication is concerned? How does a terminology work deal with source language synonymous terms? And for target language synonymous terms, as far as intra- and interdisciplinary communication are concerned?

-- Has a terminological diachronic study been done for connecting existing conceptual systems to imported ones or for revitalizing terms?

-- Terminology argumentation for: term creation habits, priorities, criteria, when derivations are not term (e.g. *imaginable* and *imager* as derivations of *image* in the visual arts), combinations and collocations, international terminologies, borrowing strategies, neoterms, abbreviations, replacing established terms.

2.2.2 Practical content is concerned with what happens in a real terminological work:

-- How are terminological activities organized?

-- What kind of information items are required to be registered on a terminology record?

2.3 Products, e.g. dictionaries (structures and contents) and procedures/methodologies/guidelines

2.4 Promotion covers the following activities:

2.4.1 Spreading terminological products

2.4.2 Employing linguistic, human and technological resources to promote the intended users' awareness in order to encourage them implant terms.

2.5 Evaluation (qualitatively and quantitatively) of products and methodology to see to what degree a terminology planning project has achieved its goals. It is a scale for measuring how much a linguistic community has been touched by the project within a specific period of time.

2.6 Revision of products and methodology

2.7 What your agency wants to do in the future?

2.8 The last question could be: is there any theoretical or practical barrier which you do not know how to deal with?

After collecting and processing the data, the above list of macro- and micro-structure questions accompanying the answers were sent to the directors of the three agencies (Termcat, DGLFLF and TNC) to receive their ideas and approval. Information from around thirty sociolinguistic situations were gathered from literature as well. It is to back the thesis frame and the ultimate objective of the present research, i.e. a model for terminology planning.

All data were first coded and then thematically categorized based on their major similarities/nodes. The results, more or less, corresponded with the three components of Diagram 3.3, i.e. planning theory (a diachronic and synchronic sociolinguistic

analysis), linguistics of science and implementation. The questions in macro-structure are related to planning theory and in micro-structure with linguistics of science (theoretical content) and implementation. Comparing the structure and content of the questionnaire mentioned above from the author's PhD research project in 2008 (defended in 2009) with these three axes from Diagram 3.3 indicates how the thesis has evolved into a relatively developed framework.

The next step was concerned with going into details and finding the second level of similarities/universal principles. The data processing continued step by step to show sub-principles; some of them are restricted principles, i.e. they are not available in any ecolinguistic situation (see Diagram 6.1: Part A and Part B).

By adopting this methodology, the researcher is trying to find answers for the research questions (see Section 1.5).

The following sections are concerned with the data organization.

4.2 Thematic material classification

The material is from four case studies and about thirty linguistic communities taken from a wide range of documents such as journals, monographs, proceedings, reports and so on. The four cases are samples of real practices and the literature can be divided into two groups: the first part is from agencies or people involved with agencies and the second is from experts, expressing their own ideas or experience.

The data thematically classified form three layers such as planning theory (a diachronic and synchronic sociolinguistic analysis), linguistics of science and implementation and their principles and sub-principles.

The data presented below are first from four cases (Catalan, French, Swedish and Persian) and then from the literature.

An outline of the thematical data organization comes as follows:

4.2.1 Planning theory layer (a diachronic and synchronic sociolinguistic analysis)

4.2.1.1 Social dynamic forces

1) Unexpected forces

2) Forces from top to down

a) Language law

b) Language policy

c) Language agencies

3) Forces from bottom to up

a) Individuals and non-governmental agencies

b) Language attitudes

4.2.1.2 A brief history of scientific languages, especially terminological activities:

- 1) Languages with a long history in science
- 2) Languages with a discontinuous experience in science
- 3) Languages without an old history in science

4.2.1.3 Needs and aims

- 1) Linguistic needs and aims
- 2) Non-linguistic needs and aims

4.2.2 Linguistics of science layer (Terminology argumentation)

4.2.2.1 Terminology research (e.g. Typology)

4.2.2.2 Terminology approaches

4.2.2.3 Standardization

4.2.2.4 Terminology resources

4.2.2.5 Terminology formation methods

4.2.2.6 Implantation criteria

- 1) At a theoretical level
 - a) Linguistic criteria
 - b) Non-linguistic criteria
 - i) Actors' role
 - ii) Social networks
 - iii) Language availability

iv) Knowledge as a conceptual system

v) Level of specialty

vi) Language attitude

2) At a practical level

a) Linguistic criteria

b) Non-linguistic criteria

i) Language attitude

ii) Language agencies

4.2.3 Implementation layer

4.2.3.1 Infrastructures

1) Human capacity building

2) Technological capabilities

4.2.3.2 Workflow

4.2.3.3 Organizational structure

4.2.3.4 Dissemination

4.3 Evaluation

4.4 Conclusion

When there is no reference in the following information, it means that it has been obtained from questionnaire during the research stay at those agencies.

4.2.1 Planning theory layer (a diachronic and synchronic sociolinguistic analysis)

This section is devoted to the data covering conflicting forces, language of science experience and needs and aims.

4.2.1.1 Social dynamic forces

After studying and then coding the data, a large group of forces were recognized which fell into three categories: unexpected forces, forces from top and forces from bottom. Here *social* is an umbrella term covering political, economic and cultural factors.

Forces from all sides affect a given linguistic community. A complex of variables, ranging from a number of unexpected forces, e.g. invasions and dictatorship, a group of forces pressuring from top such as language law, language policy and language agencies and another one from bottom like individuals, non-governmental agencies and language attitudes are involved in language planning as an activity aimed at bringing about some changes in a sociolinguistic complex system.

This section is organized in the following way:

1) Unexpected forces;

- 2) Forces from top to down;
- 3) Forces from bottom to up.

1) Unexpected forces

Unexpected forces are variables that policy makers and target audiences are not involved with them. That is to say, they are often uncontrollable and may have positive or negative effects.

Catalan (Termcat): Mari i Mayans (1991a: 95) states that under the dictatorship of General Franco (1936-1975), Catalan “was severely persecuted, and it came to be identified as a symbol of the democratic resistance to the Franco regime. Cultural activities in Catalan continued despite the difficulties, and from the sixties onwards these became increasingly visible and consistent.”

However, the current situation of Catalan, as described by Mari i Mayans, is that it is “spoken in the north-eastern Mediterranean area of the Kingdom of Spain, in the French department of the Eastern Pyrenees, in Andorra and in the city of l’Alguer (it. Alghero) on the island of Sardinia.” (p. 94) In Spain “the Catalan-speaking area is divided into 5 autonomous communities: Catalonia, the Valencian Community and the Balearic Islands ... Aragon, and Murcia” (p. 94)

Persian (APLL): According to Sadeghi (2001: 19) “in the seventh century A.D. Pahlavi or Middle Persian, the official and written language of Iranian Empire, was replaced by Arabic.” Then the

author continues that “With the Mongolian invasion in the thirteenth century and their domination in our country for more than a century and a half, a number of Mongolian and Turkish loans slipped into Persian, as most of the Mongol troops were Turks. The subsequent rulers of Iran were Turks, a fact that contributed to the penetration of Turkish administrative and military words into Persian.” (p. 20) At the beginning of the nineteenth century, Iranians’ contacts with Western civilization and modern science and technology started “through Russia and the Ottoman Empire, and to a lesser degree through India. Automotive, food, printing, and military terms were borrowed from Russian. A number of civil and military terms were also borrowed from Turkish” (p. 20). Then “In the nineteenth century, Iran came into contact with France The linguistic consequence was ... a great number of borrowings from French, most of which are still in use in contemporary Persian” (pp. 20-21).

Persian is now living in a multilingual environment with some other Iranian languages such as Kurdish and Balochi. It is also spoken in Afghanistan and Tajikistan.

The linguistic communities below, from the literature, are arranged based on negative to positive effects of unexpected factors, from facing the consequences of language domination to enjoying an advantage of having a connection with regional interests.

Ukrainian: Rytsar (1992: 139) argues that “The overwhelming majority of new scientific and technical terms come from English and German. Russian continues to play a role but as an

intermediary between these two languages and the Ukrainian language. ... [Ukrainian] terms were typically the product of a double translation, first from English or German into Russian, and then from Russian into Ukrainian.” (see Citkina 1991; Rytsar and Shunevych 1999 for Ukrainian situation)

Latvian: It has been dominated by German and then by Russian and English.

Greek: Papadaki (1994: 543) believes that “...the 400-year Ottoman occupation and the geographical distance from the emerging [sic] new centres of scientific development, were the two cardinal reasons that from the 14th century onwards, deprived the language of the possibility of evolving its scientific vocabulary.” The author also states that “an additional factor pushing towards an urgent and final solution of the problems is the European [sic] integration which calls for a unified approach of the complex issues related to the “creation” of new technical terms.” (p. 549)

Hungarian: Fóris (2007: 16) explains that “The large-scale industrialization following World War Two had a positive influence on Hungarian terminology research ... and the appearance of several special dictionaries.” Fóris (2010: 39) argues “The two most important steps in the substantial changes in the terminology of economics were the change of political system in 1989, and accession to the European Union in 2004.” Then she explains these changes: “The Soviet model of economic organization collapsed in 1989, taking the *conceptual system of socialist economy* down with it By the 1990s a new terminological system had to be created to correspond to the

Western-European conceptual system (this has been more or less achieved, but several problems remain).” (p. 39)

(see “Terminology work in Denmark” 1994 on terminology work in Denmark after joining the European Economic Community)

2) Forces from top to down

There are variables which are not in the hands of target users. The factors like language law, language policy and language agencies discussed below are usually under the control of governments.

a) Language law

Some linguistic communities, as stated by Oakes (2005), to protect their national languages have passed language laws, e.g. French, German, Spanish, Hindi, Indonesian, Hebrew, Swahili, Swedish, Norwegian and Danish (see Gaivenis 1991 on Lithuanian as the state language; Grin 1991 on the Estonian Language Law; O’connell and Pearson 1991 on language law in Ireland; Schlyter 1998 about language law in Uzbekistan). This part is about how language laws affecting language planning processes and, ultimately, linguistic communities.

Catalan (Termcat): The Institute for Catalan Studies was established in 1907 and finally, as Mari i Mayans (1991a: 95) states, “Catalan became co-official under the Statute of Autonomy of Catalonia (1932) in the framework of the Second Spanish Republic

(1931-39)”. According to *Generalitat de Catalunya* (the Catalan Regional Government) in *The legal framework for language*²⁶ (2009: 9) “In accordance with the 1979 Statute of Autonomy of Catalonia, the Language Normalisation Act of 1983 established Catalan as the language of the Government of Catalonia and of the administration for the Catalan region, local administrations and other public bodies dependent on the Generalitat [the Regional Government].”

French (DGLFLF): According to Humbley (1997: 261), France “... has a long history of both status and corpus planning going back to the Renaissance. The *édit de Viller-Cotterêts* (15 August 1539) was the first explicit status-planning law, making French the only language of justice and government.”

“Today [in 1992], the Constitution (article 2) specifies that the language of the Republic is French, while remaining open to the use of other languages”²⁷

Here a detailed French ecosystem picture can be drawn: “Present in five continents, the French language is the fundamental tie between a community of 63 members, associates or observers of the International Organisation of the French-speaking World (Organisation internationale de la Francophonie - OIF). Twenty-nine countries have chosen French to be their official language. It is also one of the official languages of the International Olympic

26..http://www20.gencat.cat/docs/Llengcat/Documents/Informe%20de%20politic a%20linguistica/Arxiu/a_cap01_08.pdf (Accessed 9/4/2010).

27. http://www.culture.gouv.fr/culture/dglf/dglf_presentation_anglais.htm (Accessed 6/4/2014)

Committee and is a working language in most international organisations, notably those which are associated with the United Nations and the European Union. In the EU, French is the only language which is both officially spoken in more than two states (like German) and enjoys international influence (like English or Spanish)’’,²⁸

Swedish (TNC): In Bucher’s words (2007: 37), in 2005, the Swedish Parliament “decided that Swedish should be the main language of Sweden.” The parliament formulated a new language policy including the following principles: “1. Swedish is to be the main language in Sweden. 2. Swedish should be a complete language, i.e. be possible to use in all areas of society, serving and uniting our society. 3. Swedish in official and public use shall be correct, simple and understandable. 4. Everyone shall have a right to language: to learn Swedish, to learn foreign languages, and to use one’s mother tongue or minority language.” (p. 38) This status was granted by a language law²⁹ on 1 July 2009. The law also strengthens the position of Sweden’s five official minority languages: Finnish, Yiddish, Meänkieli (Tornedal Finnish), Romani Chib and Sami. The Swedish Language Act³⁰ highlights “the issue of the development of Swedish terminology” that “authorities are to

28. http://www.culture.gouv.fr/culture/dglf/dglf_presentation_anglais.htm (Accessed 6/4/2014)

29. See *Speech* (Draft action programme for the Swedish language). 2002. Statens Offentliga Utredningar. And *Värna språken* (Take care of the languages) – *förslag till språklag* (proposal of a Swedish Language Act). 2008. Statens Offentliga Utredningar.

30. *Värna språken* (Take care of the languages) – *förslag till språklag* (proposal of a Swedish Language Act). 2008. Statens Offentliga Utredningar.

have particular responsibility for ensuring that Swedish terms are accessible and are used and developed in each authority's functional area." (p. 22)

Persian (APLL): Although there is no language law in Iran, Persian, according to the constitutional law (art. 15), is the official language.

The information extracted from the literature comes as follows:

Ukrainian: Krouglov (2001: 202) criticizes the Ukrainian language law passed in 1989: "it had been developed and passed in Parliament without the appropriate sociolinguistic considerations and without any significant analyses or evaluations of the existing linguistic situation in the country. It was more of a political manifesto than a well-thought-out programme, specifying dates and actions, but failing to identify the methods by means of which certain objectives would be achieved. The Law did not indicate how each stage of the programme should be evaluated, what surveys needed to be undertaken and how the information would be analysed." (see Fflur Huws 2006 on advantages and disadvantages of the Welsh Language Act 1993)

b) Language policy

This section deals with the linguistic communities having language policies. A single language policy may pursue different aims. For example, the puristic approach can be adopted for meeting various demands. It is used in Israel, as Madiba (2001) states, for "protecting Hebrew from Arabic and specifically English

influence”, in Italy it was for “eradicating Gallicisms from the language”, in Germany, during the Third Reich, was “focussed on promoting patriotism” and in Turkey was for “dissociating Turkey from the countries of the Middle East while encouraging associations with Western countries.” (p.55) Then the author gives an example to illustrate how a policy of “divide and rule” is hidden behind an apparent linguistic strategy: “Two main institutions, the Language Boards and the South African Broadcasting Corporation (SABC), were very influential in preventing borrowing across African languages and, at the same time, in encouraging borrowing from English and Afrikaans.” (p. 57)

Catalan (Termcat): There is a language policy for Catalan covering a terminology policy as an integrated scenario which is available on *Generalitat de Catalunya* (the Catalan Regional Government) in *The Legal Framework for Language* (2009)³¹.

French (Quebec): Draskau (2001) under the sub-heading of “Can attitudes be deliberately changed by policy? Is imposition formative?”, by referring to Daoust (1991), states that “Whereas, in 1983, some 54% of respondents favoured English terminology, by 1990, after exposure to the francization campaign, 66.2% shared the belief that French was better suited to technical discussions. This would appear to indicate that imposition is formative.”

31.http://www20.gencat.cat/docs/Llengcat/Documents/Informe%20de%20politica%20linguistica/Arxiu/a_cap01_08.pdf (Accessed 9/4/2010).

The information extracted from the literature comes as follows:

Estonian: Siiner (2006: 165) believes “Language policy was the main cornerstone in the modification of Estonian society that started in 1988.” The author discusses “While the protection of the grammatically pure Estonian language was the only way to resist Russification, the Estonian transformation from a totalitarian to a democratic society implicitly presupposes some easing of the restrictive and protective language policy.” (p. 175) Siiner argues “a normative and protective attitude towards a national language as an ethnic marker can make linguistic integration and the emergence of a multinational civic state a complicated task to implement. Of course, no nation state can exist without a standard national language... . In order to create the basis of a *common* civic culture, the Estonian language, now in the position of the official language, has to become a bridge between different ethnic, social and linguistic groups in Estonia, not a border between them. Language management activities and normative documents should therefore have an advisory role, rather than an imperative or prohibitive one. Making restrictions and requirements more severe is not always the way to go if changes in language usage and practices are desired. To escape from the stagnation of the linguistic integration, there is a need to liberate language pedagogy in Estonia from the traditional national paradigm. For that purpose, it might be worth considering the redefining of the concept of national in a larger civic, multicultural and multilingual global context, including creating positive multilingual and multicultural awareness, both among Estonians and Russian-speakers.” (p. 181)

Lithuanian: Gaivenis (1991: 21) states “On the whole, the present language policy favours the development of terminology.”

c) Language agencies³²

This part is devoted to the roles which language agencies may have. The arrangement of the following data is from the necessity for setting up language agencies (Greek) to examples of successful ones (Swedish and Ukrainian) and the last one represents an example of obligation imposed by the language agency on other governmental organizations (Lithuanian).

Greek: Papadaki (1994: 545) states “Another problem is the publicity which is required, not to mention the public judgement of the so-called “product” in order to be totally accepted. This is a problem which cannot be easily solved, unless adequate resources are allocated to such as a goal, in establishing a proper organisation.”

Swedish: Elkhafaifi (2002: 261) believes that the success of language planning in Sweden “must also be attributed to the existence of a central planning agency, an official policy of support for its labors, and a well formulated policy and approach to lexical modernization and standardization. Coordination of work, rather than duplication of effort, is the standard in Sweden.” (see Elkhafaifi 2002 on the Arabic language planning agencies’ problems)

32. For the role of the language academies and management agencies see *Language policy*, 2011 (10: 4).

Ukrainian: Rytsar (1992: 131) argues that “The creation of the Institute of Ukrainian Scientific Language...was to play a vital role in the Ukrainization of all spheres of life and particularly in general education and science.”

Lithuanian: Gaivenis (1991: 21) states “By the decision of the Presidium of the Supreme Council of the Lithuanian Republic, the State Commission of the Lithuanian Language was established in 1990. It was recognized in 1992. Its resolutions and recommendations are mandatory to all Lithuanian ministries and departments, institutions and enterprises, organizations and publishing houses. The Commission handles the urgent problems connected with the standardization of terminology.”

3) Forces from bottom to up

The forces discussed below are exerted by resources other than governments. These forces can be categorized into two groups: individuals and non-governmental agencies and language attitudes.

a) Individuals and non-governmental agencies

This part deals with the role individuals and non-official agencies play in language planning.

French (DGLFLF): Terms are not made entirely in this system (DGLFLF). They have been built freely in manufactures, laboratories, universities etc. without government interference.

The data below are from the role of individuals, the role of non-governmental agencies and their corporation.

Swati language: Ohly (1997: 110) explains that “Mbo Shongwe, a Swati-man, started a business on computers. He realized that in order to reach the Swati farmers in selling his computers, he needed siSwati terms that must be used in connection with the computer..., Shongwe formed a committee which was constituted of a linguist, siSwati inspector, a computer scientist, a person from the mass media and a clerk to Senate/Parliament of Swaziland.” (see Antia 2000 for another example in Africa)

Tonga (a minority language in Zimbabwe): Makoni et al (2008: 413-414) state that “the article examines how different language activists lobbied for the promotion and development of Tonga to counter the perceived hegemonising effects of other indigenous African languages such as Shona and Ndebele.”

Sámi: Utsi (1991: 52) states that “New terms are created by journalists, authors of teaching materials and books, individuals occupied with common language vocabulary making, and very little by professional terminologists.” Helander (1994: 40) believes “The vocabularies compiled by the physician Egil Utsi are a good example of how individuals have contributed to terminology work within their own subject field”.

Estonian: Erelt and Saari (1991: 9-10) state “There are also terminological dictionaries [e.g. dictionaries of forestry and military terms in 1986] that have been prepared without any such commission, which simply represent the result of the prolonged

efforts of one or two specialists supported by both a colleague and a linguist, either as reviewer or editor.”

Irish: Ní Ghearáin (2008: 16) gives an example that “In the 1940s and 50s, the lexicographic team working on the English-Irish Dictionary (EID) (published in 1959), made a significant contribution to terminology provision for Irish. Their efforts in differentiating and standardising synonymous terms is particularly noteworthy; For example, the introduction to the EID cited eighteen possible Irish designations for the concept telescope Although not typically the duty of the lexicographer, the EID team also developed many new terms for technical subjects and established principles for gaelicising foreign terms.”

Icelandic: Helgadóttir (1991: 64) believes “Almost every Icelandic language user creates new words.”

Swahili: Antia (2000: 44) refers to Kummer's sociological evaluation in 1983 that “formal and institutional state channels of dissemination are not as effective as informal means”.

Hebrew: Rabin (1989: 33) states “... the words created by all official bodies make up only a small part of word innovation when compared with those created by journalists, publicity experts, novelists, poets, and scientists. The way of creating new words is, however, the same in each case, even if certain procedures may be used more by one group than by another.” Nahir (2002: 293) believes “This [revitalization] was achieved within some 25 years, by 1914, through the cumulative and collaborative efforts of both the language planning agency involved, the Hebrew Language Committee, and the thousands of language planning ‘agents’ in the field—educators, writers, poets,

translators, editors, and so on, along with other influential language-conscious individuals.” (see Spolsky 2009 on the role of individual activists in revitalizing Hebrew as an example of language activity from below)

Chitumbuka-speaking northern region of Malawi: Kamwendo (2005: 144) introduces “...the Chitumbuka Language and Culture Association (CLACA) that is based in the predominantly Chitumbuka-speaking northern region of Malawi.” and continues that “In Africa, there has been, and there continues to be, significant contributions to language planning made by non-governmental institutions and even individuals.” (p. 146) The author argues that “The end of Banda’s autocracy in 1994 ushered in a new administration whose philosophy of language policy favours multilingualism and promotion of the various ethnolinguistic identities The new and open political dispensation has created room for the establishment of language and culture associations, and CLACA ... is the most outstanding in this respect ... unlike during the Banda era, there is now freedom for grassroots organisations to make their views on language known. Whilst the authorities may not implement everything proposed from below, there is always one or two lessons for the authorities to learn or be reminded of.” (pp. 162-163) Kamwendo believes that one of the strengths of CLACA is that “its membership includes people who came from a wide range of professions- the clergy, teachers, authors, media practitioners, Bible translators, politicians and so on.” (p. 161) and then refers to its weaknesses that “CLACA’s resolutions are not binding on government or any other organization Secondly, CLACA membership lacks people with sound training

in and knowledge of linguistics Thirdly CLACA has a poor financial and infrastructure base.” (pp. 161-162)

Persian: Sadeghi (2001) refers to some of efficient non-governmental agencies and an individual. He states that *dā'erat-ol ma'āref-e fārsi* (a Persian encyclopedia) was one of the circles which “published in 1338/1959 a booklet comprising some 700 geographical, geological, and meteorological terms” and “The Iranian Cultural Foundation published a number of bilingual (English-Persian) scientific dictionaries whose authors had tentatively translated English scientific terms into Persian.” And, of persons, he mentions “A.-H. Âriânpur, who in his Persian translation of M. Iqbal’s *The Development of Metaphysics in Persia*, coined some 2000 Persian words for English philosophical terms.” (p. 24)

b) Language attitudes

The data presented in this part, from the literature, are about the role of users’ language attitudes in failure or success of language planning. The following data are from positive attitudes (Swedish and Catalan), negative attitudes (Latvian) and a conflict between users’ and agencies’ attitudes (Mauritanian, Swahili, Hebrew and Irish). The Québec approach and the Tonga Language and Cultural Association in Zimbabwe are examples of agencies considering language users’ attitudes.

Swedish: Oakes (2005: 168-169) states “In 2003, there were nearly 7,000 subscribers to the Council’s periodical, *Språkvård*, which publishes articles on issues related to the internal and

external state of the Swedish language, while the number of questions on language usage answered by telephone, letter and e-mail had risen to nearly 11,000 annually (Svenska språknämnden, personal communication). These figures represent substantial increases over the last decade and may provide further evidence that the Swedish language is no longer being taken for granted, but is instead regaining its status as a prominent component of Swedish national identity.’’

Catalan and Galician: Marcos Marín (1991: 16) believes that Catalan and Galician “are spoken by a relatively equal percentage of the population, but the first is consistently supported by the public, whilst the second faces the indifference of the population.’’

Latvian: Skujina (1991: 36) argues “The obstacles to a successful revival and restoration of the social functions of the Latvian language are of both material and psycho-logical character On the one hand, Russian speaking immigrants want to recognize only Russian as being able to cover all the necessary functions and as an interethnic means of communication in Latvia as well. A complicating factor is the empire-oriented nomenclature psychology of some people who still occupy high posts in industry and elsewhere, and also an unwillingness to recognize the vital needs of the Latvian nation.’’

Mauritanian: According to Mahmud (1986: 101) “The process of terminology planning in Mauritania was initiated in 1981 when the speakers of the three African national languages [Pulaar, Sooninke and Wolof] ... won the legal right to develop these languages and introduce them in education beginning in 1985.’’

The author believes that “The language situation of Mauritania is a recipe of conflict. The uneven distribution of the language resources (Arabic, French, and three national languages) among the ethnically and racially diverse population is dialectically linked with social inequalities [sic] that have, in their turn, created institutionalized language attitudes and language ideologies which are inherently contradictory.” (p.108)

Mahmud argues “when the Mauritanian government pursued a language policy of Arabization, it immediately unleashed strong ethnolinguistic forces that rallied around indigenization and authenticity as a response to the threat of assimilation. Indigenization of terminological expansion was the only viable alternative in this context, for French cannot be presented as a possible source without accusations of cultural schizophrenia and of subservience to the former colonists being levelled at its proponents.” (p. 109)

Swahili: According to Mwansoko (1991), there was a conflict between users' views and the National Swahili Council (NSC) in Tanzania about a source of borrowing. The former favoured English but the latter preferred Arabic terms. And NSC did not care about the users' views.

Hebrew: Jernudd (1977: 232), based on a research he did by asking questions to know the respondents' favorite terminology resources, states that “Israeli students, teachers and textbook writers did not favour Hebrew as a source language, which conflicts with the views held by members of the Hebrew Academy”

Irish: About the difference between attitudes towards a language and attitudes towards a language policy, Donnacha (2000: 17-18) argues that “... although there is widespread support for action in support of the language, there is also considerable opposition to policies which are perceived to involve any sort of unfair advantage, coercion, or favouritism in connection with the language (Mackey, 1977).”

French (Quebec): Rousseau (1993: 38) states “The Québec method is based on orienting language use through consultation with users.”

Tonga (a minority language in Zimbabwe): Makoni et al (2008: 424-425) believe that “The Tonga Language and Cultural Association (TOLACO) was formed in 1976 in response to perceptions by Tonga-speaking communities who felt that Tongan language and culture were threatened, not by English but by indigenous languages, in this case Ndebele and Shona.”

4.2.1.2 A brief history of scientific languages, especially terminological activities

This section is for a brief history of the languages of science, emphasizing terminology, in some linguistic communities. But before it, a categorization of linguistic communities is presented.

For instance, Martel (2001) divides nations first by the criterion of “development” and, at the second level, “in reference to English” into the following groups:

Highly developed nation/community/agency

- a) Native of English
- b) Non-native with English as official language
- c) Non-native without English as official language
 - i. who had an international language of science
 - ii. who did not have an international language of science

Developing nation/community/agency

- a) Native of English
- b) Non-native with English as official language
- c) Non-native without English as official language (p. 36, Table 2).

Ammon draws a distinction between three types of language communities:

1. The English language community (the Anglophones).
2. The language communities of an international scientific language other than English, ... Examples are the French, the Spanish or the German language communities.
3. The language communities of a non-international language,

This is the great majority of language communities, of which the Finnish, the Danish or the Malay language communities are examples (Ammon 2006: 16).

This classification is based on having international and non-international languages. However, an outline of three broad linguistic situations regarding their histories in scientific activities which resulted in terminological repertoire can be in the following way:

- Languages with a rich source in terminology owing to a long and continuous stream of scientific activities in most subject fields, e.g. French, Swedish and Russian;
- Languages with a discontinuous stream of the language of science because of some reasons such as domination of other languages, e.g. Persian, Catalan, Greek, Hungarian and Latvian;
- Languages without an old history in expressing scientific concepts, e.g. Basque, Manx Gaelic and Sami (see Sager and Nkwenti-Azeh 1989).

Categorizing languages according to continuous and discontinuous involvement in science is not an exact classification, but rather a categorization based on the present data. These are three major points of a spectrum containing various minor ones. A fact which should be stressed here is that a language, even belongs to the first situation, is not entirely consistent in their terminological sources in all fields of knowledge. In some disciplines, it may have more terms than the others and in some cases, for instance in computer sciences or medicine, it may be at risk of domain loss (e.g. Swedish).

Three groups of languages are presented below: languages with a long history, with a discontinuous experience and without an old history in science.

1) Languages with a long history in science

The following languages started modern sciences and continued nonstop.

French (DGLFLF): French is a Romance language. The scientific press have been appeared in the first half of seventeenth century and in Italy, Switzerland and Holand most of them were in French as well. During this century French was language of science in Europe in the same way as Latin (Rousseau réf. note: 11, p. 242 in Walter³³ 2003: 6).

Swedish (TNC): Swedish is from Indo-European (Germanic) language family. Unless in some specific areas, e.g. medicine threatened by English, in other subject fields, Swedish has enough terminological resources.

Information extracted from the literature comes as follows:

Russian: Leitchik and Shelov (2003b) believe that terminological activities have passed four periods in USSR: from 1780 up to the end of the 1920th, “The preparatory period of selecting and primary processing of the terms and definitions related to special concepts...” (p. 82); from 1930th to 1960th is “characterised by a

33. Walter, Henriette. 2003. “Histoire des langues de la science, de Sumer à nos jours”. In Séminaire “Quelle langue pour la science?”. Caire, 19 May 2003.

theory of terminology coming into being and high activities of the two major experts with technical educational background – D.S. Lotte and E.K. Drezen, who promoted an engineering approach to terminology that determined greatly the future practice in standardisation and internationalisation of terminology.” (p. 82); from 1970th to -1990th “terminology is becoming an independent discipline.” (p. 83) and another feature of this period is “the development and interaction of terminological committees within the framework of academies of sciences in the republics of the former Soviet Union.” (p. 83); and since 1990th up to now is characterized by “an evident decline of scientific research in the sphere of terminology studies caused by deep and difficult changes in the social life of the former USSR but, then, it is followed by gradual renewal.” (p. 83)

2) Languages with a discontinuous experience in science

The following languages have a discontinuous experience in science. Of course, the members of this group are not at the same level.

Persian (APLL): Persian is from Indo-European language family. Sadeghi (2001: 19-20) states that the first endeavor for replacing Arabic terms with Persian ones was began “by Avicenna [11th century AD] in his Persian *Dānišnāma-i ‘Al ā’ ī*, an encyclopedia of physics, metaphysics, and logic. However, his attempts were not fruitful and no other scholar followed him.”

Catalan (Termcat): Regarding Catalan’s experience of participating in scientific activities, Mari i Mayans (1991a: 94)

argues that “As the official language of the ancient Crown of Aragon (1147-1716), Catalan was generally used in all fields of activity and in all areas of knowledge in society ... until the 18th century, although, from the 16th century onwards, Spanish also came into use as a vehicle of expression for some specialized social functions” He also explains that “Catalan was one of the first Romance languages used in specialized prose, as was exemplified in the encyclopedic work of Ramon Llull, in the 13th century. Despite the reverses which have affected it since the 16th century, it has never ceased to be a language of specialists in most fields of knowledge” (p. 98). To support his claim, he refers to some dictionaries and an encyclopedia which “contain a very considerable proportion of the terms in use, though they do not reach the higher levels of specialization.” (pp. 98-99) But “In the course of the 19th century, the Industrial Revolution ... promoted the resurgence of Catalan as a language of culture”. (p. 95)

Greek, Hungarian and Latvian, from the literature, come within this group:

Greek: Papadaki (1994: 540) explains that “Modern Greek is in many aspects a development of the form of the language once spoken in Attica in the 5th century B.C. and referred to as “Ancient Greek”. It is to be noted in passing that the changes that have taken place within the language in the last 24 centuries are not greater, at least in syntax, morphology and lexis, than the differences obtaining between the language of Chaucer (1400 A.D.) and present-day English.” The author also states that “... the 400-year othoman occupation and the geographical distance

from the emerging [sic] new centres of scientific development, were the two cardinal reasons that from the 14th century onwards, deprived the language of the possibility of evolving its scientific vocabulary.” (p. 543)

Latvian: Skujina (1991: 28) states “Latvian terms appeared in the 16th century, when the first books in Latvian were published - the Catholic (in 1585) and Lutheran (in 1586) Catechisms. The first terms in printed form were religious ones. But in such folk occupations as seafaring and fishery, Latvian terms had been used before the German invasion in the 13th century.” Then the author continues “The scientific approach to the selection and formation of terms began in the second half of the 19th century In the second half of the 19th century, the first terminological dictionaries containing Latvian terms were published” (see Skujina 2003 for a brief history of terminology development in Latvia)

Hungarian: Fóris (2010: 38) argues “Systematization of technical terminology ... began in the 1950s, when its principles and methods were established” They were based on Soviet School of Terminology. She continues that “In the 1970s specialized translation groups were founded at Hungarian universities.” And in 1974 they started to teach language for special purposes.

The author also states that “An elaborate set of Hungarian terms and systems of terminology were developed during the 17th-20th centuries in relation to the historic crafts, branches of science, sports, technical sciences and related industries, conventional

agriculture, etc. This system called for further growth to adjust to the accelerating pace of development’’ (p. 38)

3) Languages without an old history in science

The following languages do not have an old history in expressing scientific concepts.

Basque: Marcos Marín (1991: 16) states ‘‘The linguistic and literary reinforcement of the language started in the 19th century as an offshoot of the Romantic movement. Pre-indoeuropean Basque is the oldest European language. It is a treasure but it has never been a language of science and technology. The industrialization of Basque Country was made in Spanish’’

Manx Gaelic: Draskau (2001) argues that ‘‘In Manx Gaelic, as in many revitalised languages, no predominately specialist text corpus, and little enough by way of general corpus, exists. For over a millennium, the main means of communication in the Isle of Man was Manx Gaelic, which, like Scots and Irish, evolved from Old Irish.’’ (see Nahir 2002 and Spolsky 2009 on revitalization of Hebrew)

Sámi: Utsi (1991: 47) states that ‘‘The Sámi language belongs to the Finno-Ugric language family of which Finnish and Estonian are the major language groups. Sámi belongs to the western branch of this family and it is closely related to the Balto-Finnic languages...’’. Sámi is spoken in ‘‘the north of Norway, Sewden, Finland and the Kolan area.’’ And ‘‘Teaching in Sámi language started in schools in the Norwegian area of Sámi as late as in 1967.’’ (p. 46) Its terminology activity has mainly been concerned

with “equivalency lists with Sámi and Finnish, Swedish or Norwegian.” (p. 50)

4.2.1.3 Needs and aims

This section is for categorizing needs and aims, ranging from linguistic to non-linguistic ones.

1) Linguistic needs and aims

This part is devoted to linguistic communities which strive for linguistic goals such as modernization, terminology development, language diffusion, unification and revitalization in their terminological activities.

a) Modernization

The languages in this group are going to keep themselves updated.

French (DGLFLF): The DGLFLF’s mandate in terminology planning field is to “Enrich and modernize the French language; ... [DGLFLF] supports and co-ordinates the actions taken by the various players who participate in the establishment of neologisms (General Commission for terminology and Neologisms, the Académie française, specialised committees, partner ministries etc.) and is responsible for making them available to the public. Some terms from the terminology and neologism committees have become part of every-day language ... : *logiciel, puce, baladeur*

(*software, chip, walkman*). More recent terms include: *monospace, covoiturage, v.t.t., soit vélo tout terrain, remue-méninges (people-carrier, car-sharing, mountain bike, brainstorming)*. And in relation to Internet: *courriel, navigateur, pirate (email, browser, hacker)* etc.”³⁴

When a new foreign concept enters, regarding to what extent it could be disseminated and used by laypeople, the DGLFLF finds or creates an equivalent for it and also defines it; no need to find French equivalents for English terms which are rare in France. For administrators it is obligatory to use the approved terms. But they are recommended to experts and professionals and if they prevail among them, then it may improve their chances of percolation into other layers of the linguistic community, e.g. *Sida* for *AIDS*.

b) Terminology development

The following languages are in need to equip themselves with terminologies.

Catalan (Termcat): Termcat established in 1985 as a governmental organization is responsible for organizing Catalan terminology. Its mission is “to ensure the development and integration of Catalan terminology into both specialist sectors and society in general through the constant creation of innovative, quality tools and resources in permanent dialogue with experts and users. TERMCAT's activities take place within the framework of the

34. http://www.culture.gouv.fr/culture/dglf/dglf_presentation_anglais.htm
(Accessed 6/4/2014) See also www.culture.gouv.fr/culture/dglf

process of standardising the Catalan language and in a global context determined by the knowledge society, diversity and multilingualism.”³⁵

Persian (the Iranian Academy, 1935): Sadeghi (2001) refers to the charter of the Iranian Academy (the first academy), with 16 paragraphs, and quotes the first and the second paragraph that “the Iranian Academy is being founded for the maintenance, development, and promotion of the Persian language” and “the Academy should prune incongruous foreign words from the language and coin Persian terms and expressions for every branch of life, using, as far as possible, Persian (and not Arabic or Turkish) roots and words.” (p. 23)

Persian (the Iranian Academy of Language, 1970): The Iranian Academy of Language (the second Academy) was founded in 1349/1970. Sadeghi (2001: 25) states that “Protection of the national language and its preparation for supplying the ever-increasing scientific and technical needs of the country are insisted upon in the Shah’s order.” He also states that “The main task of the department of word selection is to find Persian equivalents for foreign words used both in common language and in scientific writings.” (p. 28)

Persian (APLL, 1991): The terminological motivations at the present academy (the third academy) are: “to develop Persian and

35.

http://www.termcat.cat/en/El_TERMCAT/Centre_De_Terminologia/#Supervisor
(Accessed 25/1/2014)

to equip it for satisfying the increasing technological and scientific demands and to coordinate terminological activities”³⁶ (my translation from Persian).

The languages below are planning to develop their terminologies:

Norwegian: Hjulstad (1994: 49) states “In the old days one of the main objectives of terminology work in Norway was to replace Danish terms, and in particular loan words from Low German through Danish, by terms of Norwegian origin. As a consequence of this tradition, many Norwegians look at terminology work primarily as a tool to get rid of “ugly foreign words”, presently most often of English origin.”

Sámi: Helander (1994: 39) explains that “There were no central institutions to guide these [term creation] efforts until the 1970s, when the Nordic Sami Institute ... and the Sami Education Council were founded.” And the author continues that in 1985 “the Nordic Sami Institute initiated a reaserch [sic] project with the aim of drawing up a model for a systematic development of new Sami vocabulary. This work is an important step towards coordination of guidelines for further efforts.”

Ukrainian: Myking (2006: 139) believes that the main goal of terminology planning in Ukrain is “developing Ukrainian into a full-fledged communication tool in all public spheres” He also states that “My interpretation of the main features of Ukrainian terminology may be summarised in the following four points:

36. <http://www.persianacademy.ir/fa/VG.aspx> (Accessed 15/4/2010)

- Language-planning orientation: Ukrainian terminology is directed towards language development as well as domain defense and conquest. This is comparable to the situation in a large number of ‘Western’ communities [sic] and is considered a parametrical feature.

- Strongly prescriptive goals

- Interdisciplinary approach

- Established theoretical platform: ... Ukrainian terminology explicitly recognises the ‘General theory of terminology’, but also the importance of the Russian school of terminology.’’ (pp. 137-138)

Hebrew (The Academy of the Hebrew Language, 1953): The aims of the Academy of the Hebrew Language, as Allony-Fainberg (1983: 33) states, are:

“a. to assemble and to carry out research into the Hebrew vocabulary of all periods;

b. to carry out research into the structure of the Hebrew language, its history and its evolution;

c. to direct the development of the Hebrew language, in accordance with its original spirit, its requirements and possibilities in all theoretical and practical fields, its vocabulary, grammar, script, spelling, and translation (Regulation number 465).”

Arabic: Elkhafafi (2002: 255-256) believes that “The main goal has always been the regeneration of Arabic as an effective

communication medium for modern science and technology. The creation of new technical terminology is one means of achieving this goal. Other terminology projects are envisioned for the arts, humanities, and social and natural sciences, although in these areas Arabic exhibits less deficiency than in scientific disciplines.” And also the author states that “Another major goal is the preservation of the purity of the language.” (p. 256)

(see also *social development* in non-linguistic needs and aims about Arabic)

Hungarian: Fóris (2010: 43) considers “The creation of new terms to replace missing and incorrect ones.” and “The systematization and maintenance of the terms belonging to a certain domain.” as the aims of terminology work in Hungary (see also *social development* in non-linguistic needs and aims about Hungarian).

c) Language diffusion

The aim of language diffusion is to expand its use inside and outside of its linguistic community.

Hebrew (The Council of the Hebrew Language, 1890): Allony-Fainberg (1983: 14) states “The CHL’s [The Council of the Hebrew Language] basic aim was ‘diffusing the Hebrew language and Hebrew speech among all classes of the people’ (AHL 1970: 27). After 1903 the aim of the CHL was ‘elaborating the spoken language and deciding on new words’ (AHL 1970: 27-28).” (see Nahir 2002)

d) Unification

The goal of Basque unification is to unify its varieties.

Basque: Marcos Marín (1991: 16) believes that “The first problem of the language is its planning, its unification. Mutually not understandable varieties of Basque are being reduced to a unified tongue, called precisely that, viz. batua, which means “unified”. The Basque Government actively encourages the use of euskera batua, which is also employed for terminology. Since 1987 U.Z.E.I. (Unibertsitate Zerbitzuetarako Euskal Ikastetxea) is the agency in charge of research on language planning, and Euskalterm is its terminological institute. A huge number of terms and glossaries have been translated into Basque, but this attitude is not to be misunderstood. Terminology is but a part of the crucial goal: the unification of the language. The general framework is that of language planning.”

e) Revitalization

Revitalization is a sociolinguistic process whereby a language not being used for different reasons to be revived.

Irish: Ní Ghearáin (2008: 14) states that “... almost all speakers of Irish in Ireland are speakers of English, the majority being native English speakers for whom Irish is a second language. Thus, Irish terminology planning is aimed for the most part at bilinguals whose competence in English in most cases exceeds their competence in Irish.” She believes that “The needs of language revitalisation rather than specialist communication have

provided the primary motivation for terminology planning in Irish in the last one hundred years.” (p. 14) NÍ Ghearáin argues that “There are three areas within the direct remit of the government where it sought to improve the status of Irish in the twentieth century: law, education and administration. Understandably, terminological development was also necessary in these three domains and this was carried out through the establishment of two main agencies: Rannóg an Aistriúcháin, a legal translation team established in 1922, and An Coiste Téarmaíochta, established by the Department of Education in 1968 but with predecessors dating back to 1927. Though Rannóg an Aistriúcháin’s primary remit is law, and An Coiste Téarmaíochta’s education, they are both government agencies and accordingly influence the terminology used by the administration.” (pp. 15-16)

2) Non-linguistic needs and aims

This part includes linguistic communities pursuing non-linguistic objectives, like social development, professional communication, independence and maintenance, in their terminology planning.

a) Social development

Social development, albeit a non-linguistic aim, is achieved through promoting a language status. French in Quebec, Hungarian and Arabic are examples of this group.

French (Quebec): Rousseau (1993: 35-36) states that “The Office de la langue française in its current form was created in

1977 under the Charter of the French Language, which conferred on it the following twofold mandate:

1. To define and conduct Québec policy on linguistics research and terminology.
2. To ensure that the French language becomes, as soon as possible, the language of communications, work, commerce and business in the civil administration and business firms.”

In Quebec, terminology planning, according to Rousseau, comes within language planning “or even within a social development project”. (p. 38)

Rey (1996: 100) believes “Quebec’s terminological problem was foremost socio-professional in nature and had to do with a social and political objective (i.e. diminish the role of English in a primarily francophone environment), presented as a linguistic objective: that of improving the quality of spoken and written French.” (see L’Homme 2006 for the OQLF’s mandate)

Hungarian: Fóris (2007: 16) argues that “The aim of developing the Hungarian scientific language was to eliminate the intellectual monopoly of the high society while its methods varied from discipline to discipline – only the field of natural sciences applied uniform principles.”

Arabic: Rey (1996: 101) states that an “example of terminology fulfilling a “sociological mission” is that of the Arabic-speaking countries, where the primary concern is to enable the Arabic language to rid itself of the diglossia which relegates Arabic to a position of inferiority *vis à vis* English or French in many special languages ... and which also renders many dialects of Arabic,

especially the dialects of the countries of the Maghreb, inferior to the dialects of those countries considered as representative of standard modern Arabic (Egypt, Syria, Iraq, Jordan).”

b) Professional communication

The aim of professional communication is to reduce linguistic barriers as far as possible to improve communication among target users.

Swedish (TNC): Westerberg (1992: 22) states that “The first publication was on quantities and units and their designations. It was prepared in collaboration with the Swedish Standards Institution The next publication provided guidelines for technical writers but also for others This publication was the first of its kind in Sweden” Then the author continues that “In Sweden we have a tradition of systematizing and categorizing knowledge and this certainly contributed to the establishment of TNC. The botanist Carl von Linneus, for instance, was part of this tradition.”

The TNC announces its aim that “The overall aim of Terminologikum TNC is to meet all kinds of terminological needs of users of languages for special purposes. TNC achieves this through terminological services and support to authorities, organizations, enterprises who pursue terminological work of their own within various subject fields, and also to individuals.

TNC is involved in:

- the development of terminological products such as terminological glossaries and databases, compilation of manuals for technical writing, etc.
- the formulation of rules and guidelines for the writing of technical texts
- collection, processing and dissemination of terminology of specialised subject fields
- terminological reviews of standards and other documents containing terminology
- lectures and courses on the principles and methods of terminology work and technical writing
- co-operation with other language institutions on a national level and with terminological institutions on an international level.”³⁷

The main objective TNC pursues is to meet all kinds of terminological needs. Bucher (2007) deals with TNC’s needs and aims:

-- In 40’s, producing different glossaries in founding, enamelling, strength of materials... . “The focus was to delimit and describe concepts within one subject field at a time (or area of specialized practice) in Swedish, reflecting the Swedish conceptual world, and

37. <http://www.tnc.se/the-swedish-centre-for-terminology.html> (Accessed 6/4/2014)

also to give equivalents in other Nordic languages, often also in English, German and French.” (p. 41) She also continues that “The purpose of TNC’s early terminology production was to meet communication needs that came about due to industrialization, standardization and internationalization”

-- In 60’s, terminology production in other subject fields such as forestry, work environment;

-- In 80’s, translation projects because of the establishment of a European Economic Area (EEA), by translating about 10000 pages of official EC documents into Swedish and also by publishing *EC Words and Expressions*, as a dictionary to guide translators.

-- When Sweden entered the EU in 1995 ... “Within a period of five years, TNC updated Eurodicautom with approximately 140000 Swedish terms, mostly also with definitions, covering about 100 subject fields.” (p. 42)

Moving from an industrial to a knowledge-based society, Swedish is faced with new demands such as:

“ -- quality assurance,

-- semantic interoperability,

-- knowledge organisation and knowledge handling,

-- the structuring of information in the development of ICT-systems (content management),

-- automatic handling of large quantities of information, and, re-use of information, e.g. in health care records" (Bucher 2007: 45-46)

c) Independence

Independence, as a non-linguistic aim, can be achieved through linguistic activities as discussed in the literature below:

Manx Gaelic: According to Draskau (2001) "The constitutional requirement for the translation into Manx Gaelic of the abstracts of texts of all new legislature prior to their public promulgation necessitates a certain amount of translation activity, including the coining of new terms, by Gaelic specialists. This activity is pragmatic and *ad hoc* rather than theoretical or organic. This custom is a time-honoured tradition that was never rationalised into oblivion and has now been found to have potential uses." The author refers to the reasons for the official support. One of them is "To strengthen the Island's position as an independent state, giving credence to its status as a fiscal authority independent of Westminster and the EEC."

Icelandic: Helgadóttir (1991: 56) states "In Iceland this growing need [for new words] first became a matter which challenged attention and required a definite language policy around 1780." The author explains the philosophy behind language policy that "The 19th century was the century of struggle for independence from Denmark. Language purism acquired [sic] a new perspective as a part of the political programme." (see Helgadóttir 1994)

Pilke and Toft (2006: 45) argue “Sigurdur Jónsson ... has found that terminology in Iceland is based on the following ‘isms’: nationalism, internationalism, philologism, and democratism. According to Jónsson, fear of changes in society was the main motivation behind Icelandic language planning and language purism activities in the early 1900s. The internationalization on the 20th century brought about more trade. In the beginning, this meant that new professions appeared, and they did not have an Icelandic variant of their special language but only English, Danish or Norwegian. It was in these new professional groups that the need to be able to communicate in their own national language was realized. One example of this is that it was the telegraphists who initiated the founding of the first Icelandic term group in 1919 (Jónsson 1919: 162-165).”

d) Maintenance

A nation can survive through keeping its language continuing to live, e.g. Estonia.

Estonian: Erelt and Saari (1991: 6) argue that “The goal of the linguistic policy of Estonia has always been the survival of the Estonian language and, correspondingly, of the Estonian nation.” Siiner (2006: 173) believes “For the needs of the state, and for speakers of Estonian as the native language, Estonian had to be normalised, regulated and standardised in its use as the official language.”

4.2.2 Linguistics of science layer (Terminology argumentation)

As discussed in Chapter 3 (see Section 3.4.1), terminology argumentation, at the practical level of linguistics of science, is responsible for solving the discourse problems discovered by planning theory, a diachronic and synchronic sociolinguistic analysis.

Terminology planning as a practice, based on its theoretical point of view, requires to know about, e.g. linguistic (e.g. morphological structures and from which resources terms should be provided), discursive (e.g. amalgamated texts, a combination of loan and native terms and their effects on their neighbors and the whole text), cognitive (teaching and learning scientific concepts and connecting new concepts with existing related ones) and communicative (social contexts and the level of users) factors. Arguing about the above mentioned issues, among others, comes within the area of terminology argumentation. Topics addressed in terminology argumentation can be categorized in the following way:

4.2.2.1 Terminology research (e.g. Typology)

4.2.2.2 Terminology approaches

- 1) From term
- 2) From concept
- 3) Both onomasiological and semasiological approaches

4.2.2.3 Standardization

4.2.2.4 Terminology resources

4.2.2.5 Terminology formation methods

4.2.2.6 Implantation criteria.

It is not claimed that terminology argumentation is only limited to them but it can be developed by more studies.

4.2.2.1 Terminology research (Typology)

It would seem that the theoretical discussion of terminology typology started by Nematzadeh (1997), drawing terminologists' attentions to linguistic typological achievements. She believes that "As the terms are the subset of linguistic units, any generalizations in lexical typology, can be used in terminology." (p. 151) But due to complicated internal structures of terms, manifesting complex concepts which are the features of the modern world, word-based generalizations, in some cases, are inapplicable to terminology. The empirical evidence provided by Leitchik and Shelov (2003b: 86) shows that "In a number of publications, various types of formal structures used for the coining of Russian terms have been analysed and assessed, some of them being very far from characteristic of the general language."

Terminology typology can be of great help to both theoretical and practical discussions. Comparative researches are required to learn more about inter- and even interlingual term-formation potentialities, target users' favorite structures and so on. An

example of an interlingual comparison offered by Papadaki (1994: 544) is English and Greek constructions. For instance, an English phrase such as “quality control” is a problem in Greek: whether “control of quality” or “qualitative control”. Sager and Nkwenti-Azeh (1989: 33), going into details about different categories of terminological contents and forms, are, in fact, concerned with a kind of interlingual typology research. Regarding terminological forms, they refer to “terms which are exclusive to a discipline; terms which have different meanings in different disciplines: these may be terms which also exist as words, e.g. *fastidious* in bacteriology; terms which are indistinguishable from words except in the special context in which they are used.” (p. 25)

The merits of typological researches can be found in experts’ suggestions. For example, Sager and Nkwenti-Azeh (1989: 33) argue that “It is of interest to examine vertically how different societies have shaped and used language in the process of scientific and technological development. A sufficient number of such smaller case studies may then permit the formulation of general rules on how languages can adapt to deal with scientific and technological innovation.” This point is also stressed by Nematzadeh. After giving some suggestions for typology research such as “Classification of languages into head-marking and dependent-marking”, Nematzadeh (1997) concludes that terminologists must distinguish “the core characters of terms from peripheral characters of terms to provide terminological universals.” (p. 152) Therefore, typological researches can produce worthwhile results which “show language planners how to create

usable and acceptable terminology, and how to assess the success or failure of their efforts (Elkhafaifi 2002: 264-265).”

From the literature the only example of this field is Russian.

Russian: Tkacheva (1986), doing a terminology typology research in English, German and French, states that “The degree of intensity of “the abbreviation outburst” varies in different languages particularly in the termsystems of computer techniques, electronics and cosmonautics.” (p. 139) For example, in French “The greater number of acronyms in the computer technique termsystem is borrowed from English: LAZER, COBOL, FACT etc.” (p. 140) In German, “the cases of acronymy are met only among aviation term abbreviations. All of them are of English and French origin” (p. 140)

Grinev (1993: 15) argues that “The efficiency of decisions concerning the choice of forms and their endowment with a specific meaning, as well as their use, depends on a clear understanding of the most general laws governing the development and functioning of terminologies The mere description of particular phenomena in different terminologies, with no attempt to compare and interpret the results of the separate studies, or to draw general conclusions, cannot provide practical terminologists with reliable information concerning the probable results of their decisions.” The author refers to the results from “a large volume of terminological research concerning the processing of a substantial corpus of Russian and English terms from various subject fields” which show “that the most ancient fields of knowledge borrowed their terms from common speech. The newer fields of knowledge borrowed their

main terms partly from general language and partly from the existing terminologies of subject fields” and “... in many languages, in older subject fields, compound two-word terms generally appeared in the first half of the 19th century, three-word terms at the end of the same century.” (p. 17). As far as the state of a subject field is concerned, in a turbulent state, “there is a connection between changes in subject fields and prevalent types of polysemy.” but “laminar periods” are marked by “the growth of word-formations” (p. 18). Another achievement Grinev refers to is that “The areas of application of terminology (oral or written speech of specialists, professional education, specification of products, information systems, etc.) influence the degree of inculcation of terms and also the forms of regulation of terms (strictness of norms).”(p. 20)

(see Tkacheva 2001 for terminology typology; Alexeeva 2004 about term, term formation and typology of term formation processes; Fóris 2010 for “Research into terminology”)

4.2.2.2 Terminology approaches

By terminology approaches, the thesis means the direction of a terminology work; whether it starts from term, concept or both.

1) From term

This part deals with terminological activities concerned with collecting terms.

Catalan (Termcat): It starts terminology work by extracting terms from corpora built on a conceptual structure of the domain.

French (DGLFLF): The data gathering direction is that experts are monitoring to find new terms, not highly specialized ones, which usually come from English and pose a risk to enter the general language, e.g. in the area of administration.

Persian (APLL): The Academy starts from foreign (English) terms of a specific subject field and then selects Persian terms, gives new meaning to them (resemanticization) or, sometimes, creates new terms (neoterms).

Irish is an example from the literature beginning from terms.

Irish: Ní Ghearáin (2008: 14) states that “The official agents of Irish terminology planning, An Coiste Téarmaíochta (the Irish Terminology Committee), ... concede that their approach to terminology work is necessarily term-, rather than concept-focused,”

2) From concept

The following language agencies consider terminology work as a concept analysis activity. Then they move from concepts to terms.

Swedish (TNC): Term is a designation for a specific concept in a specific subject field or skill, e.g. *door* in building construction has a specific definition; all terms are word but not vice versa.

Terminological foundations at TNC are:

- a) Making efficient communication and taking users and contexts into account;
- b) Defining concepts clearly by placing them in their conceptual systems;
- c) Clarifying the kinds of relationship among related terms.

Since behind a term there is a concept, TNC tries to describe concepts, by consulting different sources from Swedish and some other languages; it is a concept-based approach. A new concept, e.g. *free mover-student*, imported from English, is placed in a Swedish conceptual system. Diagram 4.1 represents this system.

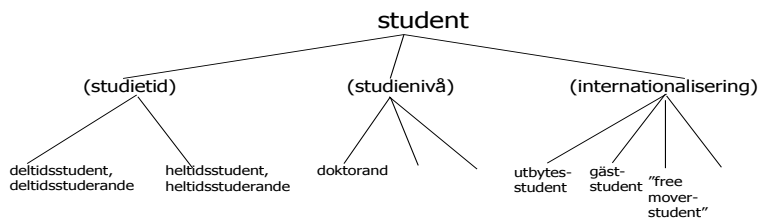


Diagram 4.1: A conceptual system

Other languages (agencies) start from concept come as follows:

Hungarian: Standardization started, according to Fóris (2010: 38), “in the 1950s, when its principles and methods were established” They were based on Soviet School of Terminology.

Ukrainian: Myking (2006) refers to Kyyak considering Ukrainian terminological activities based on Russian school. Myking argues that Ukrainian terminology employ both the Vienna and the Russian schools.

3) Both onomasiological and semasiological approaches

This part covers terminological activities from the literature dealing with both directions, from term to concept and vice versa.

French (Quebec)/Canadian groups: L’Homme (2006: 55) believes that “Like many other organizations throughout the world, Canadian groups have applied models that originated from the Vienna school and have adapted them to their own specific needs (translation or language planning) or research priorities (terminography, computer-assisted terminology or ontology modeling).” Although both the Translation Bureau and the Office Quèbécois de la Langue Française (OQLF)³⁸ follow an onomasiological approach, L’Homme discusses the reasons why these two organizations turned from conceptual systems to terms: “Since all these applications (concordancers, term or collocation extractors) are text-based, it is no longer possible to ignore contextual and linguistic information about terms and to adhere

38. Quebec Board of the French Language

exclusively to an onomasiological approach.” (p. 59) and also “...describing phraseology forces terminologists to take into account the linguistic aspects of terms and raises a number of problems in a truly conceptual description.” (p. 60) She continues that at OQLF the approach is “partly onomasiological” because “terminologists start from text to identify potential terminological units and analyze them. This will lead them to discover the knowledge structure of a subject field. Finally, the resulting description, i.e. the term record, is devoted to one concept.” (p. 66)

(see Alexiev 2007; Laurén and Picht 2006 about the combination of these two approaches)

Nordic approach: Pilke and Toft (2006: 37) argue that “We find that the only important divide [in Nordic countries] is the choice of focus or methodology, i.e. whether the concept or the term is chosen as one’s point of departure. It seems that a semasiological approach is not unusual in Nordic terminology.”

4.2.2.3 Standardization

In this section, the thesis tries to know how different linguistic communities look at standardization and which factors they take into account.

Catalan (Termcat): The Supervisory Council sticks to the theoretical principles listed below:

1.Criteria for standardization:

- a) Linguistically, i.e. looking at terms semantically, morphologically and so on;
- b) Terminologically, i.e. observing the terminological patterns in Latin languages for international terminological coordination;
- c) Sociolinguistically, i.e. creating terms by considering the target audiences, e.g. Latin and Greek roots are usually employed for medicine terms not for sports ones.

2. Standardization of:

- a) Loan terms: accepting or replacing them;
- b) Spelling, pronunciation, plurality or singularity of loan terms;
- c) Not semantically well-developed terms;
- d) Synonymous terms;
- e) Brand names.

French (DGLFLF): When definitions of source language polysemous terms are different from each other, they are considered as distinct concepts. But when their definitions are more or less the same, different disciplines should reach an agreement. If no, the General Committee decides.

Swedish (TNC): TNC considers different semantic layers of polysemous terms as separate concepts, for instance *webbplats*, *webbsida*, *förstasida* and *startsida* have been suggested for the different concepts *homepage* expresses.

Persian (APLL): The principles for polysemous and synonymous terms from *osul va zavābet-e vāžegozini* “Principles for Terminology” (2007: 13-14) are presented below:

1) When a term designates different concepts, each of them can be expressed by an individual equivalent; e.g. the equivalents of *deposit* in chemistry and banking are *rosub* and *sepordeh* respectively (the example is from the previous version.).

2) When a term designates a certain concept, it is suggested that one equivalent is used, except that it has long-established equivalents in different disciplines; e.g. the equivalents of *observation* in meteorology and basic sciences are *didebāni* and *moshāhedeh* respectively (the example is from the previous version.).

3) When a term is used in a certain field, only one equivalent should be used, except that it designates different concepts in that field.

4) When a concept is expressed by different terms, it is better to use only one equivalent, but, if it is required, different equivalents can be used.

5) It is possible to use an equivalent for different terms, e.g. *rekhnegar* (the example is mine.) both for *hacker*, in computer sciences, and for *penetration aids*, in military sciences (my translation from Persian; numbers are mine).

(see Mansouri 1988 on statistical comparison between Persian and English synonymous and polysemous physics terms)

The data extracted from the literature come as follows:

Latvian: Borzovs et al (2003: 27) suggest ten guidelines for creating Latvian IT and T terminology. Three of them are concerned with standardization:

1. **“A term in the source language shall correspond to a single term in the target language.”**

“This guideline is violated only in case if the term in source language has two (or even three) quite different meanings. For example the term *cookie*”

2. **“Different terms in the original language [English terms *error, fault, failure, malfunction, bug*] require correspondingly different terms also in the target language.”**

3. **“For a polysemic word functioning terminologically in the original language a word with a similar diapason of meanings should also be found in the target language, for example, *hard return – stingrā atgrieze, soft return – nestingrā atgrieze* .”**
(numbers are mine)

Manx Gaelic: Pilgrim and Draskau (1991: 80) give, from Fargher’s dictionary (1979), an example of different Manx Gaelic equivalents of a source language polysemous term, *development: anhoodaghey* (in photography), *crouwghey* (in mathematics and geometry) and *bishaghey* (in finance).

4.2.2.4 Terminology resources

In this part, the thesis is going to know from which resources terms can be exploited (native terms, borrowings and internationalisms).

Swedish (TNC): Term creation priorities are:

- 1) Existing Swedish terms;
- 2) Direct borrowing (*functional food*).

Persian (the Iranian Academy of Language, 1970-1977): About the resources at the Iranian Academy of Language (the second Academy) Gol-e golāb and Kiā (1976: 27 quoted in Sadeghi 2001: 26) state that first “from among commonly used words or from literary Persian or the combination of such words.” The second choice is “from other Iranian languages and dialects. These words, if chosen, should be Persianized.”

Persian (Iran University Press, 1980): Mansouri (1996: 401) explains that “The root of a word family could be borrowed from any language, but it had to be used under the regulations of the Persian grammar. We used, e.g., the Latin root 'quant' and made the Persian verb 'quantidan' for 'to quantize' and 'quantesh' for 'quantization'.”

Persian (APLL): According to *osul va zavābet-e vāžegozini* (*Principles for Terminology* 2007: 11), the APLL gives priorities to:

1. Words which have been considered as Persian words, without regarding their origins; the priority is given to those which can participate in the further morphological processes;
2. Words from living Iranian languages and dialects;

3. Words and roots from Old and Middle Iranian languages;
4. Loan [mostly from English and French] words and combining forms which: a) they are simple or their structures do not reject Persian word formation processes; b) the Academy, with regard to experts' opinions, recognizes that it is not necessary to find or create equivalents for them." (my translation from Persian; numbers are mine).

The terminology resources in Latvian, Hebrew and Sami are given below:

Latvian: Skujina (1991: 31) believes that Latvian term creation is “on the basis of native Latvian word stock and native word-building potential.”

Hebrew: Allony-Fainberg (1983: 17-18) states that “... on the principles for language elaboration ... it is impossible to ignore the fact that all innovators stressed the sources of the Great Tradition: the Bible, the Mishna, the Talmud and the literature created after that Similarly, innovators were unanimously advised to draw from Aramaic, but there was vigorous contention concerning Arabic.”

Sami: Helander (1994: 38) argues that “The aspect of language planning work concerned with term creation has benefited from the terminology in the religious texts, especially as regards terms denoting abstract concepts. The reason why the only texts dealt with were religious ones is that the church remained the only public institution using Sami in its activities for many years. This,

together with the publication of religious works, has played a significant role in the development of the Sami language.’’

4.2.2.5 Terminology formation methods

This section deals with term formation processes used by a wide range of linguistic communities, from universal methods to rare ones. But it does not mean that the methods are only limited to the following ones.

Catalan (Termcat): Principles for loan terms are:

a) Replacement:

i) Term creation

ii) Loan translation

iii) Adaptation, e.g. *eagle* changes orthographically into *iguel*

b) Adoption:

i) Highly specialized terms used in a limited area, e.g. *damnation memoriae* (damnation of memory) in archeology;

ii) Concepts not available in the target language, e.g. *kame* or *klippe* in geography.

French (DGLFLF): The committees are not given advice on the subject because most terms are already existing in French and they are only given new meanings. The French Academy naturally

considers that a neoterm is not useful when an existing term can do the trick.

Swedish (TNC): Term creation methods are:

1. Derivation (*borrning*)
2. Compounds (*enstegsblekning*)
3. Multi-word terms (*askfritt papper*)
4. Ellipsis (*flextid*)
5. Metaphor (*mus*)
6. Terminologization (*besök*) (inom sjukvården)
7. Borrowing:
 - a) Direct borrowing (*functional food*)
 - b) Adapting loan terms (*webbsajt* for *web site*)
 - c) Adapting spelling (*skanner*)
 - d) Adapting pronunciation (*syber* for *cyber*)
 - e) Adapting inflection (*skannern*)
 - f) Adapting word-formation (*hackare* for hacker)
- 8) Loan translation (*funktionell ma*)
- 9) Combination of loan word and Swedish word (*webbplats*)
- 10) Neoterm (*snable-a* for @).

Persian (APLL): According to *osul va zavābet-e vāžegozini (The Principles of Terminology 2007: 12)* selection, resemanticization and neoterm creation are general methods. New terms can be created through:

- a) Derivation, compound and derivation-compound
- b) Syntactic phrase
- c) Abbreviation
- d) Borrowing measurement units, chemical substances and pharmacological nomenclature, and loan words, even those which have not gained currency among Persian speakers but they meet the required conditions, mentioned in Section 4.2.2.4 regarding borrowing at the APLL.
- e) And also “The Academy, if it is required, can use morphological processes which are unprecedented in Persian.” (p.13)

(my translation from Persian)

The following languages from the literature are in descending order from general to rare term formation methods:

Estonian: Erelt and Saari (1991) argue that Estonian language employs the following methods:

- a) Composition, derivation, reverse and zero-derivation;
- b) Deliberate morpheme coinage: “Deliberate morpheme coinage means the invention of roots or affixes, including acronyms The new term may be built quite arbitrarily, or

suggested by a foreign, or genuine linguistic unit.” E.g. “*raal* “digital computer” (an arbitrary combination of phonemes), *sudu* “smog” and *tärk* “alphanumeric character” (portmanteau words), *vasa* “transceiver” (acronym).” (p. 13)

- c) From dialects: semantic alteration, phrase building, internal borrowing with optional semantic alteration;
- d) From other languages: ordinary borrowing (from German, English and also from the cognate Finnish language), loan translations (from Russian), imitations and use of Latin and Greek morphemes.

Lithuanian: Gaivenis (1991: 24) states that there are “three ways to form new terms in modern Lithuanian”:

1. terminologization of a word from Standard Lithuanian or its dialects;
2. neoterm creation on the basis of the inventory of Lithuanian word-formation;
3. borrowing.

Term formation methods have changed over time as the author explains that “At the beginning of the 20th century terminologization was considered the chief means of term-creation.” But “The terminological use of Standard Lithuanian and its dialects has lost its popularity, and new concepts are now usually named either after existing international terms, or new terms coined for the purpose.” (p. 24)

Gaivenis describes the current Lithuanian term-formation which is “characterized by various hybrids made up from Lithuanian and international words, especiallay [sic] with international

components such as aero-, agro-, auto ... with prefixes anti-, infra- ...with suffixes -(i)acija, -atas' (p. 25)

Ukrainian: Rogers (2006), based on Kyyak's paper, refers to "three largely chronological trends in terminology in the Ukraine from the 1920s on: "using Russian for scientific and technical communication" for five decades; developing specialist dictionaries "based on neologisms created through loan translation and the revival of archaic Ukrainian words"; and forming terms "based on terminological principles of form-content transparency ... and international transparency" (p. 154) She believes that "the recent efforts by Ukrainian domain specialists to create terms in their national language ... go beyond the filling of lexical gaps to the replacement of existing Russian loans." (p. 157)

Kyyak believes that Russian term formation models dominate Ukrainian (Myking 2006: 144).

Krouglov (2001: 208) states that "A number of western concepts have not found adequate lexical counterparts in Ukrainian. In such cases the descriptive approach is usually employed," (p. 208)

(see Krouglov 2001 about how to create new native words and borrowing strategies in Ukrainian)

Fenno-Ugric languages of Russia: Pusztaý (2003: 121) considers "the revival of long forgotten words" and "terminologization of dialectal words" as term formation methods.

Irish: According to Ní Ghearáin (2008), the principles established by a committee, in 1928, gave priorities over "...

indigenous rather than foreign sources, an approach which is still favoured today, e.g., (1) the formation of compounds from indigenous words, (2) the formation of compounds by suffixing and prefixing indigenous words, (3) the gaelicisation of foreign terms, (4) the revival of words from Old and Middle Irish, changing their meaning where necessary.” (p. 16) She also states that “... one of Rannóg an Aistriúcháí’s [established in 1922] primary achievements has been the differentiation of synonymous terms and the allocation of specific definitions to terms that in the general language are treated as synonyms. An illustration of this is the differentiation of the terms ‘mír’, ‘alt’ and ‘cuid’ in legislation to designate respectively ‘paragraph’, ‘section’ and ‘part’, while in the general language ‘alt’ is most often used to designate ‘paragraph’ and ‘cuid’ to translate ‘section’.” (p. 17)

Icelandic: Helgadóttir (1991) refers to compounding, derivation, semantic changes, and phonologically, morphologically and orthographically adapted foreign words as terminology methods.

Árnason and Helgadóttir (1993), by referring to Ari et al (1991: 45-60), argue about “the possibility of making up new roots or nonsense words, and assigning them arbitrarily a meaning He also mentions the possibility of using acronyms. But the main disadvantage of these methods is that the words created in this way would be unmotivated ... he suggests that others, i.e. creation of new words from existing roots and affixes or the assignment of new meanings to old ones, should be used first.” (p. 11-12)

Manx Gaelic: The Coonceil ny Gaelgey (the Manx Language Council) sometimes suggests employing “a term historically documented elsewhere in Manx Gaelic sources. Purists welcome

this move as an effort to retain the unique linguo-cultural flavour of Manx.’ (Pilgrim and Draskau 1991: 78)

Russian: Grinev (1993) considers semantic methods such as “borrowing from general language or the language of the science that serves as foundation for the new science” and morphological methods such as “derivation, combination” (p. 23)

Leitchik and Shelov (2003b: 86) classify some of “term formal structures”:

- a) Non-derivative words, *glaz* (*eye*);
- b) Derivatives with new affixes, *pozitron* (*positron*);
- c) Compound words, *zubrobizon* (*wisent-bison*);
- d) Abbreviations including word-like units *tokamak* (*tokamak*), apocopes *retro* (*retro*), compound abbreviations *remstrojkontora* (*construction and repair company*), telescopic words *reanimobilj* (*reanimobile*), abbreviated collocations *sotskultbyt* (*social and cultural every day life*), symbol-words *i-oblastj* (*i-area*) and pattern words *V-klapan* (*V-valve*).

Hebrew: Nahir (2002) summarizes “The major methods used in the lexical codification of Hebrew during its Revival [1890-1914]” as follows:

“1. Drawing words from old texts for use with their original meanings.

2. Drawing words from old sources and assigning them new meanings (/xashmal/ ‘electricity’; /mexona/ ‘machine’, from biblical Hebrew...).

3. Deriving roots from old sources and using them to create new words.
4. Using words drawn as above but as different parts of speech (verb > noun > adjective, etc.).
5. Reduction of expressions into single words while keeping their meanings (/klavlav/ ‘small dog’, for /kelev katan/; /milon/ ‘dictionary’, for /sefer milim/).
6. Borrowing from European languages, particularly from Yiddish (especially colloquialisms, /menadned/ ‘nag’ ...), Russian (including suffixes, e.g., /-chik/ diminutive; /-nik/ ‘one who belongs to a given group’) and German; and from Arabic (including colloquialisms, e.g., /adiv/ ‘polite’ ...) and Aramaic. Usually borrowed words went through a Hebraization process.
7. Loan translation (e.g., /gibuy/ ‘backing’ ...).
8. Popular etymology (e.g., /matneãa/ ‘starter’ from the root /noãa/).
9. Adding suffixes or infixes to create words of different patterns from existing words. ...the pattern /CaCaC/ for profession or trade (e.g., /sapar/ ‘barber’, /tabax/ ‘cook’); the pattern /CaCeCet/ for diseases (e.g., /šaxefet/ ‘TB’, /nazelet/ ‘a cold’); and the pattern /maCCeC/ for tools etc. (e.g., /masmer/ ‘nail’; /mavreg/ ‘screwdriver’; /matspen/ ‘compass’).
10. Using one of a small number of consonants as prefixes to create new words from existing roots, e.g., initial /t-/ (/tizmoret/

‘orchestra’...).

11. Merging pairs of words into single words. (e.g., /migdalor/ ‘lighthouse’, from /migdal/ ‘tower’, /or/ ‘light’; /madxom/ ‘thermometer’ from /mad/ ‘measure’ and /xom/ ‘temperature’...).” (p. 291-292)

Latvian: Skujina (1991: 30) states “‘Latvian term-building principles [Principles of Formation in Latvian Terminology] were formed in the last century.’” She believes “‘New words are created according to Latvian models.’” (p. 31) In addition to derivation, compounding, semantic changes and conversion, the author refers to appellationization and separation³⁹.

Arabic: Baker (1987) refers to some Arabic term formation methods: derivation, discovery, loan translation/calque and Arabization (p. 186).

About derivation she goes into details: “‘In theory, the structure of the Arabic language offers unlimited potential for the derivational of new terms by analogy. Arabic is based on a system of three radical consonant roots. Any given root carries a specific meaning and is used to generate various verbal and nominal forms by the addition of prefixes, suffixes and vowels in certain positions, according to set patterns For example, the pattern *MaCCaC* generally indicates a ‘‘noun of place’’... ‘‘*mansa?*’’ [factory – from ‘‘*sn?*’’, to manufacture]...’’ (p. 186)

Then she describes discovery method that “‘This method consists of reviving old archaisms and extending their meanings to express

39. For appellationization and separation processes see: V. Skujina (1989). “‘Appellationization and separation as methods of word-formation’”. *BALTISTICA*. 111 (2).

new concepts. It is one of the methods favoured by the academies since it utilizes the rich lexicon of Arabic instead of introducing new elements to it Some of the archaisms they sought to revive have been the subject of much ridicule. These include words like “*irzīz*” (suggested for telephone; originally meaning sound of rain)...” (p. 186)

When a word goes along Arabization, its derivation is restricted “since they cannot be made to fit into the Arabic root and pattern system.” E.g. *al-komputer* (p. 187) And she continues that “In spite of this restriction and the disapproval of the academies, Arabization remains one of the most common methods of introducing new vocabulary into Arabic.” (p. 187)

(see Bahumaid 1994 for Arabic term-formation methods)

Azerbaijani: Gasimov (1999: 41) states “the abbreviation method is not so characteristic to Azerbaijani term creation.”

4.2.2.6 Implantation criteria

Implantation is a sociolinguistic process whereby terminologies will be established among target audiences and gained currency (see Quirion 2003). A terminology work is looking for ways to help terms to implant. For this reason, during a terminology planning project, some criteria have to be observed. The criteria discussed below come from two main sources: language agencies and experts, at a theoretical level, and experts’ evaluation studies, at a practical level. An outline of this part comes as follows:

- 1) At a theoretical level
 - a) Linguistic criteria
 - b) Non-linguistic criteria
 - i) Actors' role
 - ii) Social networks
 - iii) Language availability
 - iv) Knowledge as a conceptual system
 - v) Level of specialty
 - vi) Language attitude
- 2) At a practical level
 - a) Linguistic criteria
 - b) Non-linguistic criteria
 - i) Language attitude
 - ii) Language agencies

1. At a theoretical level

This part is concerned with the data obtained from language agencies or experts but not based on researches. For this reason, it is called a theoretical level.

a) Linguistic criteria

Linguistic criteria include not only grammar (morphology, phonetics, spelling and so on) but also transparency, conciseness etc.

French (DGLFLF): The DGLFLF advises the committees to find transparent equivalents, to observe French rules and to find terms to be easy to pronounce. Concision is best but not necessarily successful. The French Academy naturally considers that a neologism is not useful when an existing term can do the trick. The DGLFLF does not try to translate an English term which has been included in French for a long time. There are also English terms which the committees have not succeeded in finding French equivalents for them.

Swedish (TNC): Terms should be well-established (*gyttja*), transparent (*low-chlorine paper*), unambiguous (*nuclear energy* instead of *atomic energy*), concise (*paint roller* instead of *painting roller*) and productive. TNC prefers experts to build them.

Persian (APLL): According to Sadeghi (2001: 21-22), the criteria for term creation at the “society for coining scientific terms” (1311 A.H./1932 - 1319/1940) were:

1. Conformity to the rules of Persian grammar
2. Simplicity and brevity
3. Conservation of existing terms, unless they were wrong, or more appropriate terms could replace them

4. Preservation of terms that could be considered international.

About term creation criteria at the Iranian Academy of Language (the second Academy 1970-1977), Sadeghi, referring to Gol-e golāb and Kiā (1976: 27) states that “In coining new words and compounds, the Iranian Academy of Language endeavors not to harm the beauty and harmony of the Persian vocabulary. It selects new terms in such a manner that the ties between modern Persian and its past should be strengthened”. (p. 26)

At the APLL, the criteria from *osul va zavābet-e vāžegozini* (*Principles for Terminology* 2007:13) are:

1. In creating terms, Persian grammatical rules should be observed.
2. It would be better to select an equivalent which goes through productive morphological processes for derivations and compounds.
3. Persian phonetic rules should be observed. Loan words should be phonetically adapted.
4. Spelling should be based on *dastur-e khat-e fārsi* (Rules for Persian Spelling) set by the Academy. If it is required, some of punctuation marks which have not yet been common in Persian can be used; e.g. hyphen for joining two words like *samt- sor'atnemā* as the approved term for *velocity-azimuth display* (the example is mine.).

(my translation from Persian; numbers are mine.)

The linguistic criteria from the literature come as follows:

Icelandic: Árnason and Helgadóttir (1993: 12) give some criteria:

“- Terms should be phonologically acceptable and maintain the inherited relation between orthography and pronunciation.

- Terms should be morphologically acceptable.

- Terms should be transparent and related to other forms in the language, which make use of native stems.” (see Helgadóttir 1991)

Irish: O’connell and Pearson (1991: 87- 88) state “The following guidelines are those promoted and used by An Buachoiste Téarmaíochta and were first published by α Baoill in 1988:

1. As far as possible, there should be one-to-one correspondence between a concept and the term used to signify that concept.

2. Terms already in use are not to be changed or dispensed with, without good reason.

3. A correspondence should exist between related terms on both a morphological and a semantic level.

4. All terms are to have a precise form and meaning and ambiguity is to be avoided.

5. The use of the selected term must be applicable to other areas or related disciplines. In terms of its structure it should be possible to transform a noun into a verb or an adjective, and it should be possible to use it as a constituent in a compound word.

6. All new terms must conform to the orthographical and

grammatical conventions used in Irish and their pronunciation must conform to the phonological and phonetic patterns of Irish.”

Latvian: According to Skujina (1991: 31) “The adoption of a term largely depends upon its semantic precision,”

Borzovs et al (2003: 27ff) offer ten guidelines for creating Latvian IT and T terminology:

1. **“Such equivalent has to be chosen that in case of back translation the same original word would be used.”**
2. **“In the coining process one must pay attention to whether a coinage will fit into the corresponding term system, as well as to be aware of its similarity with terms close or analogous to it.”**
3. **“If the term is already established in practice then it is not advisable to change it without sufficient motivation.”**
4. **“A term of Latvian origin has to be given preference to international terms.”**
5. **“... They have to be short, precise euphonious and easy perceptible. Requirements can be mitigated for terms of rarer usage.”**
6. **“Having a good balance of vowels and consonants Latvian language is an euphonic language.”**
7. **“None of these guidelines is absolute.”** (Numbers are mine.)

Ukrainian: Rytsar (1992) explains the approval procedure at the Institute of Ukrainian Scientific Language, set up in 1921, which

“followed the principle of seeking the closest possible correlation between the adopted term and its semantic content while at the same time respecting morphological conventions involved in derivation and modification. Furthermore, terms were preferred which favored the economy of writing by containing fewer letters; for instance, the term ‘strumin’...was rejected in favor of ‘strum’ which is now the established term.” (p. 133)

The author continues that terms based on the principles “published in the *Bulletin of the Institute of Ukrainian Language* of the Academy of Sciences (vol. 2, p. 12) (Kiev, 1930)” should be: “easy to understand, exact, unambiguous, flexible for the creation of derivations, and euphonious in sound.” (p. 133)

Citkina (1991: 41) believes that “In the process of constant interaction of Russian and Ukrainian terminology, the synonym that survives and becomes normative is the one that is symmetric to Russian (generally common), or shorter (in either language), or international.”

Rogers (2006: 153) also believes “In the case of the Ukraine, a principal concern is the establishment of specialist vocabularies in Ukrainian as a national language which are well-motivated, consistent with the conventions of the Ukrainian language, and where possible, with an international aspect.”

Swahili: Mwangoko (1991: 305) states that term formation processes should observe Swahili phonological and grammatical structure, precision, derivational productivity, conciseness [sic] and consistency.

b) Non-linguistic criteria

Besides linguistic criteria which should be fulfilled, non-linguistic factors have impact on term currency. Some of them expressed by language agencies and experts are: actors' role, social networks, language availability, knowledge as a conceptual system and level of specialty and language attitude.

i) Actors' role

The position and qualification of stakeholders remains of paramount importance. Steurs (2006: 124) emphasizes that “When studying the process of term formation, an important aspect is the level of communication and the actors involved”

The data below are concerned with the role of general actors (Irish), subject field experts (Latvian, Russian and Icelandic), a combination of specialists and linguists/terminologists (Ukrainian and Norwegian), a lack of specialists (Hungarian and Arabic) and a lack of experts in linguistic researches (Greek and Uzbek).

Irish: Ní Ghearáin (2008: 17) believes “The media, educators and writers who communicate in Irish, including creative writers, academics or translators, represent other significant actors in Irish terminology policy, in terms of developing new terminology and influencing the acceptance or non-acceptance of particular terms.”

Latvian: Skujina (1991: 31) focuses on “the activity of specialists in the popularization of the term and – in some ways – on the public prestige of the author who created the term.” And

also she states “The process of adoption is more succesful [sic] in institutions of higher education, when the new terms are popularized in lectures to students.”

Russian: Džinčaradze et al (1992: 18) believe “The major portion of terminology work conducted in the USSR has been carried out either with direct participation or under the leadership of prominent scientists of our country within the framework of authoritative organizations such as the Academy of Sciences, universities and Gosstandart. This fact has had an impact on the quality of terminology work in this country.”

Icelandic: Árnason and Helgadóttir (1993: 19) state that “...the Minister of Education and culture asked the Icelandic Language Council to prepare a report on present terminological activities in Iceland and make proposals for the future organization of terminological activities and how they could be strengthened.” The authors continue that “terminological activities initiated by those who need the terms and use them produce the best results. The role of the government would then be to provide the proper environment for the terminological activities to flourish.”

Ukrainian: Rytsar (1992: 133) states that “The requirements for establishing terminology were published in the *Bulletin of the Institute of Ukrainian Language* of the Academy of Sciences (vol. 2, p. 12) (Kiev, 1930) in an article entitled ‘On the principles of compiling Ukrainian terminology’ by the engineer Tadey Sekunda.” Citkina (1991: 40) explains that “...deliberate LSP language planning in Ukraine began in 1957, when on the Academy of Sciences level it was decided to compile a series of various dictionaries of special lexics and terminology in

particular. This work is mainly carried out by field specialists with the help of linguists... .’

Rogers (2006: 158) states that “...Kyyak’s prognosis for the survival and use of recent Ukrainian neologisms coined by domain experts in the form of loan translations or re-semanticisations is pessimistic. His solution is to involve linguists in the process of term formation and to develop a set of principles which would result in better motivated terms.’”

Norwegian: Hjulstad (1994: 50) believes “It is our experience that it is the joint effort of terminologists and subject field experts that produce the best result.’”

Hungarian: Fóris (2007: 22) argues “The frequent professional insufficiencies and mistakes in the entries of (general and special language) dictionaries describing technical issues can be attributed to the fact that the lexicographic and terminological work is carried out with no representative from the given professional fields.’” Fóris (2010), referring to her research on terms’ definition in Hungarian dictionaries, stresses this point that when experts do not take part in revising dictionary, definitions are inaccurate. She also claims that her research results “match the results of Zajankauskas obtained in Lithuanian dictionaries” (p. 43).

Arabic: Elkhafafi (2002: 257) emphasizes a barrier to terminology planning. It is “the difficulty in staffing the various committees with professionals and linguists. There is a lack of trained personnel in most fields and the meager funding the language planning agencies receive does not attract the few qualified individuals. A group developing terms for chemistry

might or might not have the services of a chemist to assist it. Generally, working professionals with their valuable expertise and subject knowledge are actively engaged in their own fields and have neither the time to spare for, nor the interest in, the work of language planning agencies. Nonetheless, these professionals might actually be engaged in terminology production for their own use without realizing that they are contributing to the scientific and technical lexicon. However skilled they might be in their own areas, they are generally not trained to produce terminology and thus they may inadvertently muddy the waters through haphazard or inconsistent creations that slip into general use.” (see Bahumaid 1994)

Greek: Papadaki (1994: 545) believes that “An inhibiting factor for the creation of neologisms is the lack of experts who will be able to dedicate their time to the necessary linguistic research and the invention of terms according to the principles of naming and the rules of production, synthesis and syntax.”

Uzbek: Schlyter (1998: 167) explains that “In a bulletin in Uzbek (Hožiev 1996), "Criteria for the Choice of Terms", published by the Lexical Research Committee and the Linguistic Institute at the Uzbek Academy of Sciences, it is pointed out ... that the work on reforming and updating the Uzbek lexicon should be left to experts in order to obviate uncertainty as to the choice between variants and the appearance of improper or inaccurate forms.”

ii) Social networks

Terms for getting established need to circulate among relevant agents and agencies in the form of a network sending information and receiving feedback. The examples from French, African languages and Arabic are presented below:

French: Pavel (1993: 24) focuses on “social interaction as the basic unit of analysis of terminological acceptability.” Then, by referring to Turner 1988, a social interaction theorist, Pavel argues about interactional and structuring processes. Interactional processes mean “Conceptual and terminological changes do not occur by decree but by degrees” (p. 26). The other aspect is structuring processes which are “The repeated alternation of those activities that intensify information exchanges and those that orient its dissemination promotes a high degree of interconnectivity within a cooperative network and facilitates consensual acceptance of neologisms.” (p. 27) Then the researcher clarifies the point by referring to “the International Network of French Neology and Terminology (RINT) in which terminologists from French-speaking countries started scanning specialized French texts in advanced technical and scientific fields for newly coined terms. For each concept, all proposed designations, definitions and contexts are to be sent to the Canadian terminology bank TERMIUM, systematized on terminological records, circulated to interested specialists in each member country for comments, returned to TERMIUM researchers for integration of comments received and preparation of a collection to be published in France and made available to French-speaking users.” (p. 27)

Rousseau (1993: 41) states “... modernization of French terminology will require increasingly sustained joint international efforts. In the 1970s, a first international neology network was created in Québec and its works published in the collection *Néologie en marche*.” (see Nilsson 2010: 73, Figure 1: “A model for a terminology co-ordination programme”)

African languages: Fourie (1994: 11) categorizes the reasons why not all terminologies are accepted. In addition to “inaccuracies in the terminographical process” and “cognitive complications in the encoding and decoding processes”, the author states that when “the relationship between **terminological institution** and **language user** is not based on **feedback**”, it can be a non-linguistic reason for term rejection.

Arabic: Elkhafaifi (2002: 256) deals with the problems that the Arabic language planning agencies are faced with, e.g. “The agencies’ terminology lists are circulated on an irregular basis among scientific institutions and universities in the Arab countries.” And “The agencies themselves may not even adhere to their own decrees in their published writings.” (p. 257) Another problem is the lack of cooperation among institutions. The author, referring to Khaleefah 1983, states that “In 1984, the University of Jordan refused to fulfill its commitment to the Jordanian Academy of Arabic to use certain science textbooks, which had been translated into Arabic by the Academy specially for their curriculum” (pp. 263-264)

(see Bahumaid 1994 on insufficiencies)

iii) Language availability

Language availability means that terminologies should be provided with a scene to appear on; they need an opportunity to function. Creating terms by itself is not enough but different areas are required for employing terms.

The following examples represent the results of the absence and presence of language opportunities:

French (Quebec): Aleong (1982: 234) states that “... the same school that transmits PAT [Proposed Automotive Terminology] to students also explicitly teaches the English-language terminology for reasons of sociological and economic pragmatism The main obstacle to the rapid diffusion of PAT among student and professional mechanics is the constant need to use the English language terminology as the medium of access to essential technical information.” The author concludes that “...it would seem evident that corpus planners in Quebec must look beyond sheer vocabulary-making and more toward implementation.” (p. 235)

Afrikaans: Cluver (1991) believes that although “There has never been any explicitly formulated plan for the introduction of Afrikaans in Namibia ... the introduction and spread of Afrikaans in Namibia must count as one of the “success stories” in language planning.” (p. 45) Then the scholar explains that “As the Namibian civil service expanded, it naturally attracted Afrikaans-speaking applicants from South Africa's burgeoning civil service. In this way Afrikaans soon became established as the language of

the civil service, education and later, with the escalation of the war in Angola, as the language of the armed forces.” (p. 46)

iv) Knowledge as a conceptual system

Owing to the systematic construction of knowledge, terminologies should be offered in a manner that encompassing a specific area of knowledge, in the form of conceptual systems as discussed by Antia (2000) and Antia and Kamai (2006).

African languages: Antia (2000: 141), referring to Baldinger (1956: 380f), states that “any ‘scientific’ dictionary that seeks to instruct must be conceptually structured. His premise, (German) *Erkenntnis bedeutet Erkennen von Zusammenhängen*, treats knowledge as being all about knowing how things are interrelated.”

Antia and Kamai (2006) raise the question that “whether the mere fact of having indigenous language terminologies is able to check drop-out rates and enhance learner achievement in classes taught in local languages.” (p. 137) Then they, from their data, arrive at this point that “the creation of terminologies of science in African languages will not necessarily translate into enhanced learner achievement, ...” (p. 147) The researchers explain that “In the light of the data in this study, it is obviously desirable for teachers and learners of science in whichever languages to preface the teaching/learning of subjects or topics by a concept-relations-driven metascience.” (p. 147) Finally, the authors conclude that “... the use of any language does not automatically confer advantages in the science classroom. It does so, and possibly very

remarkably, only after attention has been paid to how science functions in every language.” (p. 148)

v) Level of specialty

Terminologies, as packages of knowledge, have to be prepared and distributed proportional to audiences’ needs.

African languages: Ohly (1997) in an article entitled “The African users' model” states that “In lexicographic practice African terminographers, in order to ensure that the communication is successful, distinguish between the beginner, intermediate and expert User Model with respect to semantic fields.” (p. 103) The author explains that because they are beginners “terms coined are transparent and descriptive.” (p. 103) and “The intermediate UM [user model] is geared towards persons with some knowledge of the given terminological domain.” (p. 105) The Expert User Model (EUM) “is already implemented at the level of secondary school programmes and technical schools” (p. 106)

vi) Language attitude

Language attitude can include users’ favorite terminology resources as demonstrated by the following example from Swahili.

Swahili: Mwansoko (1991: 304) states that “Although English is usually relegated to the last position among the external terminology sources for Swahili by the NSC [National Swahili Council], this being the case especially in the humanities, our

informants, who are the actual users of Swahili terminology, gave it prominence as a source of borrowing among the foreign languages.” The author believes that taking account of users’ attitudes improves terminologies’ chances of spreading among intended users.

2. At a practical level

To know whether terms have gained currency or not (an evaluation process), Quirion introduces *terminometrics* as:

a study designed to measure the degree of implantation of all designations referring to a single concept or to a set of concepts. It is generally carried out on a homogeneous group of concepts, such as a subset of a more general discipline. It is used to measure vocabulary usage subsequent to the language and terminology planning interventions of government organizations with linguistic responsibility (Quirion 2003: 30).

He also mentions that “Since 1974, a total of twenty different terminometric studies have been carried out in three political jurisdictions: France, Israel and Québec.” (p. 31)

A research-based categorization of linguistic and non-linguistic factors affecting implantation is presented below.

a) Linguistic criteria

This part presents scholars' linguistic findings influencing terminology acceptability in their own linguistic situations: Hebrew, French (Quebec), Catalan and African contexts:

Hebrew: Allony-Fainberg (1983) did a research in Hebrew to know about 25 neologisms by considering their length, newness, register, semantic load on the root and verbal paradigms associated with the root. Conclusions from the research are: “... this study presents data which refute the hypothesis that the length of a neologism is of considerable importance for its acceptability.” And “... origin in a great tradition is of limited consequence for acceptance. The newer words, not necessarily based on sanctified sources, were better diffused and more accepted.” (p. 39)

French (Quebec): Quirion and Lanthier (2006) describe their study which included “... almost 300 terms from different fields of study and covered the province of Quebec.” (p. 117) Considering four terminological factors such as “conciseness, absence of competing terms, derivative form capability, and compliance with the rules of language”, they conclude that “they are all more characteristic of terms with an implantation coefficient of 1 than of terms that are not accepted into usage.” (p. 117) Then the scholars continue that “Hypotheses concerning of the influence of certain terminological variables on implantation can now be statistically confirmed What was previously an axiom can now be considered as fact.” (p. 117)

Catalan: Montané (2012) in her PhD thesis proves this hypothesis that brevity affects implantation positively. Another linguistic

factor empirically confirmed by her research is the formal analogy between standardized terms and the original units. A variable negatively influences implantation of the standard terms, from the author research findings, is competition.

(see Antia 2000 employing the theory and technology for creating a legislative terminology resource (English — Efik))

b) Non-linguistic criteria

This part is devoted to non-linguistic criteria taking crucial roles in implantation, emphasized by evaluation researches.

i) Language attitude

Some researchers claim that language attitude, a way language users view their or foreign languages/terminologies, affects implantation.

An example from African languages comes below:

African languages: Madiba (2001: 58), referring to Mwansoko (1990) and Samsom (1988), believes that their studies “clearly show how the puristic terms developed by BAKITA [Baraza la Kiswahili la Taifa/National Kiswahili Council] were ignored by the general public who preferred to use borrowed terms.”

ii) Language agencies

This part shows how insufficiency of language agencies influencing dissemination in Turkish and Irish and also offers suggestion for spreading terms in Catalan sociolinguistic situation.

Turkish: Karabacak (2009: 148) studies “the current situation with respect to use of economic terms planned by the TDK [Turkish Language Society]. The study took both corpus analysis and users’ perceptions into account and attempted to determine the extent to which terms invented by the language society in Turkey have actually replaced foreign competing terms carrying the same meaning”

The result is: “Currently, Turkish newspaper writers use equivalent loan economic terms over official terms.” (p. 167) And the reasons are: “First of all, the TDK was not considered by the writers surveyed to be an authority for planning economic terms. Thus, many of the terms sanctioned by the TDK are not even known to these writers. Unofficial terms used by the writers also lack standardization. This lack of standardization of economic terms prevents writers from using certain terms because they are concerned about not being able to convey their ideas precisely, and consequently losing readers.” (pp. 167-168)

Then the author makes suggestions: “It seems that a credible authority is needed to plan these economic terms to end the uncertainty experienced both by the writers and their readers. From this point of view, the TDK might need to change the way it coins and disseminates economic terms. It seems that the TDK is on the right path by having a new team formed of six scholars of economics from two universities, one of whom is also a newspaper writer, to prepare another dictionary that only focuses on economic terms. However, as suggested by the writers surveyed for this study, inclusion of more than six people is necessary, and the existence of this council should be known to all economists. As a matter of fact, every newspaper writer should be

invited to share his or her suggestions. Considering the existence of internet technology, this type of inclusion is not impractical. An online database could be used for each writer and scholar of economics to suggest terms or vote for other fellow economists' suggestions. In this process, a study team like the one currently used by the TDK could adopt the role of facilitator, rather than taking the whole responsibility of coining and disseminating terms; it could organize and evaluate the terms that are suggested by the expert users. The group might then suggest those terms to be used that are most agreed upon. Once majority of the writers and scholars agree, they might feel more comfortable using these terms." (p. 168)

Irish: Ní Ghearáin (2011: 321), presenting the empirical evidence, states that "the data suggests that planned terminology performs certain limited functions in the informants' lives, mainly related to the language policy of the work domain. ... the poor dissemination of planned terminology results in the choice of using an Irish term occasionally not being available to informants. Once known to the community, the Irish term may be regarded as unsatisfactory or unsuitable due to a variety of linguistic and sociolinguistic factors. It is argued, for example, that the marked status of the Irish term vis-a`-vis the generally well-established English term results in a critical predisposition towards new Irish terms, which is then exacerbated by the lack of reinforcement received by Irish terminology."

She continues that "It is argued that the estrangement of the Gaeltacht speech community from official terminology planning and the non-engagement of the community in terminology development, which is a feature of State-led language

development generally, contributes to the perception that new terms are unnatural and arbitrary. The data illustrate a lack of awareness of the terminology planning structure and a perception that official terminology planning is conducted with little awareness of and sensitivity towards Gaeltacht language norms. Yet, the evidence also tentatively suggests reliance on the part of the community on institutionalised planning for the development of new terms which are needed for use in certain communicative contexts. Therefore, the study concludes that institutionalised terminology planning in the threatened language—when conducted at a remove from the language community—has the potential to alienate or marginalise the community from terminology development and reinforce the dependence of the community on official authorities for the elaboration of the language.” (p. 321)

Catalan: Montané (2012), based on her research in Catalan sociolinguistic environment, believes that the presence of standard terms in terminological dictionaries does not guarantee that they will be used effectively in specialized texts but what is needed is a strategic framework covering sociolinguistic features of a given field of specialty.

4.2.3 Implementation layer

This layer represents how to manage and implement the results from both sociolinguistic analysis and linguistics of science layers. Actualizing terminology planning has prerequisites, completely dependent-situation factors, including human resources

qualifications, technological tools, which part of the structure is responsible for which part of the project, agency structure and how to deliver a terminology product to intended targets.

This layer consists of:

4.2.3.1 Infrastructures

- 1) Human capacity building
- 2) Technological capabilities

4.2.3.2 Workflow

4.2.3.3 Organizational structure

4.2.3.4 Dissemination

4.2.3.1 Infrastructures

Starting terminology planning requires basic tools and skills to make it work properly. These requirements are called infrastructures divided into two groups: human capacity building and technological capabilities.

1) Human capacity building

Terminology planning implementation stage ideally needs suitably qualified experts. However, it varies from a linguistic situation to another one, depending on the development level of this subject field. The data below show how different linguistic communities

deal with this requirement: professional terminologists, linguists or people trained in other fields.

Catalan (Termcat): For training, Termcat offers courses inside and outside.

French (DGLFLF): DGLFLF has not any program for training and its terminologists do not do any terminology per se and they do not create any terms. But the terminologists are working as counselors and file makers and do some researches when they are needed.

Swedish (TNC): According to Bucher (2007: 44), “Training in terminology at universities began on a relatively large scale in Denmark and Finland in the early 1970s (in business economics) while in Sweden training was confined to learning on the job (at TNC), not in degree or diploma programmes.” At a regional level, as she states, “Within the framework of Nordterm cooperation four post-graduate courses – the first one in 1978 – have been arranged.” (p. 45)

In Sweden, Bucher explains “These courses gradually also led to training at Swedish universities and most of the training is given by TNC, sometimes in cooperation with The Institute for Interpretation and Translation Studies at Stockholm University. ... The spring of 2002 saw the establishment of the first separate terminology course for credit at Stockholm University.” (p. 45)

Regarding training at the TNC, she states “TNC also offers custom-made courses for special projects or interest groups both in the public and the private sector.” (p. 45)

According to Bucher (2007), TNC is planning to expand its training involvements by:

- 1) elaborating and developing more web-based courses at the national and Nordic level;
- 2) introducing terminology modules in all university programs at an early stage, because terminological awareness plays a significant role in knowledge acquisition.

She believes that “As a matter of fact, training activities have expanded more than the other of the TNC’s activities during the last decade. The raised terminological awareness that we see as a result of the current information and knowledge society ... leads to this demand;... .” (p. 45)

For TNC, an ideal terminologist has a basic linguistic knowledge, language proficiency in their mother tongues, knows more than one language and possesses expertise in a subject field.

Persian (APLL): The APLL has offered some short courses for teaching its methods and workflow. The courses included: an introduction to linguistics, an introduction to terminology, morphology, phonetics, semantics, syntax and Latin and also how to fill in terminology records. Meanwhile, the APLL proposed a syllabus of *vāžegozini va estelāhshenāsi*, literally meaning “Word-selection and Terminology”, for an MA course to the Ministry of Science, Research and Technology. Although the Ministry approved it about ten years ago, no universities or institutes have started it.

The following data arrangement is: lacking trained terminologists (Manx Gaelic, Lithuanian, Hungarian), having basic training courses (Latvian and South Africa) and having teaching terminology in institutes or universities (Icelandic, Swedish, Finnish and Estonian).

Manx Gaelic: Draskau (2001) argues that “There is no deliberate LSP planning. The work is carried out by individuals and by Coonceil ny Gaelgey, the Manx Language Council, whose training has been philological, etymological and linguistic rather than terminological.”

Lithuanian: Gaivenis (1991: 21) explains that “Theoretical work has mostly been carried out by the linguists of the Institute of Lithuanian Language They investigate the linguistic problems of the standardization of terms as well as problems of the development of terminological systems.” The author continues that “New terms are usually coined by the Terminology Commission.” (p. 22)

Hungarian: Fóris (2010: 44) suggests that “the presentation of a given profession’s terminology along with the general academic questions of terminology, either as part of an independent professional training programme or in further education. I am referring to the training of terminologists, which is already a fact in some European countries (no such training currently exists in Hungary).”

Latvian: Skujina (1991: 33) explains that “Terminology training is realized mainly in specific terminology work in the structures of the Terminology Commission, and also in special organized

courses in terminology for specialists at various institutions, where terminological questions are relevant.” The author believes that “specialists play the leading role, but it is especially important for them to collaborate with linguists.”

South Africa: Alberts (2008: 21) states “The Terminology Coordination Section (TCS) of the National Language Service (NLS), Department of Arts and Culture provides in-house training in its capacity as the official national terminology office. There are at present only a few tertiary institutions in South Africa that offer official courses in terminology theory and principles ... dealing with translation or lexicography. Terminology training as such receives actually too little attention in these courses to be effective.”

Icelandic, Swedish and Finnish: Pilke and Toft (2006: 44) state that “both Iceland and Sweden completely lack LSP and terminology study programmes at the BA and master levels; and even in Finland systematic education of students as well as of researchers has been established at the University of Vaasa only.” Then they continue that “For this reason, in many cases LSP and terminology research in the three countries is carried out by ‘private entrepreneurs’, not by research units in the proper sense of the term.” In Iceland as Helgadóttir (1991: 66) states “In November of 1991, the Icelandic Language Institute arranged the first introductory course in terminology in cooperation with the University of Iceland.” The author continues that “The Language Institute has also published an instruction booklet on terminology [1991]. It deals with the theory of terminology, word formation in Icelandic and computer software for the registration and

processing of terminological material which the Language Institute has developed.” (p. 66)

Estonian: Erelt and Saari (1991: 17) describe Estonian situation that “It was only from 1977-1984 that the curriculum of the degree course in Estonian philology at Tartu University featured a special course on terminology After 1984, the course was thrown open to students who had chosen terminology as their special field of interest.”

(see Nedobity 1990 on “training of local personnel”; Acuña Partal and Cordoba 1992 on terminology teaching and training in Spain)

2) Technological capabilities

The increasing progress in sciences and technologies has created new tools which can be used not only for spreading terminological products but also for promoting language awareness. These facilities span a broad socioeconomically-dependent spectrum.

Catalan (Termcat): Besides publishing dictionaries, Termcat has produced technological tools:

“GesTerm is a terminology management tool created using free, downloadable software and which can be improved collaboratively by modifying the source code. GesTerm assists users in carrying out the main tasks involved in terminology work: creation of files and dictionaries containing terminology; maintenance of information

linked to such files and dictionaries; advanced searches and generation of printable lists.”⁴⁰

And

“GdTweb is a tool designed for people who collaborate with TERMCAT from different physical locations (terminologists and experts), enabling them to work online by using a terminology management programme connected to the Centre’s terminology databases.”⁴¹

French (DGLFLF): *Franceterme*⁴² presents all approved terms published in *Official Gazette/Journal Officiel*. And also there is a facility for visitors to subscribe for being informed of terminologies which come within their interests. If the visitors have any suggestion, they can input it to the suggestion box.

Swedish (TNC): In the pre-computer era, the terminological information (terms, definitions, etc.) were stored in card file boxes. At the end of the 60’s, computer-aided methods started to be used for elaborating glossaries. In 1987, TNC released its first term bank on a CD-ROM. The second version was released in 1989, the third in 1992 and the fourth in 2005 (Bucher 2007).

TNC also has a larger internal database (called TNC-bas) for internal use, developed since the’70s. It contains a rich terminological material in many languages and covers a

40 and 41. http://www.termcat.cat/en/El_TERMCAT/Serveis_Termcat/#Eines
(Accessed 25/1/2014)

42. <http://franceterme.culture.fr/FranceTerme/>

representative number of subject fields, in more detail all TNC's glossaries, questions and answers from the help desk services, excerpts from magazines and external glossaries.

Tekniska basord, common terms shared among different subject fields, was developed in 1995. For designating X, it should be first determined whether it is a *machine*, an *instrument* or an *apparatus*.

Terminology Infrastructure for Sweden (TISS), 2002-2004, was for Swedish infrastructure with the financial help from the Ministry of Enterprise, Energy and Communications (see Nilsson 2010 for a detailed description). It is free of charge.

*Rikstermbanken*⁴³ [national term bank], officially inaugurated in 2009, includes “Terms in the other Nordic and the major European languages, as well as the official minority languages of Sweden ... although Swedish terms will certainly dominate.” (Nilsson 2010) *Rikstermbanken* is free of charge for the users.

Nilsson (2010) mentions that TNC for creating such a term bank drew inspiration from Terminų Bankas⁴⁴ in Lithuania. The author also emphasizes the role of infrastructures in promoting language awareness.

Persian (APLL): As a technological capability, *ganjvāzeh* (literally means *a treasure of words*), is a software including the existing Persian terms from 3000 sources and it has 6,400,000 records.

The approved terms by the Academy are also available online.

43. www.rikstermbanken.se

44. <http://terminai.vlkk.lt:10001/pls/tb/tb.search>

Technologies from the literature are database/termbank (Irish, Danish, Finnish and South Africa), a terminology forum (Hungarian) and how to deal with writing systems in computer.

Irish: Ní Ghearáin (2008: 17) considers the focal, as the most important contribution. It is “a national Irish terminology database which was launched in 2006. This work, undertaken in cooperation with An Coiste Téarmaíochta, has resulted in a free online terminology database for Irish which is both comprehensive and user-friendly see <http://www.focal.ie/Home.aspx>.”

Danish: Steurs (2006: 125) states “The Dutch Terminology Association (NL-TERM) supports different initiatives to keep track of the occurrence of new terms in the Dutch language. One of these is *Neoterm*, the Neologisms watch. It is a detailed and very rich database, where new occurrences of terms can be listed. Very often new Dutch equivalents for English terms are created, but some only survive in one part of the Dutch speaking area, e.g. in Flanders; some only survive in the Northern part, the Netherlands.”

Finnish (TSK): According to “The Finnish Centre for Technical Terminology” (1994), it has operated an online termbank called TEPA from 1985 and it has been “available to the public since 1987.” (p. 44)

South Africa: Alberts (2002: 92-93) states that “the Terminology Coordination Section maintains an electronic National Termbank. Terminology work is done in close collaboration with stakeholders, subject specialists, linguists, academics, end-users

and business partners (such as the national, provincial and local government, PANSALB and its structures, e.g. the National Lexicography Units (NLUs), the National Language Bodies (NLBs), Provincial Language Committees (PLCs), etc.).”

She continues that “In the 1950s, terminologists started documenting terminology on index cards. In the 1980s, the Coordinating Terminology Board (COTERM) initiated research on various aspects regarding the computerisation of terms and on the terminological management process. After thorough investigations, the national terminology office in 1996 decided to purchase licenses to use the MultiTerm database system. MultiTerm is a professional multilingual terminology management system developed by TRADOS. At present most of the functions and activities of the Terminology Co-ordination Section can be carried out via the electronic media.” (p. 93)

Hungarian: Muráth (2010: 49) states “In 2003, HUTERM, an online terminology discussion forum for translators, interpreters and language revisers was set up.” (see Fóris 2010 on “The creation of terminological databases”)

Japanese: On orthography and spelling, especially in computer, Fujikawa (1988: 94) refers to Hisakazu Kaneko, a professor of the Japanese language, who believes that “The barrier of the Japanese language is formed by the extraordinary complexity of the use of Chinese characters, not by its grammar,…” (see Budin and Wright 1997; Galinski 1990 on writing systems in computer)

4.2.3.2 Workflow

The workflow includes stages which a terminology planning project goes through and their relationships.

Catalan (Termcat): The workflow at the Termcat covers: a) specialized dictionary making and b) standardization (see Section 4.2.2.3).

a) *Specialized dictionary making*

The process of making a dictionary consists largely of five steps: framing a policy, laying the ground, making a dictionary, editing and diffusing it. Diagram 4.2 (my translation from Catalan) represents the steps. For policy making, Termcat should be in close touch with some private and public organizations to know of urgent needs. Preparing the ground and outlining a plan form the next step. Compiling a dictionary starts from terms and all documents not only in Catalan but also in some source languages should be searched for extracting terms. Then a thematic tree with its branches (subdivisions) is drawn and terms are placed under them. Writing an intentional definition is preferred; terms are defined based on their salient features. Editing and disseminating are the final steps. Regarding theoretical contents, some of the principles adopted by this group are:

1. Source language polysemous terms are treated as homonyms.

Thus each semantic layer of, say, *dispersion* is considered as a

separate concept used in a subject field.

2. Synonymy is a linguistic reality and variations come from various sociolinguistic contexts.

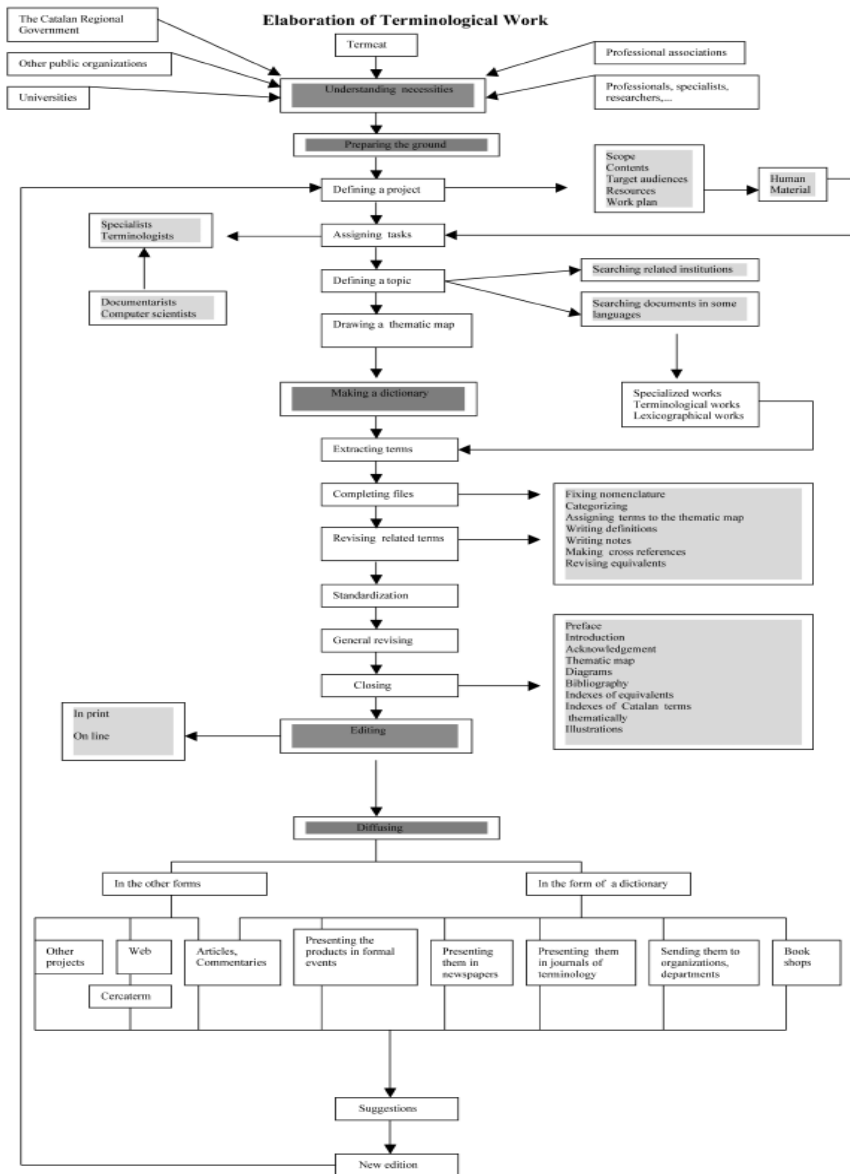


Diagram 4.2: Specialized dictionary making processes

b) *Standardization group*

The Supervisory Council is responsible for standardization. It is formed by permanent members, appointed members, geolinguistic advisors and secretary.⁴⁵

The standardization group has to follow the following steps for standardizing terms:

1. Consulting at least five experts outside Termcat
2. Filling in a terminology record. The information items are:
 - a) Subject field
 - b) Term
 - c) Synonyms with codes indicating their status
 - d) Equivalent terms in some other languages
 - e) Grammatical categories
 - f) Definition, their references and a definition proposed by terminologists
 - g) Definitions from some other languages
 - h) Their contexts
 - i) Suggested term
 - j) Note: advantages and disadvantages of each synonym accompanied by experts' ideas.

Then terminology records are sent to the members a week in advance and after the meeting terminologists revise their contents:

45.
http://www.termcat.cat/en/El_TERMCAT/Centre_De_Terminologia/#Supervisor
(Accessed 3/11/2013)

subject field, term, equivalents in some other languages, definition, the reasons why a term was accepted and the others rejected. In the next session, they will be delivered to the members. They do not put the terms to the vote but they reach a general consensus.

French (DGLFLF): The terminology work process starts from specialists. They form eighteen terminology committees whose members hold meetings voluntarily twice a month. Their duty is to prepare and to send a list of newly-imported terminologies to the DGLFLF. After receiving the available information about the terms from the laboratory of history of linguistic theories (HTL) and consulting francophone partners, the DGLFLF delivers the list to the General Commission for Terminology, consisting of 15 members, experts from universities, ministries and one linguist, arranging a meeting once a month. The committee is responsible for the first revision of the information items registered in order to know whether terms and their definitions are comprehensible to laypeople. Then it is time the Academian members to review the terminology records. If they are accepted by the Academy, the DGLFLF can send them to the related ministry. When the ministry announces its idea, the suggested terms are ready to be published in the *Official Gazette/Journal Officiel*. Sometimes terminology records have to tread another path, however. It means that the DGLFLF receives the Academian members' ideas and it necessitates to return the terminology records to the specialists, and then to the General Committee of Terminology and finally to the Academy, as a second round of revision. Diagram 4.3 (*l'enrichissement de la langue française* 2009, p. 10) shows how the

DGLFLF coordinates terminology work among different components (my translation from French).

Terminology work process at the DGLFLF

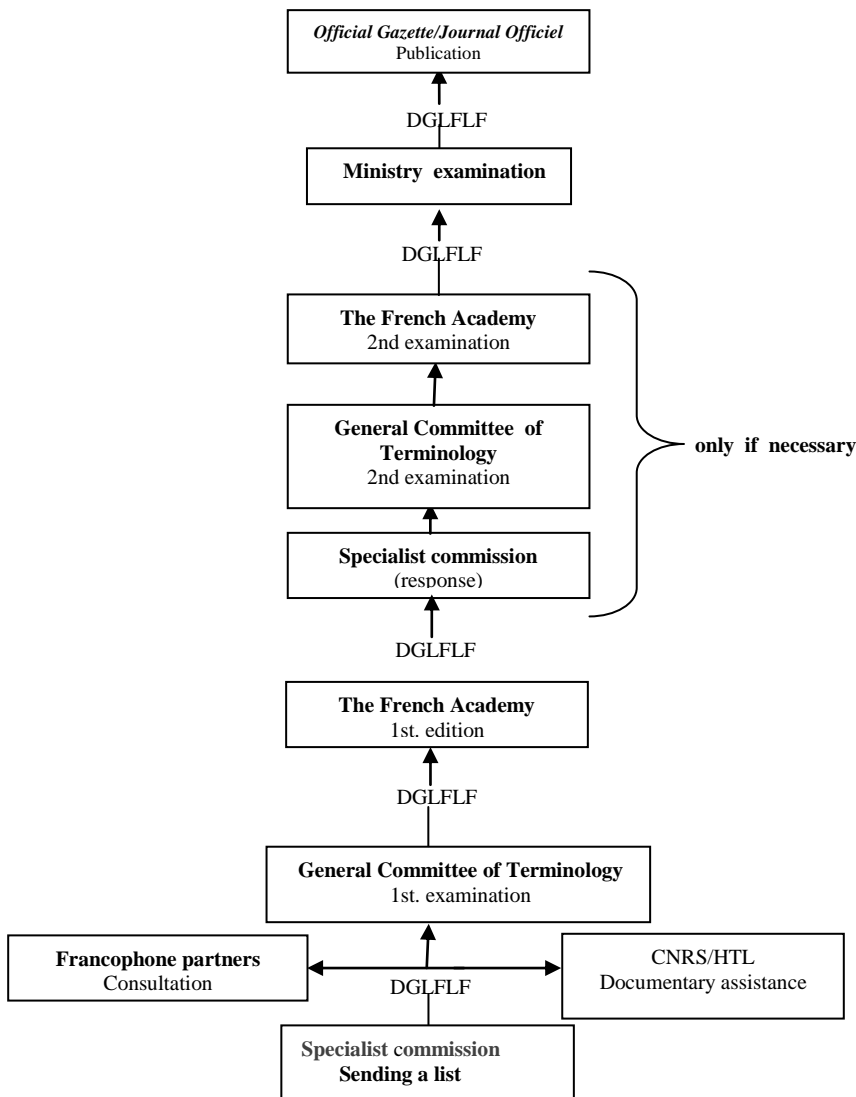


Diagram 4.3: How the DGLFLF coordinates terminology work

To decide about terms, some information items are required to be registered on terminology records. Diagram 4.4 represents a sample of a terminology record (my translation from French).

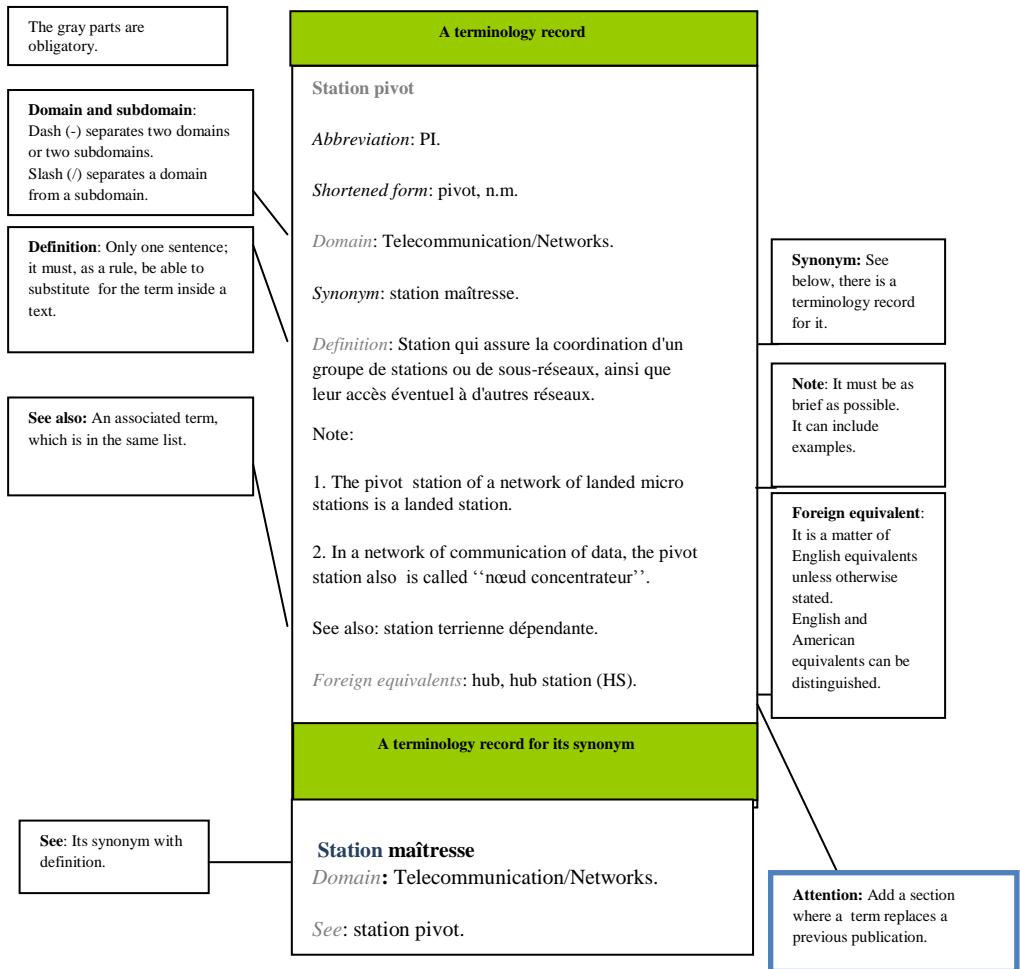


Diagram 4.4: A terminology record

Swedish (TNC): Terminological activities at the TNC are mainly based on the following sources:

a) *Methods and Principles of Terminology Work.*

b) ISO 704:2000. *Terminology Work- Principles and Methods*.

c) Suonuuti, H. 1997. *Guide to Terminology*. Nordterm 8, published by Tekniikan Sanastokeskus ry (The Finish Centre for Technical Terminology).

d) Felber, H. 1984. *Terminology Manual*. Infoterm.

Dobrina describes TNC activities:

- Compilation of terminological and special language resources: Terminological vocabularies, terminology databases, style manuals for technical writing, etc.;
- Teaching terminology theory and terminology practice: at universities, as open lectures, through custom-made courses for project teams, companies, etc.;
- Consulting services varying from operating the query service to leading long-term terminology projects, participating in language planning activities, development of ontologies, information modelling, etc.;
- Terminology standardization on the national and international level;
- Promotion of the development and use of terminology in all spheres of professional activities and public life through participation in international and national terminology networks (Dobrina 2010: 82).

Among them, activities such as terminology projects and joint terminology groups are explained below:

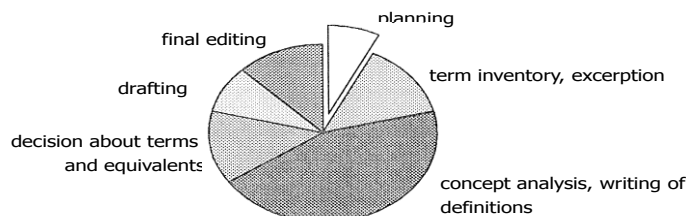
a) *Terminology projects*

Experts, from companies, and terminologists, from TNC, participate in terminology projects and the process can be described as follows:

- a) Delimiting a subject field and taking the intended users into consideration;
- b) Accumulating and evaluating relevant documentation;
- c) Establishing conceptual systems;
- d) Formulating definitions;
- e) Selecting and creating terms;
- f) Finding equivalents in some foreign languages;
- g) Drafting;
- h) Elaborating terminologies as a preparatory stage for publication;
- i) Publication.

Diagram 4.5 shows time distribution for different phases in a terminology project (Terminfo 2/1993,TSK).

Distribution of time for the different phases in a terminology project



Source: Terminfo 2/1993, TSK

Diagram 4.5: Time distribution

b) *Joint terminology groups*

Owing to a risk of domain loss, e.g. computer science which “ordinary” people come in contact with their terms, Nilsson⁴⁶ states that the *Joint Group for Swedish Computer Terminology* (JOGSCOT) was set up in 1996 “to create an adequate Swedish terminology in fields where English terms dominate, as well as to harmonize the existing terminology by analyzing the concepts and providing plausible definitions and explanations.” (p. 3) It consists of language cultivation representatives, subject field experts and media representatives, taking part voluntarily. The group suggests, revises and finally publishes terms on the web site “and the recommendations gain ground and appear in the media and as part of newly published glossaries.” (p. 3) The *Joint Group for Swedish*

46.

http://www.tnc.se/images/stories/pdf/Terminology_work_the_Swedish_way_Nilsson.pdf (Accessed 6/4/2014)

Life Sciences, set up in 1999, is smaller than the previous one, because its terminologies have not yet entered the general language. The third one is the *Joint Group for Swedish Terminology of Built Environment*, established 2002. “This group is, from organizational point of view, still some what different from the other joint groups. The main actor in the building information area (*Svensk Byggtjänst*) has teamed up with the TNC, organized a reference group of subject field experts, and launched a combined termbank/thesaurus system based on subscriptions and membership.” (p. 3)

Persian (APLL): Each terminology group is made of a representative from the Academy and some experts. Groups have to carry two main duties: providing the coordination council with a list of source language polysemous and Persian synonymous terms and filling in terminology records. In the first step, they have to collect data. Experts choose a series of foreign terms, usually from English, and put forward them at the meetings to find, create or fix Persian equivalents for them.

After gathering the data, the groups have to fill in terminology records containing the information items: term, equivalents in some other languages, abbreviation, trade name, scientific name, vulgar name, grammatical category, etymology, synonym(s), derivation(s), compound(s), related terms, a proposed equivalent (selection, resemanticization or neologization), morphological pattern and an evidence for it, definition and an example to show how the proposed equivalent behaves in a sentence which is not extracted from a context, but rather produced by the experts at the meetings,

reference(s) of definitions, existing equivalents, all equivalents proposed by the specialists during the meetings, a long-established equivalent and note.

In addition to the previous mentioned task, the terminology groups, by looking up from the *McGraw-Hill Dictionary of Sciences and Technology* and the *Academic Press Dictionary of Science and Technology*, have to prepare a list of source language (English) polysemous terms, by determining the other disciplines which those terms cover, and also Persian synonymous terms used for them and then to send the list to the coordination council, set up in 1999, for basic sciences, engineering sciences, earth sciences, life sciences, transportation, arts and humanities.

After receiving the coordination council's decisions and completing terminology records, the terminology groups send them to the editorial board whose members are supervising all of the terminological activities in the terminology department. They review and revise information items registered on terminology records.

The next stage is the major reference for making the final decision for all of the equivalents created or selected in the terminology groups. It is the terminology council formed by some of the Academian members, some of scholars in literature, linguistics, scientific and technological fields from terminology groups or outside and three members of the editorial board. All of them are selected by the Academian members. Besides the council members, some or all of the members of a terminology group, for defending

their proposed terminologies, and the representative from the Academy in the coordination council also attend the meetings.

After discussing about the information items, if the council members vote in favour of proposed terminologies, they are approved by the council. If not, the council returns them to the terminology group. Then the approved terminologies have to be sent to the President, as the head of the Iranian Academies, to give his seal of approval to them. Finally, the list of approved terms in the form of a collection will be published. Diagram 4.6 depicts the terminological processes at the Academy.

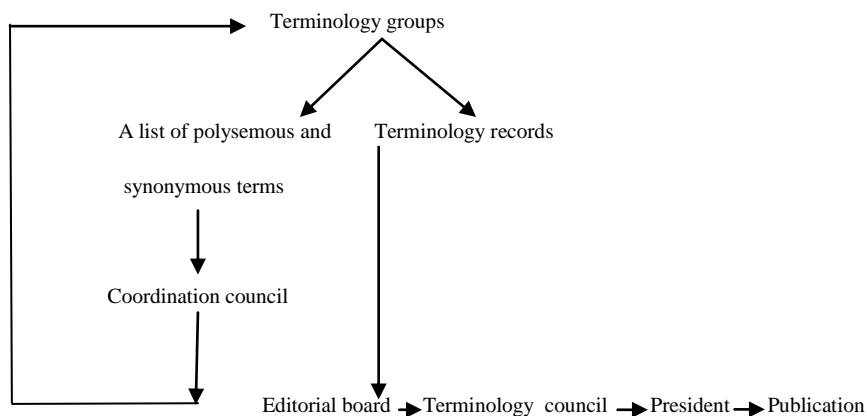


Diagram 4.6: Terminology workflow at the APLL

For help desk services, there is a limited number of contacts to gain information mainly about how to name their companies.

The data order below is from general workflow to specific one.

Hebrew: Rabin (1989: 32-33) describes the Academy of Hebrew that “Each Terminology committee is composed of between one or three members of the Academy and a usually larger number of

practitioners of the field in question. It is the latter who draw up a list of the terms required in the subject, in English, and accompanied by Hebrew terms already employed in the profession. In the meetings each term is examined as to its correctness in Hebrew, that is its form and meanings of the word in older literature. It is ascertained whether the same word is used in some other list by a different profession in a sense different from that needed in the list under discussion From time to time, partial word lists agreed by the committee are circulated to members of the Academy and to a large number of people in the profession. Criticism and alternative suggestions are received, discussed, and if accepted, incorporated in the list. The revised list is once more circulated among Academy members, and objectors are often invited to discuss their opinions with the Committee. The list, when complete, goes to a meeting of the Academy's Board of Terminology, which discusses items where Academy members insist on their objections, but the Board also raises objections of its own, which necessitate reconsideration by the Committee. In the next stage, the list and points of dissension are discussed by a joint meeting of the Terminology Board and the Grammar Board.”

South Africa: Alberts (2002: 92) argues “The Terminology Coordination Section of the National Language Service, Department of Arts, Culture, Science and Technology, is the only language office in South Africa that devotes all its energy and time to terminology work. As the national office for terminology work, its aim is to coordinate all terminological activities in South Africa.”

She continues that “The Terminology Coordination Section renders a terminology service for the advancement of the official languages on a national level. Its vision is to develop, document, standardise and disseminate multilingual terminology to promote and facilitate communication in various subject fields and domains.”

Alberts (2000: 241) states that the division “decides on terminology projects in response to needs assessment studies and/or requests”

Alberts (2008) explains that the Terminology Coordination Section (TCS) “manages terminology as follows:

- The terminographers excerpt terminology in the source language (SL) which is usually (but not necessarily) English.
- The terms are then supplied with definitions, example sentences and relevant information in the SL.
- These terms and relevant information are discussed with subject specialists to confirm the contents.
- After the SL terms and relevant information are finalised the information is translated into the 10 target languages (TLs).

The information in the target languages is also discussed with collaborators and subject specialists before finalisation of the dictionary. After finalisation of a specific terminology list, the relevant NLBs [National Language Bodies] of PanSALB [the Pan South African Language Board] are requested to verify and

authenticate the terminology. The relevant terminologists then changes the database according to suggestions. After the database is finalised the relevant terminology list can be published and disseminated to target users.

The NLS [National Language Service] also employs translators and therefore also partakes in translation-oriented terminography (TOT). Terms in SL text and term equivalents in the TL translations are aligned and harvested. These terms and related information are then submitted to the TCS to document and process in the manner described above. Terminology is also harvested from rural and urban speech communities (community-oriented terminography) for documentation in the central terminology bank.’’ (p. 20)

Ukrainian: Rytsar (1992) describes the workflow at the Institute of Ukrainian Scientific Language, set up in 1921, and explains the approval process: “Once the terms had been approved by the sections in the different fields, they were relayed for examination to an editorial board, whose staff included philologists, linguists, and dictionary compilers coordinated by interdisciplinary commissions. Copies of the manuscript for terminological dictionaries were relayed for examination to the other sections of the field, and then returned for a final review by the editorial board. Any inconsistencies or uncertainties regarding a term were settled at this point by an interdisciplinary commission including the most competent members of the field’’ (p. 133)

Lithuanian: Gaivenis (1991: 22) states that “Practical work is in the main carried out by special terminology commissions. These commissions, established in the higher schools and scientific

research institutes, prepare terminological dictionaries for different branches of science Terminology commissions submit terminological dictionaries to the Terminology Group of the Institute of Lithuanian Language, where they are discussed and reviewed. Then linguists, in collaboration with specialists from the respective fields, discuss debatable points again.” The author also states that “Practical work is also conducted by the Publishing House of the Lithuanian Encyclopaedia”(p. 22)

Latvian: Skujina (1991) argues that different groups and individuals are involved in practical terminology. But terms should be approved by the Terminology Commission. Theoretical terminology is at the Academy of Sciences “in the Terminology Group of the Institute of the Latvian Language and other academic institutes, and also in scientific centres in higher educational establishments... .”(p. 31)

Manx Gaelic: Draskau (2001) states that “The Coonceil regularly processes requests from Government departments requiring Gaelic equivalents for official designations. These often demand the creation of new terms, which will subsequently appear on public buildings, official letterheads and forms, vehicles and signs. This is tantamount to an official seal of approval and ensures adoption. The Coonceil’s policy is to draw as far as possible on the ‘native’ resources of Gaelic, and its aim is to ensure that Manx speakers be made aware of new ‘preferred terms’ which result from the on-going process, which is maintained at a steady if unexplosive level by the diversification of Government Departments and legislation.”

The author describes a recent work for updating “the Gaelic ornithological nomenclature by Phil Gawne, a fluent Gaelic speaker. Where terms did not exist, Gawne consulted nomenclatures in, in order of priority, Scots Gaelic, Irish, Welsh, Cornish and lastly English. The completed list of recommended terms and definitions was then submitted to an ornithologist to ensure the term system appropriately represented the system of concepts. As an exercise in updating the language, and as a model for the subsequent elaboration of flora nomenclature, the endeavour was felt to be successful.”

4.2.3.3 Organizational structure

This part is concerned with how language agencies are organized.

Catalan (Termcat): According to the Termcat website, “Termcat is a consortium with its own independent legal status, constituted by the Generalitat or Government of Catalonia – which is its principal source of funding – the Institute of Catalan Studies – which plays the role of reference in terminology standardisation – and the Consortium for Linguistic Standardisation – which ensures dissemination throughout Catalonia. TERMCAT is attached to the Ministry of Culture of the Government of Catalonia.”⁴⁷

Some of its national and international cooperation are:

1. European Association for Terminology

47. http://www.termcat.cat/en/El_TERMCAT/Centre_De_Terminologia
(Accessed 25/2/2014)

2. Spanish Association for Terminology
3. International Institute for Terminology Research
4. International Information Centre for Terminology
5. Pan-Latin Terminology Network
6. Ibero-American Terminology Network
7. Catalan Society of Terminology.⁴⁸

Help desk services, as an internal structure of Termcat, plays an important role in terminology work. According to *Generalitat de Catalunya* (the Catalan Regional Government) in *The Government Structure for Language Policy Issues* (2009: 14)⁴⁹, “In 2009, TERMCAT’s advisory services have focussed on dealing with requests for terminology, documentary and methodology advice submitted by users, enhancing service quality, continuous adaptation to user needs and also working with organisations that promote the use of the language and with priority groups.”

The document states “TERMCAT has continued to operate using the two platforms that deliver its public terminology data: Cercaterm, the online terminology query service, and Optimot, the Language Policy Secretariat’s language queries service, in which

48. http://www.termcat.cat/en/El_TERMCAT/Centre_De_Terminologia/#Xarxes (Accessed 25/2/2014)

49. http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CCkQFjAA&url=http%3A%2F%2Fwww20.gencat.cat%2Fdocs%2FLlengcat%2FDocuments%2FInforme%2520de%2520politica%2520linguistica%2FArxiu%2Fa_cap02_09.pdf&ei=yuUMU9-WLsXmoATX4oDQAg&usg=AFQjCNGYANNIb4Wb7IzuXI3Ivr8CRdV-Mg&bvm=bv.61725948,d.cGU (Accessed 25/1/2014)

the Institut d'Estudis Catalans and TERMCAT take part as second tier advisory organisations.” (p. 14)

It refers to statistics indicating that “The Queries Service has handled 3,136 queries about scientific, technical and humanities terminology which it has received via Cercaterm, Optimot, e-mail or by phone from language professionals in language services in government, universities, companies and the media, specialists and self-employed translators and proof-readers. The specialist areas with the most enquiries have been life sciences, humanities and social science, construction and industry.” (p. 14)

The document continues that “Cercaterm, the online terminology queries service, has received 969,748 visits and 2,475 new users have registered with it in 2009 drawn from companies, universities, language professionals and miscellaneous institutions in Catalonia, the Valencian Country, the Balearic Islands and other places both in Spain and abroad. This means that Cercaterm currently has 25,221 registered users.” (pp. 15-16)

French (DGLFLF): Humbley (1997: 263) states that in 1933, a Commission de la terminologie technique française modern was set up by the Académie française and “Initially, official moves toward terminology planning came from the Académie des sciences in 1952” and then in 1954 “the Comité d'études des termes techniques français, This body, which is still active, has concentrated on technical rather than scientific vocabulary,”

As stated on the website of the DGLFLF⁵⁰, in 1966, Prime Minister Georges Pompidou established “within his own office the Senior Committee for the defence and expansion of the French language (Haut comité pour la défense et l'expansion de la langue française), which later became the Senior Committee for the French Language (Haut comité pour la langue française).” And in 1984 it was replaced by two bodies “the Consultative Committee (le Comité consultatif) and the General Commission (Commissariat général), which, as of 1986, reported to the Ministry for Francophone Affairs.” In 1989, they were also replaced by “the Senior Council for the French Language (Conseil supérieur de la langue française) [for giving advice to the government] and la Délégation générale à la langue française [for implementing and co-ordinating language policy in France].”

In 1993, “la Délégation générale à la langue française, in a logical move, reported to the Ministry of Culture, as the latter was also in charge of Francophone Affairs.” And “When the Francophone Affairs became a separate department in 1996, la délégation générale was integrated into the Ministry of Culture” and in 2001 “the title of the department changed to Délégation générale à la langue française et aux langues de France in order to mark the government’s acknowledgement of the linguistic diversity of our country”

50. http://www.culture.gouv.fr/culture/dglf/dglf_presentation_anglais.htm (Accessed 6/4/2014)

The DGLFLF is “a government department whose role is to guide national language policy at inter-ministerial level. Attached to the Ministry of Culture and Communication, the department's role is to examine, pilot and co-ordinate issues, and to track the application of legislative and statutory mechanisms (Law of 4th August 1994 on the use of the French language). It is supported by a network of partner organisations including the Senior Council for the French Language and the General Commission for Terminology and Neologisms.”

The DGLFLF contains four components: language and law, languages of France, fight against illiteracy and language development and modernization. The last one, responsible for terminological activities, is, at the same time, related to the Prime Minister Office and consists of a head, a secretary, an administrator and three terminologists. It is involved in coordinating terminological activities which terminology committees from different ministries perform. The number of the committees a ministry has depends on the areas that the ministry is concerned with, for instance, Ministry of Finance has seven committees and Ministry of Agriculture one committee. Their members come to an agreement, but some committees hold a vote to approve terms. Diagram 4.7 shows how terminological activities organized between the Prime Minister Office and the Ministry of Culture and Communication.

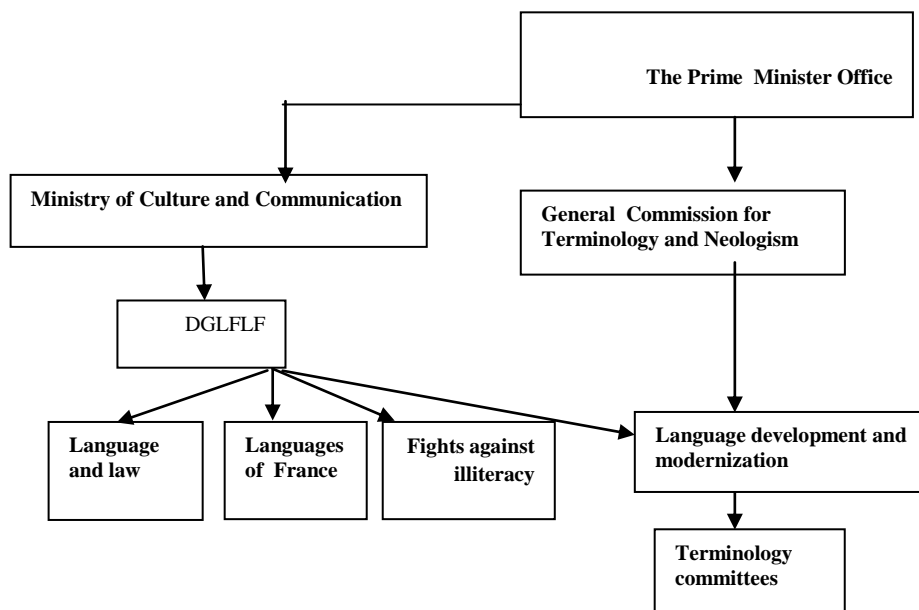


Diagram 4.7: How terminological activities are organized between the Prime Minister Office and the Ministry of Culture and Communication

As help desk services, the Franceterme “provides answers to general questions associated with language. How are words formed? How has French become enriched by contact with other languages? What are the links between the State and the French language?”⁵¹

The external structure including governmental and non-governmental organizations and some other French-speaking countries coming together to enrich French terminologies is shown by Diagram⁵² 4.8 (my translation from French).

51. http://www.culture.gouv.fr/culture/dglf/dglf_presentation_anglais.htm. (Accessed 6/4/2014)

52. The set-up was approved on July 3, 1996 (*l'enrichissement de la langue française* 2009, p. 6).

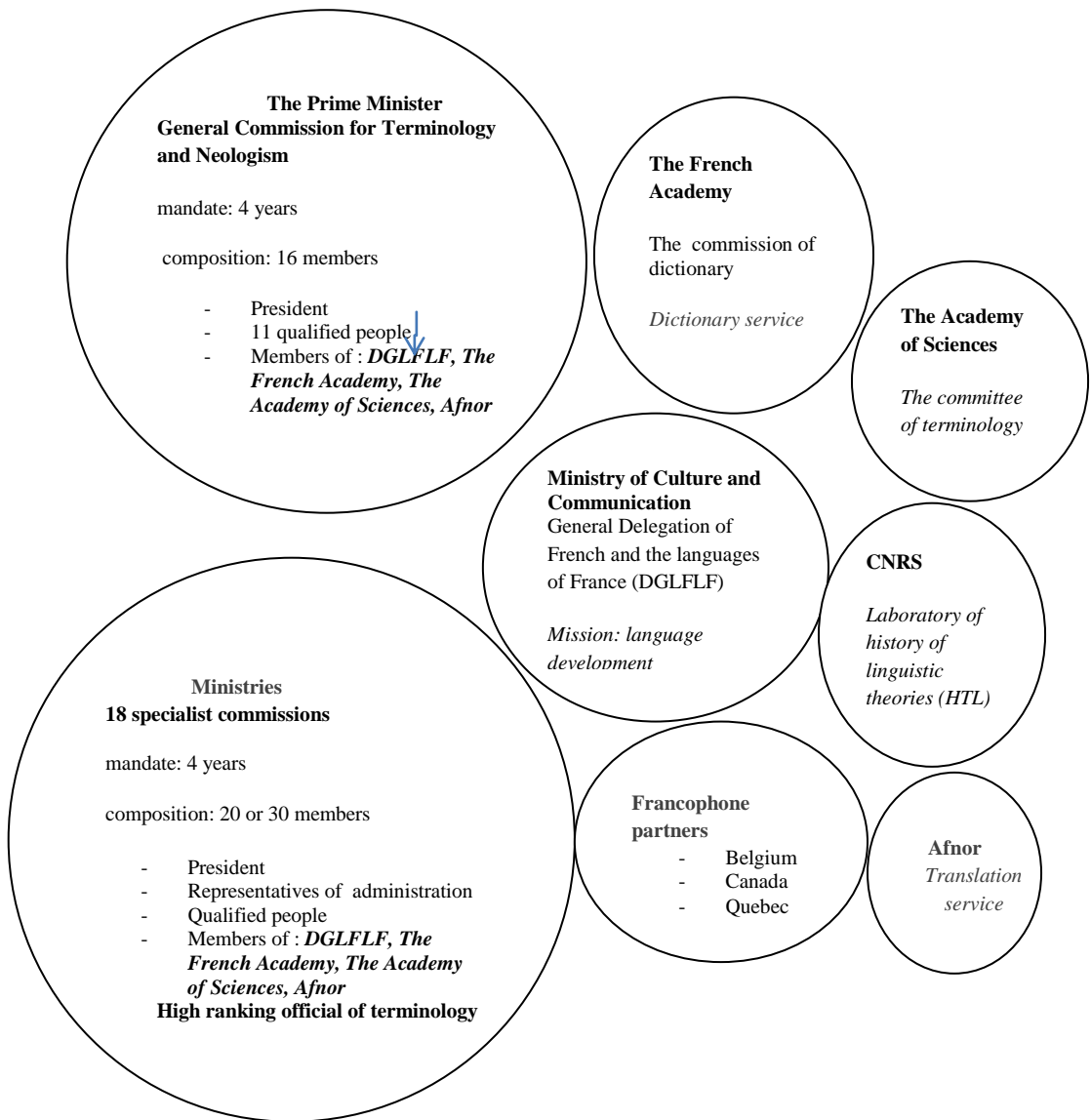


Diagram 4.8: The French enrichment set up

Swedish (TNC): According to Bucher (2007), in 1936, a committee for nomenclature was set up at the Academy of Engineering Sciences. In 1941, *Tekniska nomenklaturcentralen*, TNC (the Swedish Center for Technical Terminology) was laid down. In 2000, it was reconstructed as an independent private

company and called *Terminologiceentrum*, TNC (the Swedish Center for Terminology), receiving a grant, more than 50% of the annual turnover, from the Ministry of Enterprise, Energy and Communications (see Westerberg 1992).

TNC consists of a manager, nine terminologists with backgrounds ranging from the humanities (translation from French and English into Swedish), information science, history, linguistics, philology to mathematics, computer science, chemistry and medicine and administration staff.

TNC has many contacts with other organizations involved in language planning at the national or international levels (its networks). At the national level, TNC cooperates with:

1. The Swedish Academy
2. The Swedish Language Council, set up in 1944, concerned with the general language usage. When LSP and general languages are overlapping, e.g. computer terminologies, they are cooperating with each other.
3. The language consultants in media
4. The language consultants in the Prime Minister's Office
5. The Swedish Standards Institute
6. The National Board of Health and Welfare (Bucher 2007).

At the regional level, it is concerned with:

1. Nordterm
2. TSK in Finland, DANTERM in Denmark and Norwegian Language Council
3. University of Vaasa
4. ISO/TC 37/SC 1 (TNC's experts are members of several working groups)
5. The European Association for Terminology (TNC was a board member of EAFT for a period of 6 years)
6. European Union.

Help desk services, as an internal section at TNC, connecting this agency with real audiences is introduced here:

This activity started from the beginning of TNC. Being in touch with people shows new tendencies in LSP, e.g. as Bucher (2007: 43) describes "From the 1940's to the 1960's, the majority of the queries concerned scientific and technical fields. Today it is a wider variety of subject fields: medicine and health care ... public administration, training and teaching...; formerly the majority of users were subject-field specialists and today's users tend to work in public administration, or as translators, teachers, technical writers, journalists etc." In 1996 in the time of internet, there was an increasing number of queries about Swedish equivalents for terms such as *homepage*, *e-mail*, *web*... . People can contact TNC via telephone, e-mail or the web site.

Queries are from two groups: subscribers, paying an annual fee for this and other services of their choice, and non-subscribers, not

paying for the first time providing that their query does not require an extensive investigation.

Questions are usually: concept-related queries: definitions or explanations of two or more related concepts, e.g. *teknisk* (technical) and *teknologisk* (technological); term-related queries: equivalents, e.g. an English equivalent of the Swedish *gylle standard* (gold standard) or a Swedish term for *e-science*; language/style queries: grammar, spelling, etymology, word-formation, e.g. the Swedish plural form of *medium* or why ‘k’ in the abbreviation of *kilowatt* (kW) is written in lowercase but not in the abbreviations of *terawatt* (TW) and *gigawatt* (GT) (Dobrina 2010: 84).

As Dobrina states translators are more interested in equivalents, experts in definitions, and journalists in new terms (p. 84).

The answering process includes:

- 1) Reviewing a query to know its information is sufficient or not;
- 2) Searching for information in TNC-bas (TNC’s internal terminology database), the reference library, web resources and asking TNC’s terminologists and a network of experts;
- 3) Preparing and delivering the response:
 - a) Listing the results/information obtained;
 - b) Evaluating their quality;
 - c) Modifying and complementing the information;

- d) Writing a response report consisting of the requested information, how it has been obtained, argumentation to support the suggestion, examples of usage, references;
 - e) Preparing supplementary information such as concept diagrams illustrations, contexts ... and delivering a response;
- 4) Storing the queries and responses in TNC's query database and the query service archives for future use and a selection of most interesting queries and responses is regularly published on TNC's web site (Dobrina 2010).

Dobrina gives details about the type of people and their questions: "Of some 6000 queries recorded in TNC's query database ... the largest group is constituted by queries relating to the field of information and documentation, closely followed by queries concerning life sciences. The number of queries dealing with new and rapidly evolving subject fields with an explosive development of terminology certainly exceeds that of queries relating to old established domains with a more stable terminology." (p. 85) Languages involved in queries mainly are: Swedish, English, German, French, Danish and Finnish. (p. 85) The TNC for meeting its users' needs has a wide network to contact them.

Persian (Different structures during a period of time): Sadeghi (2001: 21) argues that "The first society for coining words for foreign terms was a society patronized by the ministry of war (defense) in 1303 A.H./1924 ... it succeeded in coining terms...which

gradually gained ground and ousted their French, Arabic, or Turkish equivalents No linguist or serious grammarian or man of letters was among the members of this group. Their products were severely criticized by some scholars, partly because they were either clumsy or wrong from the etymological point of view.” The second one of this kind is “society for coining scientific terms”, 1311 A.H./1932 - 1319/1940. During its activity “... 3000 terms were coined, some 400 of which entered textbooks...” (p. 22) And the next organization is Medical Academy, 1313 A.H./1934, to coin new terms.

In 1314 A.H./1935, Rezâ Shah Pahlavi ordered the Iranian Academy to be established “to unify these scattered societies into a single authoritative language-planning organization. One of the main objectives of this institution, called the Iranian Academy, was to remove loan words from Persian.” (p. 22) The Academy coined around 2000 terms by 1320 A.H./1941. The Academy stopped its activities in 1953 partly due to the political situations in Iran. In 1349 A.H./1970, the Iranian Academy of Language (the second Academy) was founded. “The academy of language published and distributed to specialists booklets giving English technical terms for each branch of science and their definitions in Persian. Specialists were requested to suggest Persian equivalents for these terms.” (p. 26) And “Up to 1355 A.H./1976, almost 35,000 Persian words were proposed by the committees for over 15,000 English terms. These words were to be discussed in the high council of the academy, and the words accepted were reported to Shah for final sanction.” (p. 26) After Islamic Revolution in Iran in 1357

A.H./1979, it stopped its activities. Sadeghi continues that “Apart from a few pamphlets comprising a number of accepted and finally approved words, other proposed words never appeared.” (p. 27)

Mansouri (1996) explains how the Iran University Press (henceforth referred to as IUP), set up in 1980, started terminological activities at the beginning of Islamic revolution. The IUP, for standardizing physics terms, adopted three steps:

1. *vāžegān*: “a bilingual vocabulary in which all the equivalents to an English term found in the textbooks [up to 1980] were given with a code specifying the book or books in which it was used”;
2. *vāženāme*: “standardized bilingual dictionary of scientific terms”;
3. *farhang*: “descriptive scientific dictionary” (p. 400).

Finally in 1370 A.H./1991, the APLL was established. Terminology department is comprised of terminology groups, coordination council, editorial board, terminology council. The department, at the national level, is linked to some scientific associations but nothing at the international level, except that it is a member of Infoterm.

The following data are arranged based on: a lack of centralized language planning or terminology body (Hungarian, Icelandic, Irish and Sami), terminology bodies (Norwegian, Finish, South Africa and French (Quebec)), terminology groups within academies of sciences (Ukrainian, Latvian and Estonian) and a terminology group within a language academy (Hebrew).

Hungarian: Fóris (2010) discusses that “Hungary lacks centralized and scientifically organized language planning that would extend to related fields and territories. The Hungarian research conducted inside and outside the country’s borders is not co-ordinated. No common norms are created or mutually accepted either.” (p. 41)

She continues that “The Matt (*A Magyar Nyelv Terminológiai Tanácsa*/Council of Hungarian Terminology) was founded in 2005, as a subsidiary of UNESCO. It aims to support the co-operation of professionals and researchers, and provide the theoretical coordination of Hungarian terminological works.” (p. 44) And another one is: “The TermIK (*Terminológiai Innovációs Központ*/Terminology Innovation Centre) was founded in September 2006 at the Institute of Intercultural Studies In 2009 it was relocated to the Károli Gáspár University It aims to play a determining role in the creation and maintenance of the national and international network of relations in favour of theoretical research into terminology, and also to offer improvements and services for applications.” (p. 44)

Icelandic: Helgadóttir (1991: 58) explains that “According to the law, the Language Council is to collect and publish neologisms and aid in their selection and formation. The Language Council is also to support organized work on neologisms in the country, and to cooperate with ‘word committees’ established by professional associations and institutions. Furthermore, the Council is expected to coordinate the work of those who select and form new words to be published in special vocabularies or standards.” (p. 58) And the Icelandic Language Council’s goal is “to enlarge the

vocabulary in such a way that it should be possible to express virtually any concept in “proper Icelandic”.”

Pilke and Toft (2006: 45) state that “Unlike the other Nordic countries, Iceland never had a special national terminology body...; instead, the Icelandic Language Institute has been responsible for such activities. This means that close relations exist between activities within LGP lexicography and terminography...” The researchers continue that “The Icelandic Language Institute (ILI) was founded in 1985. It is the official body responsible for language planning and preservation (neologisms and terminologies) in Iceland. The Institute provides the active terminology committees in Iceland with linguistic advice and technical assistance. In 1997 the Institute opened a word bank on the Internet”

Irish: O’connell and Pearson (1991: 86) explain that from 1922 until 1968 “the **Rannóg** was responsible for language planning and terminology work as well as for providing translation services to the parliament and civil service.” Bhreathnach (2011: 82) states that “term planning is not carried out by one single organization” in Ireland.

The Irish language planning situation in Ni’ Gheara’in’s words (2011) is “Irish does not possess a language academy. Rather, conscious language development, ranging from grammatical standardization to lexicography, has been entrusted to various organisations since the Irish State was established in 1922.” (p. 306)

She states that “Modern terminology planning for Irish can be traced back to the terminology lists compiled by early language

revivalists in their attempt to combat domain loss and promote the use of Irish for new functions. Since the 1920s, corpus development has been led by the State and has focused chiefly on the requirements of the education system. Terminology work was put on an official footing in 1927 when the first specialist terminology committee was established within the Department of Education, although a permanent structure for terminology provision—An Coiste Te’armaí’ochta [The Terminology Committee]—was not established until 1968. In 1999, An Coiste Te’armaí’ochta was transferred to Foras na Gaeilge, the Irish language promotion body ... though this move did not result in an increase in the meagre resources devoted to terminology work (Bhreathnach and Nic Pha’idi’n 2008: 19). Relative to those resources (An Coiste Te’armaí’ochta is staffed primarily on a voluntary basis with currently one full-time terminologist and one assistant terminologist), its output has been substantial. Indeed, Nic Pha’idi’n (2008: 102) contends that the language shift to English, and accompanying domain loss which persisted in the Gaeltacht throughout the twentieth century, was to some extent masked by the conscious development of new terminology outside of the Gaeltacht during that period.” (p. 307)

(see NÍ Ghearáin 2008 for Irish situation)

Sami: Sámi is spoken in “the north of Norway, Sewden, Finland and the Kolan area” according to Utsi (1991: 46). The author also states “Several Sámi institutions have been preoccupied by the task of developing Sámi terminology.” (p. 50) and regarding Sami terminology work, Utsi explains that “The results of our terminology work have mostly been equivalency lists with Sámi and Finnish, Swedish or Norwegian.” (p. 50) As the regional and

national cooperation, Utsi refers to this point that “We participate in INSTA/IT (Internordic Standardization) working groups.” (p. 52) At the national level, “The Nordic Sámi Language Committee and the Nordic Sámi Council are examples of these efforts.” (p. 53) Peeters (1997: 41-42) explains that “The three groups of Sami have a cooperation organization and overall language planning cooperation takes place in the language secretariat of Nordisk Rad.”

Norwegian: Hjulstad (1994: 49) states that “In 1938 Rådet for teknisk terminologi (RTT – Norwegian Council for Technical Terminology) was established” The author explains that the first public fund for Norwegian technical terminology was granted in 1898. A committee existed until 1912 The committee could not agree on a number of points regarding the degree of Norwegianization.” (p. 49)

Finnish (TSK): According to “The Finnish Centre for Technical Terminology” (1994), this center “was founded in 1974 conjointly by some 20 organizations representing various fields of technology.” (p. 43)

South Africa: Alberts (2008: 18) states that “The South African terminology practice officially started as early as 1950.” Before it, many terminology lists or technical dictionaries were published by individuals and governmental organizations. The author continues that “A Coordinating Terminology Board (COTERM) was formed in 1971 to coordinate the terminology endeavours of the various offices and to avoid duplication The Terminology Coordination Section (TCS) of the National Language Service

(NLS) under the Department of Arts and Culture became the official national terminology office since 1989.” (p. 18)

French (Quebec): The Translation Bureau and the Office québécois de la langue française (OQLF) are two governmental organizations. The Translation Bureau provides “translators with valid solutions to translation problems. *Terminium*, the term bank which is under the responsibility of the Translation Bureau, has been seen mainly as a tool for accessing English or French equivalents for specialized terms *Terminium* has later become one of the largest term banks of the world.” (L’Homme 2006: 57)

As L’Homme (2006) explains, the Quebec office “has been concerned with terminology as one of the aspects of language planning. The organization has the mandate to promote French in a context where it is spoken by a minority of speakers. It is responsible for enriching the *Grand dictionnaire terminologique* (GDT) that has been designed as a tool for spreading decisions regarding French terms. The methods developed within the OQLF have served as models for other regions or countries concerned with language planning (e.g. Catalonia).” (p. 57)

Ukrainian: Rytsar (1992: 131) states that “The State awarded substantial sums of money to the Institute of Ukrainian Scientific Language, created in 1921, for the compilation of terminological dictionaries in various fields of science and technology. To ensure a high level, these dictionaries required the approval of the Ukrainian Academy of Sciences prior to publication.”

Latvian: Skujina (1991: 29) states “Latvian has no government programme for LSP language planning, but there is a degree of

government support for the work of the Terminology Commission.” The author explains that “In the early part of the 20th century, the first terminology commissions were formed. The terminological activities at that time were chiefly carried out by Latvian teachers, students and writers...” (p. 29) The scholar continues “In 1946, the Latvian Academy of Sciences was founded; at the same time, the Terminology Commission was founded. The tasks of the Commission were confirmed by the Council of Ministers. It was prescribed also that the decisions of the Terminology Commission were binding for every institution, establishment, enterprise, office, organisation, etc., and for individual users.” (p. 29) And then “In 1990, the Council of Ministers passed a decision which restored the authority of the Terminology Commission.” (p. 29)

Estonian: Ereht and Saari (1991) believe “The centre of Estonian terminology work has long been the Terminology Group at the Institute of Language and Literature of the Estonian Academy of Sciences.” (p. 10) This group has worked on: LSP theory, lexicographical guidance, co-ordination of terminology work interdisciplinarily and intradisciplinarily, practical terminology, reference library and LSP consultation. The authors state that “The main traditional way of organizing terminological work has long been the discussion and subsequent fixation of terms in terminology commissions comprising both linguists and other specialists.” (p. 8)

Hebrew: Allony-Fainberg (1983: 14) states that “The Council of the Hebrew Language (CHL) was first established in 1890 by the intellectuals of Jerusalem, as a branch of the association ‘Safa Brura’.” Nahir (2002: 279) explains that “...a new Language

Committee was formed in 1903 by the newly established Hebrew Teachers Union.” Allony-Fainberg (1983) gives more information about the Academy of the Hebrew Language (AHL) that it is “a direct successor to the CHL. In 1953 a law was passed appointing the AHL to be the formal body concerning the needs of the Hebrew language. Its decisions, signed by the Minister of Education and Culture, are binding as written in the law published in the official gazette... .” (p. 16)

(see Fellman 1977 about the Hebrew Academy)

4.2.3.4 Dissemination

The methods adopted by the following linguistic communities for spreading their terminological products will be discussed below.

Catalan (Termcat): This organization diffuses its products through:

1. Online dictionaries:
 - a) Neoloterca (1986-onwards)
 - b) Cercaterm
2. Dictionaries in print
3. Experts cooperating with Termcat
4. The media: Terminology Antenna
5. *Diari Oficial de la Generalitat of Catalonia* (DOGC – Official Gazette of the Generalitat of Catalonia).

French (DGLFLF): The General Committee, a sub-division of the Prime Ministry Office, spreads the proposed terms through publishing them in the *Official Gazette/Journal Officiel*; it includes terms, domains, definitions and foreign equivalents. Franceterme presents all approved terms published in *Official Gazette/Journal Officiel*.

Swedish (TNC): TNC has spread the terminological products in the following ways:

- a) In the 40's, by publishing glossaries in different technical fields;
- b) In the 60's, by broadening its publications in new areas, e.g. work environment, cleaning and pensions;
- c) By the end of the 80's, with the establishment of a European Economic Area (EEA), by translating about 10000 pages of official EC documents into Swedish and also by publishing *EC Words and Expressions*, as a dictionary to guide translators;
- d) Disseminating terminological products online (national termbank) and in print (Bucher 2007).

Spreading its terminology methodology is another story:

Metoder och principer i terminologiarbetet (Methods and Principles in Terminology Work), Spri och TNC, 1999.⁵³

53. <http://www.socialstyrelsen.se/NR/rdonlyres/5ADD0A52-F203-4CAE-89A8-69396DAB130E/0/rap481.pdf>

TNC is trying to help implantation by writing articles, giving lectures, and holding conferences.

As Nilsson⁵⁴ states “The joint group model was exported to Norway, Finland and Greece during the Efcot-project, a project supported by the EU MLIS-program and concluded in 1999 with the formation of similar groups in the participating countries.” (p. 4) He also continues that “The success of these groups is partly due to their broad composition, and especially the fact that the media take part in the discussion and then use the terminology decided upon is crucial for the spreading of the terminology to a larger audience, The web technology has obviously also contributed to the work itself, and to the spreading of the results.”

Persian (APLL): The Academy publishes the lists of the approved terms in the form of a collection both in print and online:

1. Booklets of the approved terms for each discipline;
2. *farhang-e vāžehā-ye mosavvab-e farhangestān* (A Collection of Terms: Approved by the Academy).

The booklets’ and collections’ organization is in the following way:

1. Approved terms alphabetically including an approved term, definition and its foreign counterpart;
2. Foreign terms alphabetically with their Persian equivalents;
3. Foreign terms alphabetically with their Persian equivalents for each discipline separately.

54. http://www.tnc.se/images/stories/pdf/Terminology_work_the_Swedish_way_Nilsson.pdf (Accessed 6/4/2014)

In addition of the collections, the Academy publishes the approved terms in the *Newsletter* to know the users' ideas.

The tools of dissemination in the following linguistic communities are from not having "central publication" but using general instruments (Icelandic, Estonian and Sami) to involving electronic devices (Sami, Latvian, Hungarian and South Africa).

Icelandic: Helgadóttir (1991) describes Icelandic terminology dissemination: "New terms can spread through all manners of written translations; textbooks ... newspaper, magazines, television and radio There is no central publication for the dissemination of new terms, apart from the periodical of the Icelandic Language Council, where new terms are introduced from time to time. There is no question of "assuring" the adoption of new terms." (p. 64)

Estonian: As Erelt and Saari (1991) state terminologies are mainly spread by terminological dictionaries and specialist periodicals but "new terms are actively introduced by non-linguist specialists working on terminology commissions in the teaching process as well as in the writing and editing of texts." (p. 14)

Sami: Utsi (1991: 52) states "There exist no publications for the purpose of disseminating new terms. New terms are mainly published in new teaching materials, books, journals and newspapers in Sámi." The author mentions that "The 'Sámi Databank' project is involved in standardizing IT products for the Sámi language." (p. 47)

Latvian: According to Skujina (1991: 31), Latvian terminologies are disseminated through terminology bulletins, dictionaries, newspapers (new terms), term bank (in card file).

Hungarian: Fóris (2010: 40) states “Several specialized dictionaries have been compiled with commercial aims, and a number of Hungarian institutions have databases for terminological purposes and for internal use, but none of them is accessible freely and openly.”

South Africa: Alberts (2002: 94) explains that “By collecting multilingual and polythematic terminology, the Terminology Coordination Section builds very large corpora on specific subject areas and domains. From these corpora, multilingual terminology lists, technical dictionaries or CD-ROMs can be compiled for dissemination to end-users. Collaboration with related professional and academic institutions, subject specialists and linguists promotes quality control and the standardisation of terminologies. The Terminology Coordination Section aims to coordinate all terminological endeavours in South Africa and to be a clearinghouse for all terminological activities by sharing terminology and terminological knowledge with a multilingual content” She presents a diagram (p. 98) to show how terminological activities are coordinated in South Africa. The author also describes “envisaged web-enabled terminology management model (TRADOS MuWA and TermCO)” (p. 97), as the internet-based dissemination.

4.3 Evaluation

To know whether terms have been employed, methodology works well and, generally, terminology planning mechanism operates effectively, continuous assessment is needed. Evaluation is a process of analyzing and assessing the information obtained from surveys. Although Bhreathnach (2011: 59) states “No literature was found dealing with the evaluation of term planning organisations themselves.”, the journal of *Language policy* (2011, 10: 4) is devoted to language academies and management agencies, including NÍ Ghearáin concerned with Irish situation.

This part should be logically concerned with information indicating how to evaluate terminology planning not with the results.

Catalan (Termcat): Termcat has contracted with the IULATerm group at the University Institute of Applied Linguistics at Pompeu Fabra University. “In 2009 ESTEN, the tool used to monitor terms designed by the Applied Language University Institute and which is hosted on the University’s server, has been made available to all researchers.” according to *Generalitat de Catalunya* (the Catalan Regional Government) in *The Government structure for language policy issues*⁵⁵ (2009: 20). Termcat also has worked with the University Center for Sociolinguistics and Communication (CUSC) attached to the University of Barcelona.

55.http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CCkQFjAA&url=http%3A%2F%2Fwww20.gencat.cat%2Fdocs%2Flengcat%2FDocuments%2FInforme%2520de%2520politica%2520linguistica%2FArxiu%2Fa_cap02_09.pdf&ei=yuUMU9-WLsXmoATX4oDQA&usg=AFQjCNGYANNIb4Wb7IzuXI3Ivr8CRdV-Mg&bvm=bv.61725948,d.cGU (Accessed 9/4/2010).

Montané (2012) quantifies the implantation of computing and IT terms standardized by Termcat from a representative sample of specialized texts by observing criteria such as dissemination, scope of use, brevity, the formal analogy between standardized terms and the original units, the ways terms enter Catalan (term formation methods) and terms competition.

French (DGLFLF): The DGLFLF is searching whether its proposed terms have been used by lexicographers, e.g. by *Le Nouveau Petit Robert*, 2009, or to what extent they are available on Internet.

Swedish (TNC): No academic research is carried out at the TNC.

Persian (APLL): The Academy is not concerned with terminology researches. Evaluation and revision have not been done systematically and there are no definite strategies for them. Zarnikhi (2010) evaluated some parts of terminology work at the APLL. For instance, because the Academy does not publish its products in a systematic way in the form of specialized dictionaries, but lists of approved terms in the form of a collection, it is obvious that its collections are suffering from some inconsistencies. Table 4.1 represents the linguistic terms collected during an annual round of terminological activities and the Academy has approved Persian equivalents for them, from *farhang-e vāžehā-ye mosavvab-e farhangestān* (A Collection of Terms: Approved by the Academy, 2008). The author, aware of the other possibilities for categorizing the terms, divided them into eight groups and the last cell is for

those which do not seem to coincide with these groups. The forward slash (/), used by the author, stands for the synonymous terms.

Syntax	additive relative clause/non-restrictive relative clause/appositive relative clause, actor, agent, recipient, source, benefactive/beneficiary/benefactor, experiencer, goal, instrumental, patient, clause, relative clause, relative pronoun, relativization, co-ordinating conjunction, co-ordination, co-ordinator, complement clause, complementizer/subordinator/subordinating conjunction, subordination, complex sentence, defining relative clause/restrictive relative clause, dependent clause, D-structure, S-structure, embedded clause/subordinate clause, Government and Binding Theory, intermediate structure, logical form, main clause/matrix clause/superordinate clause, minimalist program, principles and parameters theory, thematic roles/theta roles(δ -roles), theta criterion, theta grid(δ -grid), theta theory(δ -theory), context dependent, context free, grammatical meaning, recursive definition, word-order
Semantics	meaning, connotation, denotation/denotative meaning/referential meaning, sign, signifiant/signifier, signification, signified/signifié, definition, definition style, circular definition, vagueness, type, token, lexical ambiguity, lexical meaning, sentence meaning, literal meaning
Morphology	abbreviation ¹ , abbreviation ² , acronym, acrophone/initialism/alphabetism, blend, blending, borrowing, calque, clipping, coinage/coining, coined, word, word-class, word form, loan word, lexeme, lexemic, lexicalization, lexicalized, orthographic word, lexical gap
Phonetics and phonology	phonetic form, phonological word
Sociolinguistics	bilingual, bilingualism, creolization, diglossia, pidgin, pidginized, expanded pidgins, interlingua/lingua franca, linguistic atlas, multilingualism, argot, auxiliary language, artificial language, euphemism ¹ , euphemism ² , dialectal borrowing
Lexicography	academy dictionary, activator/active dictionary, bidirectional dictionary, bifunctional dictionary, comprehensive dictionary, learner's dictionary, reverse dictionary/reverse-order dictionary, unabridged dictionary, lemma, lemmatization, lexical entry, lexical meaning
Discourse	discourse, discourse analysis (DA), critical discourse analysis (CDA)/(CA), context, context of situation, linguistic context, non-linguistic context, contextual, contextualization, decontextualized, cotext, setting
Terminology	term, simple term, complex term, compound term, term bank, terminographer, terminography
The others	arrangement, active vocabulary, passive vocabulary, core word, core vocabulary /basic vocabulary, analogy, analogical, anomaly, anomalous, sign language, contracted, contraction, genre, register, text, text analysis, text linguistics, semiology/semiotics

Table 4.1: Linguistic terms collected by the APLL

Another one of the shortcomings stemmed from the unsystematic data collection appears in registering related terms. They must form a conceptual cluster, a group of terms share a core meaning. This common meaning connects them in a horizontal line. At the same time, they are differentiated by some nuances vertically. The philosophy behind it is to avoid choosing an equivalent in place of another one. However, for instance, related terms registered for *winds aloft*, a meteorological term, are: *radiosonde*, *rocketsonde*, *radar* and *theodolite*; for *gravity wind* are: *wind*, *temperature*, *density*; and for *goldbeater's-skin hygrometer* are *electrical hygrometer*, *humidity*, *relative humidity* and *hygrometer*. On the terminology record from the nutrition terminology group, the related terms for *food spoilage* are: *enzyme*, *microorganism*, *degradation* and *deterioration*.

Except Hungarina, the others are based on empirical studies and they come in a chronological order.

Hungarian: Fóris (2007: 16-17) states that “It was half a century ago when János Klár and Miklós Kovalovszky published a volume of essays and studies In the book, the authors collected the results of terminological changes, analyzed the deficiencies and outlined the things to be done. It is quite unfortunate that the negative picture described by them has changed only a little in the past decades. Furthermore, no interdisciplinary cooperation and uniform language planning necessary for comprehensive work have developed ... this subject has no literature and hardly any methodological basis ... no scientific monograph has been published on terminology, and the

opportunities to publish works concerning this professional field are scarce.” The scholar explains that “There are no dictionaries, glossaries, encyclopaedias, electronic databases, etc. available that contain the terms and the definitions of concepts of certain professional fields.” (p. 22) Finally, she concludes “There is no real information system that shows the results of the Hungarian terminological research and practical work.” (p. 22)

African context (Nigeria): Antia (2000) states “The resource evaluated is the Nigerian project entitled *Quadrilingual Glossary of Legislative Terms* The test criteria are communication and knowledge (transfer).” (p. 49) The author explains that experiments “were aimed at investigating the degree to which the *Quadrilingual Glossary of Legislative Terms* is able to support translating (as an instance of communication) and knowledge (acquisition and transfer). The communication activity of translating is chosen because it is quite consistent with the typical terminology planning goal of capturing in a given target language some of the experience that is recorded in one or several reference languages.” (p. 50)

Turkish: Karabacak (2009) carried out a corpus-based study to know to what extent Turkish newspaper writers have accepted economic terms approved by the Turkish Language Society (TDK) from 1995 to 1998.

Irish: Ní Ghearaíin (2011) did a research to test this hypothesis “that Irish speakers in traditional Gaeltacht areas do not accept official terminology planning, both in terms of their language practices and beliefs.”

Persian: Talebinejad et al (2012) researched into the frequency of the neoterms suggested by the APLL in comparison with borrowings in the translations of scientific and technical documents. They also tried to know whether familiarity with the APLL-approved terms increases their frequency in translations of such literature. To do an empirical research, fifty-five PhD students of nine disciplines were randomly selected. Then, nine technical texts, each including twenty technical terms, followed by a twenty multiple-choice item test, accompanied by a familiarity questionnaire (to know how much participants are familiar with the APLL-approved terms) based on the same twenty terms were given to the participants. Wilcoxon Signed Rank Test and Spearman's Correlation Coefficient were applied to analyze the data.

Catalan: Montané (2012) based on a corpus study concerned with standardized terms by Termcat in Computer Science and Information and Communication Technologies sought the reasons of their success or failure by considering linguistic aspects (brevity and formal and semantic proximity to the original term), sociolinguistic aspects (field of use, entry of terms in a specific domain and terminological competition) and procedural aspects (term dissemination in general and specialized dictionaries).

4.4 Conclusion

This chapter organized the data obtained from four case studies and about thirty linguistic communities under the layers of planning theory, linguistics of science and implementation and their subdivisions. The subsequent chapter is devoted for data analysis.

Chapter 5: Data analysis

In Chapter 3, I presented linguistics of science and planning theory as two components of the language of science planning (see Diagram 3.1) and at the end of the chapter a clue in evolving and developing of modeling appeared: implementation (see Diagram 3.3). It is time to summarize and analyze the data, arranged in the previous chapter based on the three layers, in order to arrive at major and minor nodes (universal and restricted principles), parameters and their reasons.

In this chapter, we present the data in the following way:

5.1 Planning theory layer (a diachronic and synchronic sociolinguistic analysis)

5.1.1 Social dynamic forces analysis

5.1.2 History of scientific languages, by focusing on
terminological activities

5.1.3 Needs and aims

5.2 Linguistics of science layer (Terminology argumentation)

5.2.1 Terminology research (e.g. Typology)

5.2.2 Terminology approaches

5.2.3 Standardization

5.2.4 Terminology resources

5.2.5 Terminology formation methods

5.2.6 Implantation criteria

5.2.6.1 Linguistic criteria at both theoretical and practical levels

5.2.6.2 Non-linguistic criteria at both theoretical and practical levels

5.2.6.3 The correlation between theoretical and practical criteria

5.3 Implementation layer

5.3.1 Infrastructures

5.3.2 Workflow

5.3.3 Organizational structure

5.3.4 Dissemination

5.4 Evaluation

5.5 Conclusion

5.1 Planning theory layer (a diachronic and synchronic sociolinguistic analysis)

The language of science planning is suffering from an inconsistency otherwise a diachronic and synchronic sociolinguistic analysis, covering dynamic forces and a history of a given language in expressing scientific concepts, is brought to the fore. It helps recognize needs and aims. This kind of analysis is required as a pre-

step for language policy, according to Guespin (1990), in order to avoid mistaking desirability for reality. As a result, the analysis is responsible for making a balance between what actually exists (needs) and what we, in an ideal world, wish to achieve (aims).

This section includes the following three sub-divisions:

- Social dynamic forces analysis
- History of scientific languages, by focusing on terminological activities
- Needs and aims.

5.1.1 Social dynamic forces analysis

An ecolinguistic situation is under pressure from unexpected forces and forces from top and bottom and its description is, in fact, the sum of diachronic and synchronic socio-political and economic analysis. Knowing which factors are more effective in which ecolinguistic situation is indispensable in modeling dynamic forces for each ecolinguistic case.

The forces classified and labeled in Chapter 4 are summarized in Table 5.1 under three groups and then analyzed.

Unexpected forces	Forces from top	Forces from bottom
Dictatorship from 1936 to 1975 (Catalan); change of political system (Hungarian)	A co-official language by a language law in 1932 and 1983 (Catalan); an explicit status-planning law in 1939 and a language law in 1992 opening to the use of other languages (French); a language law in 2009 and an implicit terminology policy scenario (Swedish); the official language (Persian); language law suffering from inappropriate sociolinguistic considerations (Ukrainian)	As a national identity (Swedish); support from the public (Catalan); the indifference of the population (Galician); Russian speaking immigrants' negative attitude towards Latvian; a contradictory attitude between language agencies and users to word resources (Mauritanian, Swahili and Hebrew); the positive attitudes towards the language but negative ones towards unfair language policies (Irish); consideration to language users's attitudes (Quebec and Tonga)
Invasion and occupation (Persian, Greek, Ukrainian and Latvian)	An integrated language policy scenario (Catalan and Lithuanian); the positive effect of a language policy on language attitudes (French in Quebec); language policy as the main cornerstone in the modification of Estonian society from 1988	The individuals' positive role (Swati language, Tonga, Sami, Estonian, Irish, Icelandic, French)
Language contact (Persian)	The necessity for establishing a proper organization for the publicity (Greek); language agency's positive role in the success of language planning (Swedish); the positive role of the Institute of Ukrainian Scientific Language in the Ukrainization of all spheres of life (Ukrainian); the language agency's mandatory resolutions and recommendations (Lithuanian)	Non-governmental agencies' positive roles (Swahili)
Change of socialist political system in 1989 (Hungarian); European integration (Greek and Hungarian)		The individuals' and non-governmental agencies' positive roles (Hebrew, Chitumbuka-speaking northern region of Malawi and Persian)
Industrialization (Hungarian)		

Table 5.1: Summarization of the three groups of forces

Taking the variables distributed in Table 5.1 into account, it seems that none of them is a prime determinant of language planning success or failure. For instance, concerning unexpected events,

limitation imposed to a linguistic community by invasion, occupation and dictatorship have suppressed a native language (e.g. Greek and Catalan) and caused linguistic hegemony (e.g. in Iran, Ukraine and Latvia) but joining European Union, as an activity in a regional scene, and changing political system in Hungary made a linguistic community struggle for more terminologies (e.g. Greek and Hungarian). Even an unexpected happening such as linguistic domination may have a positive effect (e.g. Persian vocabulary enrichment from Arabic, Mongolian, Turkish, Russia and French, albeit morphologically affected by Arabic).

Regarding the necessity of language law, Siiner (2006) considers linguistic stability in Sweden, Denmark and Finland as a sign that “there is no need for explicit policy activities in support of the respective national languages” (p. 165) In contrast, Oakes (2005: 169) argues that “... the potential of the increasing importance of national identity amongst the general public in Sweden ... could provide the necessary legitimacy for the elaborate measures proposed in *Mål i mun*.” But how a language law should be enacted is closely related to a sociolinguistic situation. As an example, comparing success of the Swedish language law with failure of the Ukrainian one shows that the former has dealt with linguistic situation (e.g. respectful of national minority languages) but the latter is suffering from a lack of sociolinguistic considerations. Although the Swedish and French language laws are open to other languages, can it be generalized and prescribed for any other ecolinguistic environment such as African countries with the minimum number of forty languages for each country (Alberts

2008)? Allowing other languages and minorities to be involved in social activities in France and Sweden may be from their current stable socio-political situations they have achieved as final results of their conflicting forces. For example, French and Spanish have developed inside and diffused across other countries and Swedish today is a considerable part of national identity. Therefore, language law, as a force from top, is not positive or negative by itself but the factor which exerts effect is how a law is formulated. Cabré (1999), for example, dealing with multilingualism in Spain, believes that terminology planning should consider languages in Spain and Castilian language.

It holds true in the case of language policy-making to such a degree that it can change even language attitude as it happened in Quebec where the language agency consults the target users. So it may be possible to change Russian speaking immigrants' attitude towards Latvian through a language policy based on a real ecolinguistic analysis. It appears that bringing a socio-political change (democracy) in Estonia is dependent on a linguistic activity. Thus its language policy has to be realistic about its multiethnic situation.

Finally for implementing a language policy, the gathered data from Swedish, Ukrainian and Greek provide evidence of the positive effect of central agencies (see Elkhafafi 2002 for a counter-example in Arabic countries). Language agencies form a range of options: imposing an obligation (e.g. Lithuanian but not for CLACA), consulting target users (Quebec) and so on. Therefore, it

seems that a centralized activity can be considered as a principle but how it is structured and what kind of function it fulfils are matters of sociolinguistic variables. For example, Lara (1986), from experience in Mexico, suggests that “we need autonomous specialized institutions, independent of short-term government policies. Such institutions ought to be the technical support for terminologies developing in each area of science and technology.” (p. 98)

As it is seen, from top does not necessarily equal negative effects. But favoring only top-down approach and ignoring dynamic forces from bottom and the effects of unexpected events could be problematic as Oakes (2005) refers to Ireland, the Philippines and Singapore as “examples of ineffective top-down-only language policy” (p. 158). Kaplan and Baldauf (1997: 321) also believe that “... language planning and policy implementation ideally follows a bottom-up structure, rather than a top-down structure.” From bottom, target audiences’ attitudes (e.g. French in Quebec) and the role of stakeholders (Irish, Icelandic, Estonian, French, Sami, Hebrew, Persian, Tonga, Swati language, Swahili and Chitumbuka-speaking northern region of Malawi) are highly significant. A conflict between target users’ and language policy agencies’ attitudes towards terminology resource is problematic in the case of Swahili, Hebrew and Mauritanian; it is a contrast between top and bottom. In addition to this, there is a big difference between native-speakers’ attitudes towards their languages and language policies (e.g. Ireland). If they are distinguished by policy-makers, users’ criticisms can be taken into account as a language policy

assessment. Regarding the effect of non-governmental agents, “Empirical studies suggest that broadcasters, journalists, and writers create and disseminate vocabulary with far greater success than government agencies.” (Jernudd and Das Gupta 1971: 210) The Academy of Persian Language and Literature (APLL) has mainly taken a top-down approach but it has recently invited scientific associations to cooperate in terminology development which could be a kind of bottom-up approach engaging some stakeholders’ interests.

As a conclusion, it is clear that none of the above mentioned forces has the final word but the point is that how to manage them. Modeling dynamic forces means how to make a balance among forces. To do this, diagnosing key variables as far as possible and then measuring their weights should be deemed appropriate. A plausible scenario painted for modeling, in an ecosystemic view in the frame of a systemic planning, can be a combination of deploying forces from top and bottom. Therefore, language planning could be depicted as a process fastening the scaffold from top with making language law and policy by embedding intended users’ attitudes and interests and adopting strategies for promoting linguistic consciousness and, on the other side, involving as many stakeholders as possible from bottom in linguistic activities increasing linguistic awareness as well (e.g. Quebec). Top and bottom are connected by a loop. The loop is for sending information from bottom to top and then from top to bottom. A language agency is required to mediate between these two levels. The combination is reflected in Helander’s words (1994: 40) that “The foundation of

publicly-elected bodies and the strengthening [sic] of the Sami language by means of language policy and legislation have greatly improved the conditions for language promotion efforts.’’ TNC makes stakeholders involved in terminological activities and considers the intended users’s ideas, a bottom-up approach, on the one hand, and it strongly recommends some uses, albeit there is not a *must*, a top-down/prescriptive approach, on the other hand. It can be said that TNC benefits from both approaches.

5.1.2 History of scientific languages, by focusing on terminological activities

This part is for analyzing diachronic history of languages of science to know how much their current linguistic features are the result of non-linguistic variables (dynamic forces). For this reason, in terminology planning for a given language of science, adopting a historical approach makes expectations more realistic. Table 5.2 represents a comparison between effective dynamic forces and history of languages of science. From the data presented in Chapter 4, only for Catalan, Persian, Greek, Hungarian and Latvian, all of them from the second group (languages with a discontinuous history in science), effective dynamic forces (from unexpected forces) exist.

Languages	Effective dynamic forces	With a discontinuous history in science
Catalan	From C 16 th onwards dominated by Spanish for some specialized social functions; dictatorship (1936-1975)	As the official language of the ancient Crown of Aragon (1147-1716), generally used in all areas of knowledge until C 18 th ; the encyclopedic work of Ramon Llull, in the 13 th century
Persian	In C 7 th and C 13 th dominated by Arabic and Mongolian respectively; in C 19 th language contacts with Russian and French	The first endeavor for replacing Arabic terms with Persian ones by Avicenna
Greek	400-year Ottoman occupation; the geographical distance from the new centers of scientific development; European integration	A development of Ancient Greek; language changes in the last 24 centuries not greater than the differences between the language of Chaucer (1400 A.D.) and present-day English; no scientific vocabulary development from the 14 th century onwards
Latvian	Linguistic domination by German and then by Russian	In C 13 th , in folk occupations such as seafaring and fishery terms; in C 16 th terms in the first books published in Latvian; in the second half of C 19 th , scientific approach to the selection and formation of terms and the first terminological dictionaries
Hungarian	Industrialization; change of political system in 1989; European integration in 2004	During the 17 th -20 th centuries an elaborate set of Hungarian terms and systems of terminology; in the 1950s standardization based on Soviet School of Terminology; in the 1970s, specialized translation groups at Hungarian universities; and in 1974, teaching language for specific purposes

Table 5.2: How social dynamic forces influencing languages of science

Table 5.2 shows that how a chain of unexpected events has interrupted Catalan, Persian, Greek and Latvian in their career as scientific languages. However, socio-political and economic changes have positively affected Hungarian. Therefore, potentialities languages have developed are rooted in their checkered career through the interaction of dynamic forces. Russian starting terminological activities from 1780 and until 1990s has experienced four periods but, although Pre-indoeuropean Basque is the oldest European language, it has nothing as a language of

science. Hence, becoming aware of what has historically happened to a language helps to know what a language has and what it does not have and why.

It is time to know to what extent retaining these features influences terminology planning approach. In other words, whether each of the three distinct linguistic groups (see Section 4.2.1.2) has the same needs and aims? Or their members, albeit having more or less the same history of expressing science, have their own objectives? For instance, do French, with a long history in language planning, as a language of science in the seventeenth century and currently wide diffusion over the world, and Swedish, as a national identity with a success of central planning and language policy, which have yielded a considerable amount of terminologies during the past centuries, further the same aim in their terminological activities?

5.1.3 Needs and aims

This part is dedicated to see how composition of an ecolinguistic environment, i.e. its interacting dynamic forces and linguistic characteristics it has possessed, ends in contemporary needs and aims. Table 5.3 represents this process. The second column includes only dynamic forces having any impact on needs and aims.

Languages	Dynamic Forces	History of scientific languages	Needs and aims
French (DGLFLF, a governmental department)	With a long history in language law and planning	With a long history as a language of science	Modernization through finding or creating an equivalent for new foreign concepts entering, regarding to what extent they could be disseminated and used by laypeople
French (The Office de la langue française, 1977 under the Charter of the French Language)			Social development through pursuing a linguistic objective
Swedish (TNC, a governmental organization)	With a long tradition of systematizing and categorizing knowledge	With a long history as a language of science	Professional communication through satisfying users' needs for languages for special purposes
Catalan (Termetcat, a governmental organization)	With the domination of Spanish from C 16 th onwards for some specialized social functions; dictatorship (1936-1975)	With a discontinuous history as a language of science	Terminology development through promoting and producing terminology resources
Persian (The Iranian Academy, 1935; The Iranian Academy of Language, 1970 and APLL, 1991, governmental organizations)	With the domination of Arabic and Mongolian in C 7 th and C 13 th respectively; language contacts with Russian and French in C 19 th	With a discontinuous history as a language of science	Terminology development through removing unsuitable foreign words and creating Persian terms and expressions for every branch of life, at the Iranian Academy, 1935; supplying the ever-increasing scientific and technical needs at the Iranian Academy of Language, 1970, and APLL 1991
Norwegian			Terminology development through replacing foreign words (Danish and English)
Arabic countries			Terminology development through creating new technical terminologies for regenerating Arabic as an effective communication medium and eliminating the diglossia

Hungarian	Industrialization; change of political system in 1989; European integration in 2004	With a discontinuous history as a language of science	Terminology development through replacing missing and incorrect terminologies and systematizing and maintaining terms belonging to a certain domain for eliminating the intellectual monopoly of the high society
Ukrainian	With the domination of German and then Russian		Terminology development for a full-fledged communication tool
Sami		Without an old history as a language of science	Terminology development
Hebrew (The Council of the Hebrew Language, 1890; Academy of the Hebrew Language, 1953)			Language diffusion and after 1903 elaboration of the spoken language, at the Council of the Hebrew Language, 1890; terminology development, at the Academy of the Hebrew Language, 1953
Estonian	Transformation from a totalitarian to a democratic society		Maintenance Estonian as the native language for the needs of the state and speakers of Estonian
Basque		Without an old history as a language of science	Unification through terminological activities
Irish	Bilinguals more competent in English than in Irish in most cases		Revitalization rather than specialist communication
Manx Gaelic		Without an old history as a language of science	Independence through purism
Icelandic (The Icelandic Language Council, 1964, a governmental organization)			Independence through purism

Table 5.3: How social dynamic forces and history of scientific languages affecting needs and aims

To see how the sum of the socio-political and economic forces and a precedent for expressing scientific concepts determines motivations in language planning, especially terminology planning, the data distributed in Table 5.3 are analyzed as follows:

1. Languages with more or less the same sociolinguistic career do not necessarily stress the same needs and, consequently, do not follow the same aims, e.g. French in France and in Quebec and Swedish. Because of development inside and outside of France, a long history in language law and planning and a long history as a language of science, French only needs to enrich its terminologies. However, the scenario is different in Quebec where French is available. The problem is how to promote it to serve socio-professional functions. It means that the desperate need of the social promotion of French speakers will be satisfied by a linguistic factor (language development). It can also be concluded that planning for the same language but in different socio-political contexts, due to the nature of sociolinguistic adaptive systems, requires completely different strategies. Terminology repertoire may only affect their methods. But what sets the wheels in motion is their own specific socio-political and economic factors. In spite of being in the same group (language development) with French, Swedish focuses on knowledge systematization for professional communication because of its tradition in science and its industrial background.

At the opposite end of the scale, Sami and Basque illustrate two minority languages with no considerable experience in science but their aims sprung out of their discourse needs are different. The

former aims for systematic vocabulary development and the latter is trying to unify varieties. The discourse problem in Ireland is another story. It is at the first step to revitalize Irish not for developing it for specialist communication but for improving the status of Irish in law, education and administration.

2. Languages with different socio-economic development levels such as Catalan, Persian, Hungarian, Ukrainian and Sami are accomplishing the same linguistic goal (terminology development) although they may have a specific non-linguistic objective behind it (e.g. eliminating the intellectual monopoly of the high society in Hungary).

3. Behind an apparently linguistic aim could be a non-linguistic one. For instance, in addition to developing Arabic to be effective in communication, Arabic countries are trying to complete a sociological mission. It is to promote Arabic to a position where not having a feeling of inferiority to English or French and even to the dialects of standard modern Arabic. Changing socio-political system in Estonia highlights a non-linguistic need, survival of the Estonian nation, which is planned to be satisfied by Estonian maintenance through normalizing, regulating and standardizing. Dominated by three linguistic layers (German, Russian and English), Ukrainian is another example aimed at developing terminologies to reach a position to be efficient in all areas; communication as a social discourse need is the main problem.

A socio-political discourse problem such as independence, an aim originated from a historical background, shapes a need in the form

of a linguistic planning activity (purism) for Manx Gaelic and Icelandic. Madiba (2001) refers to purism in different sociolinguistic situations:

Israel (where purism aims at protecting Hebrew from Arabic and specifically English influence), Italy (where purism was aimed at eradicating Gallicisms from the language), Germany (where, during the Third Reich, linguistic purism focussed on promoting patriotism) and Turkey (where purism was aimed at dissociating Turkey from the countries of the Middle East while encouraging associations with Western countries). Consequently, thousands of loanwords from Arabic and Persian languages were removed from the language (Madiba 2001: 55).

Non-linguistic factors (more trade and new professions as a result of internationalization in the 20th century in Iceland) influenced language (new terminologies) and language, in turn, was employed for fulfilling non-linguistic purposes; it is a bilateral relationship.

4. Needs and aims change over time. The Iranian Academy, established in 1935, faced with an enormous amount of borrowings and with an interrupted career as a language of science, tried to promote Persian and remove unsuitable foreign words. It is similar to Norwegian. However, changes in discourse problems with the passing of time modified needs and aims in such a way that at the Iranian Academy of Language, 1970, the aim was to meet linguistic needs of science and technology and also to deal with the general language. The focal point for the APLL, 1991, has been the same. The Council of the Hebrew Language, with a short-time experience in revitalization from 1890, planned to spread Hebrew among users

but after 1903 the aim changed to elaborate language and to consider new words. The Academy of Hebrew Language, 1953, aimed at a higher stage, i.e. language development and preparation of its preliminary stages through terminology research.

A concluding remark is that a sociolinguistic analysis precedes any other activity to reveal real discourse problems and linguistic potentialities. Henceforth, linguistics of science layer has to resolve discourse problems discovered and passed by the planning theory layer. What forms linguistics of science and its approaches is language policy and language policy is formed by needs and aims from a sociolinguistic analysis (planning theory). Arnason and Helgadóttir (1993: 11 cited in Myking 2006: 143) believe that “the theory of terminology is simply a tool in carrying out the policy... .”

5.2 Linguistics of science layer (Terminology argumentation)

Linguistics of science, at the level of terminology argumentation, functions as a linguistic theory for the language of science planning to tackle problems recognized by the planning theory layer. To do this, it adopts its approaches (parameters) based on how a linguistic community views on *language* and *science* and the relationship between them. However, commonalities (principles) among linguistic communities, based on the present data, are: terminology typology, terminology approach, standardization strategies, resources for term exploitation, term formation methods and linguistic and non-linguistic criteria helping terms implant.

Terminology argumentation might have other aspects not included in the data but they can be found out in regard to a given linguistic community. The type of discourse problems makes a part of linguistics of science salient, e.g. for purism, terminology typology and resources are more important.

An outline of issues which will be discussed in linguistics of science is in the following way:

5.2.1 Terminology research (e.g. Typology)

5.2.2 Terminology approaches

5.2.3 Standardization

5.2.4 Terminology resources

5.2.5 Terminology formation methods

5.2.6 Implantation criteria

5.2.6.1 Linguistic criteria at both theoretical and practical levels

5.2.6.2 Non-linguistic criteria at both theoretical and practical levels

5.2.6.3 The correlation between theoretical and practical criteria

5.2.1 Terminology research (Typology)

Linguistics of science for solving discourse problems recognized by the previous layer needs to carry out researches. Terminology research serves a tripartite function: pre-terminology work research discovering problems, intra-terminology work research solving

problems and post-terminology work research evaluating the process. All form a peri-terminology work research.

Terminological typology is a kind of ground-breaking research whose findings are applicable in determining resources, devising standardization strategies, adopting or creating methods and establishing criteria. In Tkacheva's words (2004), an advantage of "a comparative study of the terminology of different branches of knowledge and of different languages" is making "some prognoses for the further development of terminology such as the widening of the process of borrowing, the interpenetration of terms, the internationalization and trans-nationalization of terminology, the shortening of multicomponent terminological combinations, the formation of interlinguistic and intralinguistic hybrid terms." (p. 353)

Table 5.4 shows what kinds of typology researches such as morphology, semantics, terminology resources, term formation methods and implantation criteria can be useful to resolve what kinds of discourse problems (needs and aims). It is worth mentioning that using "especially" on "Needs and aims" column stresses that these types of typology researches are more appropriate to these needs and aims but, at the same time, they can be suitable for the other ones.

Typology researches	Needs and aims
Morphology: categorization of terminological forms (Sager and Nkwenti-Azeh 1989); terminological universals (Nematzadeh 1997); compound and complex terms (Grinev 1993; Papadaki 1994); the growth of word-formations connected with laminar periods in subject fields (Grinev 1993)	especially for modernization
Semantics: categorization of terminological content (Sager and Nkwenti-Azeh 1989); polysemy connected with a turbulent state in subject fields (Grinev 1993)	especially for professional communication
Terminology resources: borrowing abbreviations (Tkacheva 1986); borrowing in different subject fields (Grinev 1993)	especially for development, maintenance, revitalization and purism
Term formation methods: abbreviations in different languages and subject fields (Tkacheva 1986)	especially for modernization, development, maintenance, revitalization and purism
Implantation criteria: areas of application of terminology (Grinev 1993); term creation criteria and also the reasons of success or failure of language planning process (Elkhafaifi 2002)	for all aims

Table 5.4: Applications of typology researches to needs and aims

It appears that fulfilling any kind of terminology planning needs and aims is inextricably linked with typology achievements. Comparative studies representing information regarding intra- and interlingual and interdisciplinary terminologies alter terminologists' perception. As an example, for bringing terms up-to-date, it is necessary to be aware of various intralingual potentialities and which disciplines tend to use which morphological forms and contents. To establish a more successful professional communication, semantic analyses are required. To know from where terms can be prepared is very much a subject of debate for development, maintenance, revitalization and purism. Terminology habits are closely related to linguistic structures and subject fields,

according to typology researches, then information in this topic is useful for modernization, development, maintenance, revitalization and purism. Results from comparative researches can lead terminology planners to more certain sociolinguistic characteristics which guarantee term implantation.

5.2.2 Terminology approaches

By terminology approaches, the thesis considers opposing views about term, concept, their relationship and, as a result, terminology work direction (from term or concept). Table 5.5 represents how different linguistic communities' approaches are under the influence of the planning theory layer (their own specific needs and aims).

Languages	Needs and aims	From term	From concept	From both sides
French (DGLFLF)	Modernization	+		
French (Quebec)/Canadian groups	Social promotion			+
Swedish (TNC)	Professional communication		+	
Catalan (Termcat)	Terminology development	+		
Persian (APLL)	Terminology development	+		
Hungarian	Terminology development		+	
Nordic approach				+
Ukrainian	Terminology development		+	
Irish (An Coiste Téarmaíochta/the Irish Terminology Committee)	Revitalization	+		

Table 5.5: A comparison between needs and aims and terminology approaches

Concerning the data distributed in Table 5.5, both DGLFLF (French) and TNC (Swedish) having more or less the same checkered past in science and, consequently, in their languages of science, are trying to be modernized but in different manners. Swedish concentrates on professional communication (because of its dynamic forces) and, for this reason, it has to begin from *concept* in standardized forms. What makes French, with a long experience in expressing scientific concepts, and Irish, at the other end of the scale, with a huge sociolinguistic difference with French, adopt the same approach (from term) is related to their own specific needs; the former for bringing up to date and the latter for becoming healthy and strong again. Then the two close linguistic communities (French and Swedish) try different terminology approaches but the two distant ones (French and Irish) take the same approach.

Catalan, Persian, Hungarian and Ukrainian terminology planning aim is terminology development but through different approaches. Even Termcat (Catalan) and APLL (Persian) beginning from *term* employ different methods in term gathering. Termcat collects terms from Catalan corpora but terminology work at the APLL is based on English terms as the DGLFLF does only for not highly specialized ones.

Concepts are not universal and they are under the influence of cultures. So terminology works starting from concepts are not complete by themselves. Arntz states:

In his English-French dictionary '*The Machine Tool*' (1968), Eugen Wüster demonstrated convincingly the extent of

interlingual divergences in the special vocabulary of mechanical construction even where standardized terms are concerned. The following example, which is taken from this work, demonstrates how two clearly defined technical terms (en *key* or *cotter*) can correspond to only one - equally clearly defined-technical term in another language (fr *clavette*) which combines the content of both words... (Arntz 1993: 6).

Korkas and Rogers (2010: 134), citing Schmitt (1999: 244-247) that even technical terms can be culture bound, refer to “... difficulties of matching different types of hammers and their functions in Germany and Great Britain” It could be more problematic for humanities carrying more socio-cultural load.

Muráth (2010), criticizing Wüsterian theory by doing a research on economics terminology, focuses on “the different levels of development of individual countries, and, simply, the differences between countries in both economic and management systems... .” (p. 52) Then she suggests that instead of “the classical terminology theory, ... the translator, should, in my opinion, move between text level and system level during the translation process.” (p. 52-53) In Canadian groups, according to L’Homme (2006), both onomasiological and semasiological approaches are followed. It holds true in Nordic countries.

Two points can be concluded from the discussion. The first is that what determines terminology approach is specific needs and aims originated from historical sociolinguistic situations; it depends on which dynamic forces in an ecolinguistic environment outweigh the

others. The second conclusion is that terminology works require both methods, onomasiological and semasiological approaches, because conceptual systems and knowledge structures are manifested in texts and they do not exist in a vacuum.

5.2.3 Standardization

Standardization, as a corpus planning activity, is a process of doing something on linguistic elements but it is strongly linked with non-linguistic conditions discussed below. This part is devoted to analyze how different linguistic communities deal with standardizing synonymous terms (see Riggs 1993; Pozzi 1996) in a target language and synonymous and polysemous terms in a source language. Table 5.6 represents their treatments.

Languages	Target language synonymous terms	Source language synonymous terms	Source language polysemous terms
French (DGLFLF)			Different definitions, different French terms; more or less the same definitions, an agreement
Swedish (TNC)			Different Swedish terms
Persian (APLL)	Long-established Persian terms in different disciplines	Only one Persian term	Different Persian terms
Latvian		Different Latvian terms	Quite different meanings, different Latvian terms other wise a word with a similar diapason of meanings
Manx Gaelic			Different Manx Gaelic terms

Table 5.6: Standardization

Languages in Table 5.6 partially follow the same methods towards synonymy and polysemy (see Riggs 1993 on how polysemy leads to synonymy, and vice versa). However, like other elements of terminology planning, standardization is not a process obeying strict rules. It adheres to some general principles and, at the same time, has its own parameters. For example, Termcat terminologically sticks to the patterns in Latin languages for international terminological coordination and sociologically to target audiences, e.g. Latin and Greek roots are usually employed for medicine terms not for sports ones. Standardization is not only confined to contents (polysemy and synonymy) rather it includes forms (spelling, pronunciation, plurality or singularity of loan terms) as set by Termcat rules.

Generally speaking, two theoretical approaches have dealt with standardization. One of them is Wüsterian approach, very strict, whose goal is to reach standardization but the philosophical context in which his approach developed should be taken into account. At the opposite extreme, some terminologists treat variations as a natural phenomenon and try to explain them in a sociocognitive frame. Rogers (2006) suggests that a research should be done to know whether it is possible to apply standards nationally and internationally. She refers to some points:

the incompatibility of some national object standards...; the nature of meaning as negotiable, particularly in certain types of communication such as expert-to-expert text genres, by comparison with other genres such as safety instructions...; domain-specific differences with respect to the nature, creation

and synchronic stability of meaning; in such a view, variation is both natural and creative... (Rogers 2006: 159).

An ecolinguistic environment is in a temporary equilibrium; from expansion towards compactness and then, because of the development of the areas of knowledge and inter-/multidisciplinaries and the nature of language, society and their changes, again expansion. It is clear even from Wüster⁵⁶ (1985), adhering to international standardization, explaining that “In 1924 the German Standards Committee (DNA) established *de Stahl* ‘steel’. Since then its meaning changed to include the meaning ‘wrought iron’.” He argues “However, to date, in industry, custom dictates a distinction between *de Stahl* ‘steel’ in the earlier, stricter sense, and *de Eisen* ‘iron’. Steel can be tempered, whereas iron cannot.” (p. 133) Another example by Wüster is that “the German Standards Institute (DIN) changed the German term for ‘screwdriver’ from *Schraubenzieher* to *Schraubendreher*. The Austrian Standards Institute did not adopt this change. Once again, the result was language split between the northern and southern German language area.” (p. 134) Therefore, a stable standardized situation is inaccessible.

On the other hand, standardized terms are significant entities for information retrieval (see Strehlow 1993). Adopting simply a description approach can cause irreversible damage in some real contexts such as performing a surgical operation; it holds true in a war field. Rogers (2006) believes that:

56. *Introduction to the General Theory of Terminology and Terminological Lexicography*, Eugen Wüster, 1985 (an English translation).

More realistic prospects for harmonisation exist where a need is perceived ... and acted on at a relatively local level. This is because those who employ the users of that terminology have some authority and hence exercise control, and because the relevant communicative situations are well-defined according to an established inventory of genres such as customer manuals, workshop manuals, marketing brochures... .' (Rogers 2006: 160)

Therefore, it appears that terminology planners need to steer a middle course to reconcile those approaches if the occasion arises. In other words, theoretical principles are formulated and adjusted to sociolinguistic necessities and motivations. Wüsterian approach may be, in this regard, suitable for technological terms but not for life sciences as argued by Temmerman (2000). Guespin (1990: 643) specifies that "If you try standardizing a terminology by taking into account only the scientific and technical community, you are bound to fail." The author refers to the analysis of conflicting forces which "are at work managing, regulating and enforcing linguistic uses, from families to working teams, and up to national linguistics policies."

A linguistic community has to be viewed as a whole by considering sociolinguistic forces:

a) Degree of specialty: Lara (1986: 93) differentiates between "cultivated terminology" and "practical terminology". The author argues that "Cultivated automobile terminology is never learned by the workers; on the contrary, they develop a practical terminology,

borrowing terms from ordinary life experience and from some curious images of what foreign words are like.” (p. 96) Lara also states that “The effect of such developments is the existence of some kind of “pidginized” practical terminology and of diglossia between the cultivated and the practical terminologies. Both phenomena produce difficulties in communication between engineers and workers, constant failures in car production or car repairs, and of course, add significant cost to production.” (p. 96) This unavoidable situation exists in Persian as well. The gap between experts and workers comes from their degree of specialty. Since their needs and knowledge are not the same, their terminology systems are not evolving in the same way (see Antia and Yassin 2001). In terminography, synonyms can be given labels to show their sociocognitive differences (see Kerremans and Temmerman 2008 on how to deal with variations).

b) Target users: Lara (1986: 98) believes “Terminological development needs standardization and standardization needs public acceptance.” Baker (1987: 186) argues that “The terms and rules put forward by the academies have not always been adopted or adhered to and often have the adverse effect of creating more synonyms rather than standardizing a specific term. The final decision as to which terms are accepted and assimilated [sic] into the language is generally made by translators, writers and, eventually, Arab readers.” As far as communicative role of terminology is concerned, Cabré (2000: 40) believes that “the social acceptability of terms is more important than their standardization.” These

scholars put emphasis on this point that the target users have the last word on term acceptance; they are standardizer.

c) Time: Strehlow (1993: 137), referring to Thagard 1990, focuses on a point that “At their birth, concepts are fragile. They take time to develop. Efforts to standardize that are too early could jeopardize the processes of knowledge development. The conceptual structures that Lavoisier worked on over a seventeen year period included several stages that involved terms and concepts that he did not use later.” (see Pavel 1993 about how Lavoisier’s oxygen theory developed) Leitchik and Shelov take into consideration “a specific period of the initial concept designation” and argue that:

In this period, quite often an extended period of time, there are lexical units which could be considered as “pre-terms” (for example, W.C. Roentgen has coined a name for the beams he had discovered, *X-beams*); subsequently “pre-terms” can be either replaced by terms that are optimal in their semantic and formal structure (*X-ray radiation*) – in particular, by short variants (*the young of hausen and sterlet* is replaced by *bester*) – or become naturalised as terms, and even normative terms (Leitchik and Shelov 2003b: 88-89).

Sometimes terminology disturbance is a sign of science progress; a theory is substituting a previous one by a new paradigm or a semantic clarification.

d) Type of discipline: Rey (1998/1999: 131) draws attentions to the type of discipline in standardization and believes “Whereas the sciences of non-human observation tend towards unification (a

single terminology for modern chemistry), the human sciences, like philosophy, tend towards pluralism (...Chomsky could not have been the Lavoisier or the Farady of linguistics, because there are many linguistics).” It should not be expected that all disciplines, from exact sciences to humanities, adopt the same approach towards standardization. It may come from the objects they are studying.

e) Regional differences: About variations from regional differences in Spanish-speaking countries, Pozzi (1996: 174) states “For example, Mexico receives most of its information from the U.S., while Spain gets its from France. This results in differences, such as ‘computer’ = *computadora* in Mexico and ‘ordinateur’ = *ordenador* in Spain.” It could be true for French in France and in Quebec and also for English varieties.

As the present thesis is concerned with modeling terminology planning in a systemic point of view, standardization, as a part of terminology argumentation, is a sociolinguistic issue controlled by general non-linguistic factors, some of them discussed above, and specific ones as suggested by Termcat for Catalan and linguistic variables which are not only related to semantic relationships. Then, a pre-terminology research is required to study key factors.

5.2.4 Terminology resources

As a universal principle, terms are usually selected from two main potentialities: intralingual (see Felber 1986) and interlingual

resources. Table 5.7 compares needs and aims with terminology resources in a variety of linguistic communities.

Languages	Needs and aims	Native terms	Borrowing
Swedish (TNC)	Professional communication	Existing Swedish terms	Borrowing
Persian	Terminology development	The Iranian Academy of Language 1970-1977: general words, literary words and Iranian languages and dialects; Iran University Press, 1980: borrowed roots but under the regulations of the Persian grammar; APLL, 1991: words, without regarding their origins, living Iranian languages and dialects, words and roots from Old and Middle Iranian languages	APLL: Loan words and combining forms
Latvian		Native Latvian word stock and native word-building potential	
Hebrew	Language development	The Great Tradition: the Bible, the Mishna, the Talmud and the literature created after that	From Aramaic, but vigorous contention concerning Arabic
Sami	Terminology development	Religious texts	

Table 5. 7: A comparison between needs and aims and terminology resources

Extracting terms from native resources, as a universal principle, spans a spectrum of possibilities depending on historical backgrounds (e.g. Old, Middle and Contemporary Persian), literary heritage (e.g. Persian), religious traditions (e.g. Hebrew and Sami) and also existing dialects (e.g. Persian). An example illustrating how choosing resources in Hebrew (a linguistic potentiality) is a function of subject fields (a non-linguistic variable) is given by Nahir:

when dealing with terms in arithmetic, the Committee accepted and approved words taken from old and ancient texts in addition to those created by teachers in schools when they needed them. Many of these, incidentally, have been accepted by users as well and are now part of the standard Hebrew lexicon. The Committee adopted an entirely different stand, however, when it was faced with the need to provide terms in fields such as gymnastics. This was a new field of activity and thus few relevant words could be found in old texts (Nahir 2002: 281).

It is interesting to see that the Hebrew Language Committee established by Eliezer Ben-Yehuda and some of his friends in 1890 in Jerusalem had a policy for linguistic resources (see Nahir 2002), more or less, similar to what mentioned by Allony-Fainberg (1983).

The second resource is borrowing having its own parameters varying according to potentialities and limitations of recipient languages. For example, Madiba (2001) tries to develop a pragmatic model “for the modernisation of the indigenous languages of South Africa, and for Venda in particular.” (p. 54) This model is borrowing and then indigenization. Borrowing considers: “(1) the type of subject field, (2) its degree of specialisation and (3) the target users of the terms.” (p. 65) Rogers (2006: 157-158) deals with “language prestige, nationalism, and the genealogical relationship between the SL and the TL.” as variables affecting borrowing. Sometimes a non-linguistic factor overcomes a linguistic barrier. Tadmor (2009) claims “None of the Mandarin verbs in the sample are borrowed, even though Mandarin is a highly isolating language On the other hand, Berber ... has borrowed a

large number of verbs despite being highly synthetic, because it has been under heavy pressure from Arabic for a long time.” (p. 63) Another non-linguistic factor springing from a ecolinguistic circumstance is attitude towards resources, e.g. attitude towards Aramaic and Arabic in Hebrew.

Among the controversial issues concerned with borrowing, to what extent the other family members of a borrowed term can enter a recipient language is problematic. If all linguistic family members are gradually imported, a cluster of terms with their own linguistic features and sociocultural norms influences the target language. Yousif (1984), cited in Sager and Nkwenti-Azeh (1989: 24), believes that the transliteration of the English loans causes deformation of the morphological, phonetic and syllabic patterns in Swahili. But a contradictory view is seen in Thomason and Kaufman (1988), quoted in Madiba (2001: 63), arguing that in spite of the fact that hundreds of Indic loanwords have entered into the Southeast Asian languages, they have not affected their structures.

Baker (1987: 188) looks at this issue from readers' point of view and states “... new terms often appear in Arabic texts accompanied by the foreign term in brackets or with a footnote explaining their meanings (a convention which enables the reader to understand the individual terms but creates distraction and obstructs the natural flow of argument).” It is true in Persian whose writing system is, like Arabic, from right to left.

A specific type of borrowed terms/words is international ones which have spread among many different target languages.

Tkacheva (1986: 143) believes that “... the greatest number of international terms is in the scientific and technical languages which become the possession of all the layers of the society and develop on the level of international contacts. Among them are the languages of policy, medicine, sports, and cosmonautics, *e.g. détente, confrontation, oncology, pressing ...* .” It indicates that the extent of foreign words/terms penetration into target languages can be related to a non-linguistic variable (the type of subject fields). In this area, typology researches can be useful.

Although adopting international terms, as a terminology resource, is a principle, linguistic communities do not look at the phenomenon in the same way; it is a parametrical issue. Sager and Nkwenti-Azeh (1989: 24), based on Huq (1985), state a pragmatic rule in Bangla is that “a term is acceptable if it exists in similar form in at least six other languages. By such a general rule words like telephone, computer, frequency or modulation are adopted as international words.” But even closely related linguistic communities (Persian and Tajik) have opposing views about whether a term is international or not. Although Grinev (2004: 57-58) believes “In the Tajik language, words like *student, university, institute*, which had an international character and were extensively used, were hastily replaced by clumsy national constructions which created and still create many inconveniences.”, Iranian Persian speakers use established Persian words for them. Gasimov (1999: 44) considers words like *leader, parliament, cosmos, television, telephone, meeting, experiment* as international words in Azerbaijani. But they,

except *television* and *telephone*, have been replaced by Persian words in Iran.

Concerning the role of international terms in scientific communication, Sager and Nkwenti-Azeh (1989: 24) specify that “the growing socio-economic interdependence between countries of diverse linguistic backgrounds makes the preference of internationalisms [basic root forms from Classical Latin and Greek] over existing or new autochthonous terms a more positive step towards effective communication.” Nedobity (1989) offers the same opinion as well. Employing international terms, however, does not mean unifying terminologies in different languages. If it is so, which form is preferred? English, French,...? How is it possible to remove linguistic barriers for inserting international terms? What is a difference between using excessively international terms and using a single scientific language, e.g. English? The problem of the language of science is not only limited to a set of terms helping scholars to take part in international settings.

To conclude, using native terms and borrowing (and international terms) is a universal principle. Both of them are available in all kinds of terminology planning needs and aims (see Table 5.7). But devising strategies (parameters), by inclusion of to what extent to use each of them and how, depends on sociolinguistic variables which will be identified by a pre- or intra-terminology work research. It locates linguistic potentialities (e.g. dialects, traditional texts...), existing trends, language family relationships, unexpected events, language attitudes, users' favorite terminology, historical

background, types of subject fields and international scientific communication and so on. Such a research, for instance, justifies the continued existence of Arabic terms in Persian. Any prescription for adopting this one and rejecting that one in advance of a discourse analysis is unrealistic (see Antia 2000).

5.2.5 Terminology formation methods

As the language of science is a specialized form of a general language, its term-formation methods usually follow general language rules. But terminologies' specific functions and contents naturally affect their forms. Myking (2006: 144) raises a question that "Could there be different 'laws' for terms and general words, as indicated by ... Jónsson (1990: 211)?" Analyzing "various types of formal structures used for the coining of Russian terms", Leitchik and Shelov (2003b: 86) state that "some of them being very far from characteristic of the general language".

The present study is not going to offer a list of the prevailing term-formation methods (see Sager and Nkwenti-Azeh 1989; Arntz 1993; Rogers 2006 on general/universal methods) but rather debate term building methods in the frame of principles and parameters and make a comparison between needs and aims and term formation habits as Table 5.8 represents.

Before analyzing the methods, some terms should be clarified: *Terminologization* means to give a word a new use in a specific area; a general word becomes a term like *mouse*. *Resemanticization*

is to give a new sense/meaning to a word/term e.g. *mouse*. Thus, sometimes resemanticization is embedded in terminologization. The third term which should be defined is *revitalization*. It means to reuse/renew a word/term which has not been used before it like *ballistics*, which can include both terminologization and resemanticization. At the same time, all of them are used to create neoterms.

The term-formation processes in Table 5.8 are semantic methods from *terminologization* to *conversion* and structural ones from *hybrids* to *portmanteau words*. Neoterms can be created through both semantic and structural changes. The second point is that there may be an overlap between some of them. For instance, although *neoterm*, *loan translation* and *terminologization* are considered as separate processes, the last two methods can be employed to create new terms as well.

	Modernization	Professional communication	Terminology development	Revitalization	Maintenance	Independence
Terminologization		Swedish (TNC)				
Resemanticization	French (DGLFLF)		Persian (APLL), Hebrew	Estonian	Irish (Rannóg an Aistriúcháí's in 1922)	Icelandic
Revitalization			Ukrainian, Hebrew, Arabic		Irish (Rannóg an Aistriúcháí's in 1922)	Manx Gaelic
Metaphor		Swedish (TNC)				
Borrowing		Swedish (TNC)	Catalan (Termcat), Persian (APLL), Ukrainian, Hebrew	Estonian		
Loan translation		Swedish (TNC)	Catalan (Termcat), Ukrainian, Hebrew, Arabic	Estonian		
Conversion			Hebrew	Estonian		
Hybrid		Swedish (TNC)				
Derivation		Swedish (TNC)	Persian (APLL), Hebrew, Arabic	Estonian	Irish (Rannóg an Aistriúcháí's in 1922)	Icelandic
Compound		Swedish (TNC)	Persian (APLL), Hebrew	Estonian	Irish (Rannóg an Aistriúcháí's in 1922)	Icelandic
Neoterm		Swedish (TNC)	Catalan (Termcat), Persian (APLL), Ukrainian	Estonian		Icelandic
Ellipsis		Swedish (TNC)				
Abbreviation			Persian (APLL)			
Acronym				Estonian		Icelandic
Syntactic phrase			Persian (APLL), Ukrainian	Estonian		
Portmanteau words				Estonian		

Table 5.8: A comparison between needs and aims and term formation methods

Languages with different size (from big to small ones) and needs and aims (from modernization, e.g. French, to revitalization, e.g. Irish) employ the same (universal) methods but with different frequencies. For instance, for independence (purism), borrowing and loan translation have low frequency. On the other hand, resemanticization and revitalization are more appropriate for achieving their aim.

More often than not the methods in Table 5.8 can be seen in any linguistic community as universal methods whose manifestations, due to sociolinguistic potentialities and limitations or specific rules related to an ecolinguistic situation, constitute parameters. For example, reusing general words in a specialized meaning can be a usual process but in different ways. French recycles the existing terms and Russian resemanticizes words from general language or the language of the science. Irish differentiates synonymous words in general language and the Fenno-Ugric languages of Russian, Lithuanian and Estonian use their dialectal words.

However, regarding resemanticization, the problem is that whether it is possible to load new meanings to the existing terms and to keep both the previous and new meanings in the form of polysemous terms. For instance, whether, in Persian, *sarf* and *nahv* can be used to express the content of *morphology* and *syntax* respectively, as modern concepts, when both of them (*sarf* and *nahv*) are still used in their traditional meanings. Bahumaid (1994: 136) discusses this problem in Arabic and refers to the same example, i.e. *elm os-sarf* and *nazm al-jumla* for *morphology* and *syntax* respectively.

Target users' reactions remain problematic in the case of revitalization. Baker (1987: 186) argues that "Some of the archaisms they [the academies] sought to revive have been the subject of much ridicule. These include words like *'irzīz'* (suggested for telephone; originally meaning sound of rain)" And Galinski (1993) refers to two failed and successful French examples: "The failure of bouteur versus bulldozer illustrates the difficulty in popularizing terms taken from old language bases. On the other hand, ordinateur ... is an old French word from medieval theology which has successfully found a second use." (p. 16) Table 5.8 shows the method is used by a broad spectrum of needs and aims. Then, it, like others, cannot be strongly suggested or disapproved but the only thing is that it is a linguistic possibility under the influence of non-linguistic variables and terminology typology can be of help to identify stimuli and to measure correlation between them and revitalization.

A specific form of semantic change, embedding terminologization, resemanticization and revitalization, is metaphor. Wüster (1979: 53), quoted by Kocourek (1994), argues that:

in German, metaphors do not stand easily alone, but are rather used in compounds. (Note that in English, too, compounds with a non-metaphorical base are easier to integrate: *daughter constituent* is less problematic than *daughter* (in the sense of 'lower-level constituent'). In Czech, metaphorical terms are accepted often in the form of a derivative or a diminutive (*ruka* 'hand of a person', *ručička* 'hand of watch or clock'; *matka* 'mother, person', *matice* 'tightening nut'). (Kocourek 1994: 529)

Nedobity (1989: 173) believes that “The internal form of terms is their literal or basic meaning. For instance, the widened end of a taper key has the following internal forms in various languages”, *head* (English), *talon* (French, internal form: heel) and *Nase* (German, internal form: nose). Then the scholar continues that “If it were possible to agree in all languages on only one of these three internal forms (part of the body), such a decision would make international understanding and translation work easier. A truly international [sic] form is ‘head’, for the widened end of a screw is designated in this way in all the above languages.” But the point is that those words have been created by the metaphorical process within their own languages. Metaphors can not be standardized for all or some of languages, e.g. *mouse* (English) *mus* (Swedish) and *ratón* (Spanish) are established but *mushi* and *mushvāreh*, approved by the APLL, have not gotten currency in Persian.

Another universal method is borrowing but each language planning work has its own strategies. From where terms are loaned is connected to linguistic history and situation, e.g. Lithuanian and Ukrainian from Russian; Estonian from dialects, German, English, the cognate Finnish language and use of Latin and Greek morphemes; and Hebrew from Yiddish, Russian, German, Arabic and Aramaic. Which linguistic entities are borrowed is concerned with the historical background in science (see Catalan and Persian) and linguistic needs (see Hebrew). How they should be borrowed (nativization/adaptation) is related to recipients’ linguistic structures. For instance, Swedish (TNC), due to its linguistic

features, should be careful about, e.g. inflection when adapts loan terms.

Hybrid, a combination of native and borrowed elements, is also used for different needs and aims in Lithuanian, Estonian, Swedish (*webbplats* for *websit*) and Persian (*vebgāh* for *website*). Regarding hybrids in Lithuanian, Gaivenis (1991: 25) states that “Of course, the proportion of Lithuanian and international words varies from one branch of science to another.” It is worth stressing the role of typology researches that show terminology habits are concerned with disciplines.

A wide range of needs and aims from modernization to revitalization has benefited from loan translation. On the influence of Russian on Lithuanian terminology, Gaivenis (1991) explains that “At the beginning of the 20th century, this influence manifested itself in loanwords, and in the post-war period in loan-translations.” (p. 23) It shows how a non-linguistic force (an unexpected event) affects term formation trends.

Neoterms are new units created from zero, through terminologization, resemanticization, revitalization, borrowing or hybrid. One way for coining new terms in Persian is syntactic phrase. The same is happening in Estonian as phrase building and also in Ukrainian. Krouglov (2001: 208) states that “A number of western concepts have not found adequate lexical counterparts in Ukrainian. In such cases the descriptive approach is usually employed” This method sometimes is called *circumlocution* and it is common in initial stages when new concepts entering into a

target language (see Zarnikhi 2005 on rough thinking period). As it is clear, term creating strategies are linguistic-bound issues but attitudes towards them are sociological matters. Comparative studies can guide terminologists to know how target audiences view neoterms in their disciplines and to formulate alternative strategies, if necessary.

Based on the data gathered in this thesis, some rare term-formation methods (parameters) come as follows:

1. Arabic derivation;
2. Hebrew: “reduction of expressions into single words while keeping their meanings” (Nahir 2002: 291), borrowing suffixes, popular etymology, “using one of a small number of consonants as prefixes to create new words from existing roots.” (p. 292)
3. Estonian: deliberate morpheme coinage;
4. Icelandic: “the possibility of making up new roots or nonsense words, and assigning them arbitrarily a meaning” (Árnason & Helgadóttir 1993: 11)
5. Latvian: appellativization and separation;
6. Azerbaijani: “... the abbreviation method is not so characteristic to Azerbaijani term creation.” (Gasimov 1999: 41)
7. Persian (APLL): “The Academy, if it is required, can use morphological processes which are rare or unprecedented in Persian.” (*osul va zavābet-e vāžegozini (The Principles of Terminology)* 2007: 13)

To sum up, term-formation strategies are almost universal. Some of them such as derivation and compounding are purely linguistic processes complying with linguistic rules. On borrowing and metaphor, in addition to linguistic restrictions, sociological and cognitive variables have effects. For this reason, universal principles might be reflected in a variety of forms (parameters). Therefore, each terminology work is first faced with recognizing the possible term formation methods from universal ones, hinging on its linguistic construction, specialized discourse features of a subject field, historical backgrounds (e.g. Ukrainian and Lithuanian term formation models dominated by Russian) and target users' tendencies (e.g. in the case of nativization and revitalization). Term-formation trends can be subject to change, for example, from loan words to loan translation and then to terminologization and neoterm in Lithuanian. Also in Ukrainian as Rogers (2006: 157) argues “the recent efforts by Ukrainian domain specialists to create terms in their national language ... go beyond the filling of lexical gaps to the replacement of existing Russian loans.” But it does not hold true in the case of Hebrew, according to Nahir (2002), that “Though Hebrew is now more modernized and though the organized language planners now have more authority, the methods applied in adjusting the language, particularly its lexicon, to modern needs remain basically unchanged.” (p. 294)

5.2.6 Implantation criteria

To see whether a considerable degree of overlap or contradiction exists between the theoretical and practical levels concerning linguistic and non-linguistic criteria, which group of criteria is under the control of another one and finally to extract the main principles, this part is divided into the following three sections:

5.2.6.1 linguistic criteria at both theoretical and practical levels

5.2.6.2 non-linguistic criteria at both theoretical and practical levels

5.2.6.3 the correlation between theoretical and practical criteria.

5.2.6.1 Linguistic criteria at both theoretical and practical levels

The linguistic criteria at the theoretical level (grammaticality, simplicity and conciseness, transparency and unambiguity, productivity and beauty and harmony) obtained from language agencies or experts and at the practical level (origin in a great tradition and lack of competing terms) from implantation evaluation studies are arranged in an order of emphasis from general (grammatical rules) to specific (lack of competing terms) criterion in Table 5.9.

Levels	Grammaticality (morphology and phonetics)	Simplicity and conciseness	Transparency and unambiguity	Productivity	Beauty and harmony	Origin in a great tradition	Lack of competing terms
Theoretical level	Persian (society for coining scientific terms, 1932 -1940, and APLL 1991-); French (DGLFLF); Icelandic (Árnason & Helgadóttir 1993); Irish (guidelines by An Buanchoiste Téarmaíochta published in 1988); Latvian (Borzovs et al 2003); Ukrainian (Rogers 2006); Swahili (Mwansoko 1991)	Persian (society for coining scientific terms, 1932 -1940); French (DGLFLF); Swedish (TNC); Ukrainian (Rytsar 1992: the Institute of Ukrainian Scientific Language set up in 1921; Citkina 1991); Latvian (Borzovs et al 2003); Swahili (Mwansoko 1991)	Swedish (TNC); French (DGLFLF); Icelandic (Árnason & Helgadóttir 1993); Irish (guidelines by An Buanchoiste Téarmaíochta published in 1988); Latvian (Borzovs et al (2003); Ukrainian (Rytsar 1992: the Institute of Ukrainian Scientific Language set up in 1921 and <i>Bulletin of the Institute of Ukrainian Language</i> of the Academy of Sciences 1930; Rogers 2006); Swahili (Mwansoko 1991)	Persian (APLL 1991-); Swedish (TNC); Ukrainian (Rytsar 1992: the Institute of Ukrainian Scientific Language set up in 1921 and <i>Bulletin of the Institute of Ukrainian Language</i> of the Academy of Sciences 1930); Irish (guidelines by An Buanchoiste Téarmaíochta published in 1988); Swahili (Mwansoko 1991)	Persian (Iranian Academy of Language (1970-1977); Latvian (Borzovs et al 2003); Ukrainian (Rytsar 1992: <i>Bulletin of the Institute of Ukrainian Language</i> of the Academy of Sciences, 1930)	Icelandic (Árnason & Helgadóttir 1993); Latvian (Borzovs et al (2003); Ukrainian (Citkina 1991; Rogers 2006): with an international aspect; Persian (society for coining scientific terms, 1932 -1940) preservation of international terms	
Practical level	French/Quebec (Quirion and Lanthier 2006)	French/Quebec (Quirion and Lanthier 2006); Catalan (Montané 2012); Hebrew (Allony-Fainberg 1983): refutation of the importance of length		French/Quebec (Quirion and Lanthier 2006)		Hebrew (Allony-Fainberg 1983): limited consequence for acceptance; Catalan (Montané 2012): formal analogy between standardized terms and the original units	French/Quebec (Quirion and Lanthier 2006); Catalan (Montané 2012)

Table 5.9: A combination of linguistic criteria at both theoretical and practical levels

The linguistic criteria, shared between the theoretical and practical levels from different sociolinguistic situations, are *grammaticality* and *productivity* but *conciseness* is a contentious subject between researchers in their practical studies. At the theoretical level, the focus is on *grammaticality*, *conciseness* and *transparency* by different linguistic communities.

However, there are some contradictory evidences. Concerning *grammatical correctness*, Pavel states that:

perfectly correct terminological creations that have been spontaneously adopted by a professional community for their originality and transparency are sometimes officially rejected by editors of specialized literature and other language workers, seemingly for lack of compliance with more common if uninspired term formation patterns. Conversely, officially recommended terms gather dust inside expensive hardcovers, while parallel neologisms flourish in spoken usage (Pavel 1993: 24).

As far as *conciseness* is concerned, the results from Quirion and Lanthier (2006) in French (Quebec) and Montané (2012) in Catalan are in contrast with Allony-Fainberg (1983) in Hebrew. The difference may come from their linguistic structure, sociological factors and also the length of time between these two groups of researches. The next point is the relationship between conciseness and transparency. Wüster⁵⁷ (1985: 73) believes that “The greater the degree of abbreviation, the less transparent a term becomes”.

57. *Introduction to the General Theory of Terminology and Terminological Lexicography*, Eugen Wüster, 1985 (an English translation).

Then he gives an example, *machine for planning* (phrase), *planning machine* (compound), *planner* (derived word). In contrast, compactness does not always represent intransparency, as in Persian *morāje'e be ārāye omumi* (referendum) is longer than *hameporsi* but not necessarily more transparent. In military context, *dushfang* (*dush* means 'shoulder' and *fang* is a clipping form of *tofang* 'rifle' (literally meaning 'hold up your rifle to your shoulder') is both concise and opaque but well-established. From another side, although *vāke* (vowel), a kind of restoration of archaism, is more concise and unclear than *harf-e sedādār*, it is more productive: *vākdār* (voiced), *vākdāri* (voicing) and *vāke-ee* (vocalic).

Even if two implantation case studies and some different linguistic communities confirm *conciseness* as a decisive factor in terminology planning, terminology creators, planners or evaluators should be careful about other features of a subject field. As an example, multiword terms have appeared due to the nature of the modern world in which concepts are more complicated than previous periods, like "*ethylen-diamen-methyl-amine-natro-dichlor-plato-chloride*" (Grinev 2004: 52) which can never happen in everyday life or general language (see Ohly 1997 about this point in a Swahili medical dictionary). Therefore, a prescription for all situations should be avoided and any decision making has to be left to specific ones since longer terms are sometimes unavoidable. A sociolinguistic description and typology researches precede formulating strategies and can be of help.

Myking (2006: 146), based on the Soviet and Prague traditions, believes that "...motivation is seen as a system-internal property of terms (or rather: of 'terminological signs'). This kind of transparency is given supremacy among term selection criteria and should be used when assessing synonymic groups and deciding term choices within strongly normative contexts" However, as he states, "In Wüster's own discussion, the pragmatic balance of motivation vs. economy is emphasised; there are restrictions on the applicability of this principle, and how to strike the balance is very often a matter of deciding in each specific case – generalisations are difficult to make." (p. 147) The author gives an Icelandic example "tölva 'computer' (from tala 'number' and völva 'witch') which demonstrates that efficient motivation does not always equal morphological transparency" (p. 148) Another example by Antia (2000: 74) is that "A term can, admittedly, suggest the opposite of what the concept it designates stands for (e.g. *atom*). Thus motivation, viewed superlatively, is an ideal in terminology planning that is not always met." According to Myking (2006), motivation for Ukrainian terminology, sociocognitive terminology and traditional terminology is morphological motivation, metaphorical expression and semantic motivation respectively.

Last but not least, a frequent question is that whether established terms can be replaced by new ones. The following agencies and experts believe that the current terms have not to be substituted without any reasons:

- French (DGLFLF)
- Persian (society for coining scientific terms, 1932 -1940)
- Irish (guidelines by An Buanchoiste Téarmaíochta published in 1988)
- Latvian (Borzovs et al 2003)
- Sager and Nkwenti-Azeh (1989).

However, on the other hand, in Indonesia, the technical term commissions, the Pusat Bahasa, coined internationalisms to replace native terms, according to Sager and Nkwenti-Azeh (1989), for example “*nitrogen* ‘nitrogen’ for *zat lemas*, *matematika* ‘mathematics’ for *ilmu pasti*, and *kanker* ‘cancer’, *endemi* ‘endemic’, *biologi* ‘biology’ as substitutes for *pekung*, *hawa* and *ilmu hayat* respectively.” (p. 24)

From another point of view, on the necessities for replacing terms, Mühlhäusler (2000: 339) argues that “... the ongoing terminological planning in science and industry ... continues to generate anti-ecological terminology and ignores ecologically sounder innovations.” The author continues that “In spite of Rachel Carson’s (1962) suggestions to replace the misleading term ‘insecticide’ with ‘biocide’ the latter term awaits official recognition or even listing in most environmental dictionaries.” They can be more observed in second language term formation.

Table 5.9 shows that linguistic communities mostly emphasize *grammaticality*, *conciseness* and *transparency* as linguistic criteria. Montané (2012), however, as a recent study on terminology

planning evaluation, concludes there is no generalization of linguistic criteria, even for languages from the same family. For this reason, it appears that we have to return to non-linguistic factors.

5.2.6.2 Non-linguistic criteria at both theoretical and practical levels

Because science is a socio-cultural activity, its language does not remain untouched by socio-cultural variables. Introducing *terminometrics* for evaluating “the variables influencing implantation, such as concision, motivation, derivability, etc.,”, (p. 45) Quirion explains that:

up until the present time, however, no study has ever measured the actual order of importance of these variables ... research on socioterminological characteristics, such as the prestige accorded to a competing language for example, could lead to conclusions suggesting that interventions on the status of a language are more important than interventions on its vocabulary, or in other words, that terminological variables are secondary to socioterminological variables (Quirion 2003: 45).

Quirion and Lanthier (2006: 117-118) also believe “If it is assumed that implantation is influenced by terminological factors alone, how can we explain the feminization of titles, which is so widespread in Canada but slow to take hold in France?” The quotations from the researches involved in terminometrics can be a sign leading to the importance of non-linguistic variables (see Tadmor 2009 on the importance of non-linguistic factors).

A combination of non-linguistic criteria from theoretical level (actors' role, social networks, language availability, knowledge as a conceptual system, level of specialty and language attitude) by language agencies or experts and from practical level (language agencies and language attitudes) by evaluation studies from real contexts is distributed in Table 5.10 in an order of their frequencies in the data.

	Actors' role	Language agencies	Social networks	Language availability	Knowledge as a conceptual system	Level of specialty	Language attitude
Theoretical level	Irish (Ní Ghearáin 2008): general actors; Latvian (Skujina 1991), Russian (Džinčaradze et al 1992) and Icelandic (Árnason and Helgadóttir 1993): subject field experts; Ukrainian (Rytsar 1992; Citkina 1991; Rogers 2006) and Norwegian (Hjulstad 1994a): combination of specialists and linguists/terminologists; Hungarian (Fóris 2007 and 2010) and Arabic (Elkhafaiifi 2002): a lack of specialists; Greek (Papadaki 1994) and Uzbek (Schlyter 1998): a lack of experts in linguistic researches		French (Pavel 1993): social networks; African languages (Fourie 1994) and Arabic (Elkhafaiifi 2002): a lack of social networks	French/Quebec (Aleong 1982): not available; Afrikaans (Cluver 1991): available	African languages (Antia 2000; Antia and Kamai 2006)	African languages (Ohly 1997)	Swahili (Mwansoko 1991)
Practical level		Turkish (Karabacak 2009); Irish (Ní Ghearáin 2011)					African languages (Madiba 2001)

Table 5.10: A combination of non-linguistic criteria at both theoretical and practical levels

As it is seen, at the theoretical level, the significant variable is *actors' role* stressed by different ecolinguistic situations. The position and qualification of stakeholders, as term creators and circulators, remain of paramount importance in a wide range of linguistic situations (Irish, Latvian, Ukrainian, Russian, Norwegian, Icelandic, Hungarian and Arabic). Factors common between the theoretical and practical levels are *language agencies* and *language attitude*.

Forming a network of the intended audiences encourages the other users from different levels of specialty and finally results in terminology percolation. It in turn might be influential in changing language attitudes. African languages, Arabic, Turkish and Irish are suffering from the lack of well-working agencies and network but French, in a distinct sociolinguistic situation, is enjoying from the positive effects of forming a network.

Moreover, the success of implantation depends on how much a scene (linguistic and sociological contexts) is prepared. Terms for becoming established need opportunities to function; a language should be used in different areas (e.g. Afrikaans). In spite of the fact that Persian is the language of science in Iran, university students, after passing general English courses, are taught English for Specific Purposes in humanities, science and technology disciplines. It means that students do not have any chances to learn Persian terms and to make them circulated (like Quebec situation).

Therefore, educational planning is not in line with language planning in a systemic way.

On the other hand, offering native terms by itself is not aim and it is not enough since terminologies availability does not mean that they will be used. But as Montané (2012) argues considering sociolinguistic features of a given field of specialty is required. Among others, delivering science within a package in a holistic way (knowledge as a conceptual system) is important. Along a path that goes towards transferring science, supplying terminological products proportional to level of audiences' specialty should be observed.

An overwhelming non-linguistic variable is seen in Arabic users' attitude towards Arabization. Baker (1987) argues that when words go along Arabization, their derivations are restricted "since they cannot be made to fit into the Arabic root and pattern system." (p. 187) Then she continues that "In spite of this restriction and the disapproval of the academies, Arabization remains one of the most common methods of introducing new vocabulary into Arabic." (p. 187) The point is that neither a linguistic impediment nor a force from top (the academies) can prevent users' tendency.

As a result, it seems that if a language agency is well-organized, the other demands (social networks, language availability, knowledge as a conceptual system, level of specialty and language attitude) will be met. For instance, the problems Turkey and Ireland are faced with come from the structure of terminology planning agencies: dissemination, organization of people involved in

projects, a lack of networks among target users to exchange their suggestions to arrive at a final decision and a far distance between terminology planning agencies and linguistic communities. The success of spreading science encapsulated into terms depends upon how agents (language agencies) perform as go-between for stakeholders, paying attention to their views towards their languages and also language policies.

5.2.6.3 The correlation between theoretical and practical criteria

This section is concerned with the point that to what extent theoretical term formation criteria proposed by agencies or suggested by experts from their experience correlate with the results from terminometrics (implantation studies). Among linguistic variables, *grammaticality*, *conciseness* and *productivity* and, among non-linguistic ones, *the role of language agencies* and *language attitude* are shared in both theory and practice. In spite of this, in Pavel's words (1993: 24) "... the dynamics of acceptability seems highly unpredictable, almost chaotic. For what is acceptable here or now may not be so elsewhere or tomorrow." (see Montané 2012 in this regard)

Putting aside linguistic variables because of their contradictory nature, there is apparently nothing to contradict the role of non-linguistic criteria such as *language agencies* and *attitudes*. The only generalization which can be made is that if an agency is based on a real ecolinguistic analysis, then roles, demands and favorites and

attitudes of human beings, as reality interpreters and concepts creators, are not ignored.

5.3 Implementation layer

The planning theory layer identifies needs and aims through a diachronic and synchronic sociolinguistic description and then develops language policy, and the linguistics of science layer through its practical aspect, i.e. terminology argumentation, is responsible for meeting needs and achieving aims. Both previous layers are developing software system of planning. Actualizing terminology planning in the implementation layer, as a hardware system, has to cover areas such as human resources qualifications, technological tools, which part of the structure is responsible for which part of the project, agency structure and how to deliver a terminology product to intended targets. The implementation layer deals with the following issues:

5.3.1 Infrastructures

5.3.2 Workflow

5.3.3 Organizational structure

5.3.4 Dissemination

5.3.1 Infrastructures

Creating infrastructures consists of human capacity building and language technologies. The difference between a human-made

system and a complex sociolinguistic system is that the latter is formed not only by **humans'** interpretation of the world but also by changes constantly occur as a result of **humans'** behavior. Therefore, policy makers', planners' and performers' qualifications have to be carefully monitored. Human beings' role goes beyond these and includes the two previous layers (sociolinguistic description and linguistics of science). For the third layer, humans are working on how to develop required technological tools, to manage work, to organize the structures and to spread products.

Table 5. 11 shows a comparison between human capacities and, if available, technological resources. Human capacity building column includes both what linguistic communities do for training and teaching and what kind of qualified people are involved in terminology planning. The data arrangement is: no trained terminologist, linguists and specialists, a basic course in terminology and training, and teaching experience in institutes and universities.

Languages	Human capacity building	Technology capabilities
Manx Gaelic	No professional terminologists and no deliberate LSP planning	
Hungarian	No training	HUTERM, an online terminology discussion forum
French (DGLFLF)	No training, its terminologists working as counselors and file makers and doing some researches	<i>Franceterme</i> presenting all approved terms, informing subscribers of terminologies and receiving their suggestions
Lithuanian	Theoretical work by linguists of the Institute of Lithuanian Language	Terminų Bankas in Lithuania (Nilsson 2010)
Uzbek language (the Lexical Research Committee and the Linguistic Institute)	Experts for selecting from variants and avoiding from improper or inaccurate forms	
Persian (APLL)	Basic training	<i>Ganjvāzeh</i>
Catalan (Termcat)	Courses inside and outside	<i>GesTerm</i> and <i>GdTweb</i>
Latvian	Training in Terminology Commission and also for specialists at various institutions; specialists and linguists	
South Africa (TCS)	In-house training and only a few tertiary institutions offering official courses in terminology	In the 1950s, index cards; in 1996 the MultiTerm database system, at present via the electronic media
Icelandic	In 1991, the first introductory course in terminology by the Icelandic Language Institute in cooperation with the University of Iceland	
Swedish (TNC)	Basic training; short or long courses at Stockholm University and a training course for the public sectors or private companies; in 2002 the first separate terminology course for credit at Stockholm University; four post-graduate courses within the framework of Nordterm cooperation. In future: web-based courses at the national and Nordic level; terminology modules in all university programs at an early stage	Card file boxes; at the end of the 60's, computer-aided methods; in 1987, first term bank on a CD-ROM; since the '70s, internal database; in 1995 <i>Tekniska basord</i> , common terms shared among different subject fields; 2002-2004 Terminology Infrastructure for Sweden (TISS); in 2009, <i>Rikstermbanken</i> , a national web-based term bank
Finnish	Training in terminology at universities began on a relatively large scale in Finland in the early 1970s in business economics (Bucher 2007)	TEPA , an online termbank from 1985
Estonian	From 1977-1984 at institutes/universities; after 1984, the course for students choosing terminology as their special field of interest	
Irish		In 2006, Focal, national Irish terminology database
Danish	In the early 1970s, training in terminology in business economics (Bucher 2007)	Neoterm, a detailed and very rich database

Table 5. 11: Human capacity building and technological capabilities

Since any kind of policy, planning and implementation springs from its designers' minds, the people engaged in any stage of planning should be well qualified. But a variety of people with different backgrounds (philology, linguistics, science and technology...) have done terminology work. Based on Table 5.11, the more involvement in the language of science, the more cooperation between linguists/terminologists and subject specialists (Persian, Lithuanian and Latvian). Lara (1986) believes “terminology is a creation of specialists in each field and not of linguists or terminologists. These last organize, advise specialists, solve linguistic problems, research the present state of certain areas, create data banks, but they do not originate terminologies.” From across the spectrum, as Draskau (2001) states “In practice, the terminology of revitalised and less-widely-used languages tends inevitably to be the creation of middle-class language experts rather than that of specialists... .” A good example is Manx Gaelic in the above table. From Table 5.11, it can be inferred that terminology has not reached the point taught as a **discipline** even in Finland and Sweden.

The importance of training in terminology area has been highlighted, e.g. by Fóris (2010: 44) suggesting that “the presentation of a given profession’s terminology along with the general academic questions of terminology, either as part of an independent professional training programme or in further education.” (see also Swedish in Table 5.11) Besides possessing expertise in a subject field, working on the language of science requires proficiency in a mother tongue, knowing more than one

language and, sometimes, general knowledge of linguistics. Nekrassoff (1986: 85) focuses on the point that “Graduate students with interests and high competence in a variety of fields relevant to the resolution of terminological problems – here, applied linguistics and medical genetics – are essential in achieving the intellectual cross-fertilization expected of a successful interdisciplinary program.”

Another facet of infrastructure is language technologies for which terminologists/linguists and experts from other fields can come together. The main objective of technological tools is to represent knowledge and to make a connection between planners and target users and, at the same time, as teaching instruments to raise language awareness as emphasized by Nilsson (2010). Then terminological awareness, as Bucher (2007: 45) believes, “plays a significant role in knowledge acquisition.”

Technological tools can be categorized into two groups: not-well developed and developed ones. The former, with limited use, includes:

1. *Franceterme* disseminating official terms by French (DGLFLF)
2. HUTERM, an online terminology discussion forum in Hungarian
3. TEPA, an online termbank, by Finnish (TSK)
4. Neoterm observing new occurrences of terms in Danish
5. Focal, national Irish terminology database
6. *Ganjvāzeh* for internal use at the APLL.

The examples from developed tools are:

1. *Tekniska basord*, Terminology Infrastructure for Sweden (TISS) and *Rikstermbanken* by TNC
2. *GesTerm* and *GdTweb* by Termcat.

In spite of the fact that human capacities and language technologies are major principles for infrastructure, their manifestations (parameters) vary depending on a given sociolinguistic situation. That we need some people to plan is a principle but who has to be engaged is a matter of parameter. In Myking's words (2006), it is "The parametrical position of role prominence": in Vienna school, subject specialists and in Quebec school, linguists. Concerning technologies, *Rikstermbanken*, a Swedish national term bank, was modeled on Terminų Bankas in Lithuania but its structure and contents are dependent on Swedish linguistic (morphological, phonological ...) and non-linguistic factors (demographics of users). Although both Catalan (Termcat) and Persian (APLL) are looking for terminology development, their technological capabilities are not developed at the same level. Another parameter of language technologies is writing systems in, for example, Japanese and Persian having to adapt softwares to their orthography.

In conclusion, as the thesis views terminology within the language of science planning, it is suggested that, for establishing basic education, systems and structures for the planning, linguistics of science, as a broader frame, is developed as the infrastructure. If linguistics of science maintains a position in educational system as an innovative discipline, it can include topics such as terminology,

specialized discourse analysis, cognitive linguistics, computational linguistics and language of science planning. Teaching linguistics of science can provide language of science projects and researches with both qualified human resources and relevant language technologies.

5.3.2 Workflow

This part is dedicated to extract similarities and differences and what are the necessary nodes in managing a terminology work. Table 5.12 represents workflow in different language agencies, arranged in an order of, more or less, similarity.

Languages	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
French (DGLFLF)	Terminology committees preparing a list of newly-imported terminologies	Laboratory of history of linguistic theories (HTL) and francophone partners for consultation	The General Commission for Terminology editing the list	The Academian members reviewing the terminology records, if not accepted, a second round of revision from stage 1	The related ministry publishing them
Persian (APLL)	Terminology committees preparing a list of English terms	Coordination council working on polysemous and synonymous terms	Editorial board reviewing terminology records	Terminology council (by voting) and then the President approving terms	Publication
Hebrew (the Academy of Hebrew Language)	Terminology committees preparing a list of English terms	Terminology committees examining and coordinating data; sometimes Academian members and professionals reviewing partial word lists and giving their alternative suggestions; objectors discussing their opinions with the Committee about the revised list	The Academy's Board of Terminology discussing the complete list	Terminology Board and the Grammar Board discussing the list and disagreements	Publication

Catalan (Termcat)	Framing a policy based on needs assessment and making a dictionary (data from Catalan and some source languages)	Supervisory Council for standardization	Editing dictionary	A general consensus but not putting the terms to the vote	Publication
Ukrainian (the Institute of Ukrainian Scientific Language, set up in 1921)	Sections in the different fields approving terms		Editorial board and the other sections of the field and then editorial board for a final review	An interdisciplinary commission settling any inconsistencies or uncertainties	
South Africa (TCS)	Needs assessment; data gathering usually from English; terminology records		Confirmation of subject specialists; translation into 10 target languages; discussion with subject specialists	The relevant NLBs of PanSALB verifying and authenticating the terminology; the relevant terminologists changing the database according to suggestions	Publication
Swedish (TNC)	Determination of subject field and the intended users, documentation, conceptual systems, definitions, equivalents in Swedish and some foreign languages		Drafting and elaborating terminologies		Publication
Lithuanian (the Institute of Lithuanian Language)	Special terminology commissions in the higher schools and scientific research institutes preparing terminological dictionaries		Terminology Group of the Institute of Lithuanian Language discussing and reviewing terminological dictionaries; linguists and specialists discussing debatable points again		
Latvian	Different groups and individuals involved in practical terminology; Terminology Group of the Institute of the Latvian Language and other academic institutes involved in theoretical terminology			Terminology Commission approving their terminological works	
Manx Gaelic (the Coonceil)	Government departments requiring Gaelic equivalents for official designations from the Coonceil				

Table 5.12: A comparison of workflow among different language agencies

Generally, workflow starts from collecting data and filling in terminology records, coordinating and revising information and ends up with approval/consensus and then publication as its principles (see Elkhafaifi 2002 on similarity among Arabic agencies). But their actual realizations (parameters) are from a diverse range of potentialities and limitations. For example, both the APLL and Termcat have entities for standardization (a principle), the coordination council and Supervisory Council respectively, but adopt different strategies (parameters). The DGLFLF method for coordinating terminologies includes only those entering general language which is different from the APLL and Termcat. Concerning approval process, the APLL puts terms to the vote in the terminology council and then by the President's approval but Termcat reaches a general consensus.

As a departure point, TNC pursues a specific policy, waiting to receive a client to start a terminology work. In other words, TNC, a partially private company, deals with terminology in the areas where there is an inquiry, to clarify concepts by giving clear definitions. This specific strategy comes from the reason that when a company asks TNC for its terminological issues, it indicates that the company has a linguistic awareness and thus TNC does not need to waste its budget for a project which is not clear whether the people use its products or not. This parameter is from the Swedish non-linguistic situation, i.e. communications among industrial sectors. Termcat, however, is concerned with all subject fields because of its needs to develop Catalan in all fields, in contrast with

Swedish which has been the language of science at least for two centuries.

From another side, the data gathering direction at the DGLFLF, APLL, the Academy of Hebrew Language and TCS (South Africa) is the same, from the source language (English), but not at the Termcat starting from Catalan. Another approach by TCS, as Alberts (2008) explains, is community-oriented terminography harvesting terms “from rural and urban speech communities ... for documentation in the central terminology bank.” (p. 20) It can be of importance especially in linguistic communities having a tradition in folk knowledge.

Workflow can also begin from bottom, like Lithuanian and Latvian. Although a top-down approach for workflow has been employed in Manx Gaelic, even in this ecolinguistic situation, there is a potentiality for adopting bottom-up workflow as well. The example is “the updating of the Gaelic ornithological nomenclature by Phil Gawne” (Draskau 2001) and its success. Other examples which may come within this kind of workflow, a combination of top and bottom approaches, are Termcat, TNC and TCS whose activities are based on needs assessment (see Jernudd and Nekvapil 2012 on the possibility of connection between organized and simple management).

The workflow is mainly a cooperation between subject specialists and terminologists/linguists. The Supervisory Council, for standardization at the Termcat, sometimes invites other people from the major geolinguistic Catalan areas to avoid inconsistencies. The

DGLFLF delivers the list to the General Committee of Terminology to know whether terms and their definitions are comprehensible to laypeople. Ukrainian also follows the same line. The advantage of the relevant people's involvement as far as possible, in Rabin's words (1989: 33), is "when the list is finally published most of it has already become familiar." It sheds light on the effect of workflow on implantation.

As a conclusion, workflow, as one of the major principles of the implementation layer, is formed by some minor principles such as collecting data, preparing files, coordinating with required sections, revising information, approving and presenting products but in different forms. A terminology work can be carried out by receiving information from bottom (needs analysis and inclusion of concerned specialists) and making decision from top. Then it is the workflow which forms internal and external structures of language agencies.

5.3.3 Organizational structure

The workflow affects structures and both are under the control of variables such as the size of languages, the scope of audiences and needs and aims. Some of languages such as Latvian and Irish are less-used, only in their territories. So, they do not need a complicated structure but the situation is different for French or Persian. For this reason, a prescription for creating a terminology planning structure to cover the sociolinguistic diversity, from Sámi to French, is not possible. Even small languages span an organizational spectrum:

- a cooperation organization for several Sámi institutions involved in terminology;
- a lack of centralized language planning for Hungarian; a council in 2005 for the cooperation of professionals and researchers and a center in 2006 for the creation of the national and international networks for theoretical terminology research;
- a lack of national terminology body for Icelandic; a language council for Icelandic to collect and publish neologisms and to cooperate with ‘word committees’;
- a lack of one single organization for Irish terminology planning; An Coiste Te’armaí’ochta [The Terminology Committee] in 1968 with currently one full-time terminologist and one assistant terminologist;
- a lack of official LSP language planning for Latvian; the Terminology Commission within the Latvian Academy of Sciences in 1946;
- Institute of Ukrainian Scientific Language in 1921, affiliated with the Ukrainian Academy of Sciences approving terminological products;
- Terminology Group at the Institute of Language and Literature of the Estonian Academy of Sciences discussing and fixing terminologies from terminology commissions (linguists and specialists);

- Norwegian Council for Technical Terminology in 1938;
- Finnish Center for Technical Terminology in 1974;
- Terminology Coordination Section (TCS) of the National Language Service (NLS) under the Department of Arts and Culture as the official national terminology office in 1989;
- Translation Bureau concerned with translation problems and the Office québécois de la langue française (OQLF) with terminology as one of the aspects of language planning, as governmental organizations for French in Quebec.

As a result, the thesis is concerned with extracting the minor principles connected to the major principle (organizational structures) from the implementation layer. To do this, Table 5. 13 represents five agencies allocated to terminology planning.

Languages	History	Type of structure (affiliation)	Internal structures	External structures
Catalan (Termcat)		Attached to the Ministry of Culture of the Government of Catalonia	Specialized dictionary making group, Supervisory Council for standardization and help desk services	National networks: Government of Catalonia, the Institute of Catalan Studies and the Consortium for Linguistic Standardisation; International networks
French (DGLFLF)	In 1933, a Commission de la terminologie technique française modern by the Académie française; in 1952, terminology planning at the Académie des sciences; in 1954, the Comité d'études des termes techniques français for technical vocabulary; in 1966, the Senior Committee for the defence and expansion of the French language within the Prime Minister's office; in 1984, the Consultative Committee and the General Commission; in 1989, the Senior Council for the French Language, for giving advice to the government and la Délégation générale à la langue française, for implementing and co-ordinating language policy in France; in 2001, Délégation générale à la langue française et aux langues de France to mark the government's acknowledgement of the linguistic diversity	Embedded in the Ministry of Culture and Communication and related to the Prime Minister Office	(language development and modernization component) A head, a secretary, an administrator and three terminologists coordinating terminological activities performed by terminology committees from different ministries	National networks: Governmental and non-governmental organizations involved in French terminological work: The Prime Minister Office, Minister of Culture and Communication, Ministries, General Commission for Terminology and Neologism, The French Academy, The Academy of Sciences, Afnor (Translation service) and CNRS International networks: Francophone partners
Swedish (TNC)	In 1936, a committee for nomenclature at the Academy of Engineering Sciences; in 1941, the Swedish Centre for Technical Terminology; in 2000, the Swedish Centre for Terminology reconstructed from previous structure	As an independent private company receiving a grant from the Ministry of Enterprise, Energy and Communications	A manager, nine terminologists and administration staff	Both national and regional networks
Persian (APLL)	In 1924, a society by the ministry of war, without linguists or serious grammarians or man of letters; in 1932-1940, a society for coining scientific terms; in 1934, at the Medical Academy; in 1935, the Iranian Academy, as a single authoritative language-planning organization for removing loan words; 1970-1976, the Iranian Academy of Language; in 1980, Iran University Press (IUP); in 1991, the APLL	APLL	Terminology groups, coordination council, editorial board, terminology council	National networks: some scientific associations; International cooperation: a member of Infoterm
Hebrew	In 1890, the Council of the Hebrew Language by the intellectuals of Jerusalem; in 1903, a new Language Committee, by the newly established Hebrew Teachers Union; in 1953, the Hebrew Language Academy, a direct successor to the CHL	The Hebrew Language Adademy		By a law in 1953, its decisions signed by the Minister of Education and Culture

Table 5. 13: Organizational structures

Terminology work has ranged from sporadic activities to groups/committees within academies. For instance, undergoing structural changes, terminology work in South Africa started from individuals and moved towards developing a coordination agency and then to an official body. The process of changes is considerable in France from 1933 to 2001 and in Iran from 1924 (without linguists or serious grammarians or man of letters) to 1991 when the third Academy was set up (with both linguists and specialists). The language of science planning activities focusing on terminology within the Academy of Sciences is a salient point in Ukraine in 1921, USSR in the late 1920s, Sweden in 1936, Latvia in 1946, France in 1952 and so on. It could be a sign of devoting attention to the relationship between language and science.

Either within or without an academy, the general frame depicted from Table 5.13 is a central core with its inside and outside structures, well-developed in cases such as Termcat (Catalan), TNC (Swedish) and DGLFLF (French). The main constitute in internal structure of Termcat and TNC is their help desk services, a generalizable parameter. Through this facility, agencies receive feedback from users. The statistics show how different sectors (industry, education, health, science and technology) and disciplines are involved with terminologies, who needs what, what linguistic components (definition, morphology, grammar, spelling, etymology) have most been questioned and how much an agency is successful to attract various social layers and also to know of their needs and trends. It is a kind of monitoring and recognizing sociolinguistic directions. Help desk services are of evaluation

processes which a loop carving back to the planning theory layer transfers their results to language policy and planning.

The importance of external extension in the form of a network is stressed by Lara (1986) for institutions in Spanish-speaking countries to “arrive at an adequate degree of terminological standardization.” (p. 98) Rousseau (1993: 41) believes that “... modernization of French terminology will require increasingly sustained joint international efforts. In the 1970s, a first international neology network was created in Québec and its works published in the collection *Néologie en marche*.” Cabré (1996) also considers the Spanish terminological activities not only at the national level but at the regional level (European countries) and Spanish-speaking countries (Latin-America). She believes that “Spanish terminology cannot disregard the terminology of the languages of the EU with respect to the needs for cultural, commercial and communicative interchange. Nor can it avoid the idiosyncratic features of industrialized countries.” (p. 32) In practice, a good example is the DGLFLF (see Diagram 4.8) covering all essential entities inside and outside of France in a systemic way. Sweden, as an industrial country, needs to be linked with companies and organizations at the national (e.g. industrial companies and standardization bodies) and international (e.g. ISO/TC 37/SC 1) levels. As an another example of a systemic planning, it can be mentioned that since terminology or language of science is not separated from general language, when LSP and general language are overlapping, e.g. computer terminologies, the TNC is linked to The Swedish Language Council, as one of its

national connections. To be linked with the National Board of Health and Welfare, TNC show how it deals with other relevant sectors. Even for Sámi there are national (Nordic Sámi Language Committee and the Nordic Sámi Council) and regional (Internordic Standardization) cooperations. But the APLL (Persian) is not well connected to other Persian-speaking countries.

As an external wing, Nordterm was developed in 1976 for Danish, Faeroese, Finnish, Greenlandic, Icelandic, Norwegian, Sámi, and Swedish. On its mission, Elkhafaifi (2002: 259-260) explains that “It is an association of terminology-oriented organizations, societies, and institutions ... that have agreed to cooperate as a network, with the aim of focusing on both the theoretical and practical aspects of terminology.” But the point is that, according to Elkhafaifi, although these linguistic communities are linguistically and culturally more different than Arabic ones, they can cooperate with each other. Then the author concludes that “surely the Arab nations could make a similar attempt.” (p. 260) Although Arabterm was created in 1986 within Infoterm, “Political and economic obstacles dictated its failure before it had any opportunity to act.” (p. 259)

The conclusion is that a broad form of a terminology planning network is built from internal divisions, especially help desk services, and external (national and supranational connections). External relations are also helpful in spreading terminological products.

5.3.4 Dissemination

The final aim is to disseminate suggested solutions for discourse problems in such a way that to be implanted. Dissemination methods can improve cultural infrastructure (linguistic awareness). If it happens, transferring knowledge to the target users will be more facilitated. Therefore, dissemination and linguistic awareness are affecting each other. In this regard, Drame (2010) in her PhD thesis emphasizes the importance of mass media and digital media in communication (in African context) leading to awareness-raising, as a major factor in the success of language/terminology planning.

Apart from Latvian, Hungarian, Icelandic and Sámi suffering from a shortage of certain strategy but only very general methods, Table 5.14 represents facilities reinforcing a point about dissemination.

Languages	Agents	External connections	Media	Publication	Electronic devices
Catalan (Termcat)	Experts	See external structures in Table 5.13	Terminology Antenna; Official Gazette of the Generalitat of Catalonia	Dictionaries	Neoloterca; Cercaterm
Swedish (TNC)	Through lectures and conferences	See external structures in Table 5.13	The role of media in spreading Joint group projects' decisions	Glossaries in different technical fields; with the establishment of a European Economic Area (EEA), by translating about 10000 pages of official EC documents into Swedish and also by publishing <i>EC Words and Expressions</i> ; writing articles	National termbank
French (DGLFLF)		See external structures in Table 5.13	<i>Official Gazette/Journal Officiel</i>		Franceterme (see Table 5.11)
Persian (APLL)	Experts (scientific associations)	See external structures in Table 5.13	<i>Newsletter</i>	Collections of approved terms	Online approved terms
Estonian	The role of non-linguist specialists (working on terminology commissions) in teaching process as well as in writing and editing of texts		Specialist periodicals	Dictionaries	
South Africa (TCS)	Collaboration with related subject specialists and linguists	Collaboration with related professional and academic institutions		Technical dictionaries	CD-ROMs; envisaged web-enabled terminology management (TRADOS MuWA and TermCO

Table 5. 14: Dissemination facilities

As a whole, from Table 5. 14 the following minor universal principles can be formulated:

-- tenor of discourse (who/social position), e.g. Estonian and Swedish;

-- medium of discourse (media and electronic devices), e.g. Swedish and South Africa (see Drame 2010 on the use of mass media and digital media in South Africa);

-- and mode of discourse (instruction and discussion; speaking and writing), e.g. Estonian and Swedish.

They can also be considered as non-linguistic implantation criteria. On the other side, dissemination is closely related to two previous major principles, i.e. workflow and organizational structure. A deficiency in these principles can affect dissemination and, consequently, implantation. For instance, because of a lack of central publication, caused by the way the Icelandic Language Council has been organized, “There is no question of “assuring” the adoption of new terms.” (Helgadottir 1991: 64) The reason is that the criterion of *language availability* (see 4.2.2.6) has not been fulfilled.

5.4 Evaluation⁵⁸

All three discussed layers can affect sociolinguistic variables in an ecolinguistic context if they do their duties properly. It can be measured through an evaluation system, covering entities, methods, processes and products. Evaluation is, in fact, a kind of sociolinguistic analysis to see whether the system, terminology planning mechanism, operates effectively, terms have been implanted or rejected and why. It is a control system to compare inputs with outputs from different modules, on the one hand, and outputs with feedback from different parts of a linguistic community, on the other hand. Thus, a continuous assessment is needed to ensure the health of the system.

Table 5.15 represents two groups of data: the data concerned with French (DGLFLF), Swedish (TNC), Persian (APLL) by Zarnikhi (2010) and Hungarian are not based on research studies but Persian (APLL) by Talebinejad et al (2012), African context (Nigeria), Irish, Turkish and Catalan case studies are supported by empirical evidence. The data analysis only deals with how and which components have been evaluated, not with their results.

Languages	Methods	Tools	Components
Swedish (TNC): Apart from help desk services, no academic research and no systematic evaluation of products and methodology by TNC			
French (DGLFLF)	Whether lexicographers using proposed terms or to what extent they are available on the Internet		

58. For the role of the language academies and management agencies see *Journal of Language Policy*, 2011, 10: 4.

Persian (APLL): No terminology research, no evaluation and no systematic revision by APLL	The analysis of a collection of approved terms and terminology records (Zarnikhi 2010); Translation test through a multiple-choice item test with a familiarity questionnaire and Wilcoxon Signed Rank Test and Spearman's Correlation Coefficient for analyzing the data (Talebinejad et al 2012)		Data gathering (see Table 4.1), related terms registered in terminology records (Zarnikhi 2010); The frequency of the APLL-approved terms in the translations of scientific and technical documents and the relationship between the degree of participants' familiarity with the APLL-approved terms and their frequencies in translations (Talebinejad et al 2012)
Hungarian			No interdisciplinary cooperation and uniform language planning; no literature and hardly any methodological basis; no dictionaries, glossaries, encyclopaedias, electronic databases, etc. containing the terms and the definitions of concepts of certain professional fields; no real information system showing the results of the Hungarian terminological research and practical work (Fóris 2007)
African context (Nigeria)	The evaluation of <i>Quadilingual Glossary of Legislative Terms</i> to see whether it supports translating (as an instance of communication) and knowledge (acquisition and transfer) by doing two experiments (Antia 2000)		The quality of a terminological product
Turkish	A corpus-based study (Karabacak 2009)		Acceptance of official economic terms in Turkish newspapers
Irish	An empirical study to test the hypothesis that "Irish speakers in traditional Gaeltacht areas do not accept official terminology planning, both in terms of their language practices and beliefs." (Ni' Gheara 'in 2011)		"Dynamics of acceptance and estrangement"
Catalan	A corpus-based study to evaluate the implantation of Computer Science and Information and Communication Technologies terms standardized by Termcat by observing some criteria (Montané 2012)	ESTEN, a standardised terminology monitoring tool	Termcat's standardization criteria

Table 5.15: Evaluation

As the last column of Table 5.15 shows different parts of a terminology planning work can be evaluated by quantitative and qualitative methods. Evaluation process includes both inside and outside of the system. The former includes evaluating major and minor principles and the latter tries to know whether terms have been employed by the intended targets and their reactions. Antia (2000), Fóris (2007) and Zarnikhi (2010) are concerned with the quality of terminological products from inside of terminology planning system. But Karabacak (2009), Ní' Gheara'ín (2011), Talebinejad et al (2012) and Montané (2012) have considered the other end of the scale (outside), i.e. linguistic communities, to measure term prevalence mechanism in their linguistic communities. Another point from Table 5.15 is that language agencies do not have an evaluation procedure.

The problems discussed by the researchers come as follows:

- low quality of a glossary because of terminographic inconsistencies (Antia);
- deficiency of dissemination in Turkish (Karabacak), in Irish (Ní' Gheara'ín) and in Persian (Talebinejad et al);
- the validity of Termcat standardization criteria (Montané).

Each problem dealt with by the above researchers can be traced back to one or two earlier mentioned layers (planning theory, linguistics of science and implementation). For instance, the product quality measured by Antia is related to the planning theory (a lack of sociolinguistic study and need analysis) and linguistics of science

(a lack of terminology approach) layers. Shortcomings of dissemination are caused by the implementation layer. Criteria for term creation are linked to the linguistics of science layer. The problems discussed by Fóris (2007) and Zarnikhi (2010) arise out of the same layer as well.

It appears that each layer is equipped with an evaluation tool to prevent terminology planning taking place in a vacuum and far from reality:

- a diachronic and synchronic sociolinguistic analysis in the planning theory layer evaluating a complex sociolinguistic system in order to find needs and aims for formulating a language policy;
- typology researches in the linguistics of science layer seeking more real linguistic solutions corresponding with a certain target group's needs;
- help desk services in the implementation layer building a bridge between inside and outside of terminology planning system for receiving feedback from real situations and sending them to the previous layers.

Therefore, if a terminology planning work pays attention to the evaluation devices which can be fitted in each layer, most of problems may be decreased before delivering terminological products to users. Nevertheless, evaluation from outside of the system is also required since the results from, for example, help desk services only come from users keeping in touch with agencies

but terminology planning needs to access information from other parts of the intended users.

It is apparent that because of a wide variety of goals evaluation methodologies can be various. For instance, the primary aim of Catalan (Termcat), Persian (APLL) and Hungarian is terminology development which is a linguistic aim at the first glance but for Quebec it is a social development, a non-linguistic one. Therefore, instruments for measuring a linguistic aim are different and, at the same time, more simpler than ones for monitoring a non-linguistic goal. Language planning, as a whole, is trying to manipulate a language with the original intention of modifying its linguistic environment even in Catalan, Persian and Hungarian cases. Hence, the ultimate goal cannot be just to put terms into circulation but it bears something else. Beyond knowing whether terms have been implanted, evaluation has to take a longer path to measure the language of science planning effects on the intended linguistic community (e.g. chemistry students). For example, how terminology planning has improved textbooks, how it has affected learning (cognition) and how it has reduced the number of students dropped out of schools because of difficulties they faced with their textbooks and so on. By laying down criteria, planners can take a step forward to judge to what extent a terminology planning project has been effective to change social and cognitive factors. The present thesis calls such an approach *socio-cognitive terminometrics*. Its criteria and methodology can be developed by an independent research.

5.5 Conclusion

This chapter analyzed the data presented in Chapter 4 in three layers (planning theory, linguistics of science and implementation) and arrived at their major and minor principles. The major principles or universals are free from sociolinguistic factors; they are available in any ecolinguistic environment. Minor principles can be either universal or restricted, however. Minor restricted principles are only concerned with some situations. Further detailed analysis included parameters belonging to specific sociolinguistic contexts. From parameters discussed above, some of them can be generalized to other environments.

Chapter 6: Model presentation and conclusions

The language of science planning is composed of: language of science and planning (see Diagram 3.1). The language of science study is conducted in the linguistics of science layer and planning is done in the planning theory layer through a diachronic and synchronic sociolinguistic analysis. As the thesis progressed, at the end of Chapter 3, another layer, implementation, came out which is responsible for actualizing planning. Modeling in the thesis tries to adopt a systemic/holistic approach, looking globally at issues such as mutual understanding, international scientific communication, economic crisis, peaceful co-existence, extremism etc. but practicing locally, e.g. regarding national scientific communication for improving the level of social classes. Along these lines, layers and their major and some of minor principles are universal. The actualization of principles in real ecolinguistic situations is required to consider sociolinguistic parameters (i.e. localization). To develop the model and to draw conclusions from these elements, this chapter is organized in the following way:

6.1 Model presentation

6.2 Model validation

6.3 Contributions of the thesis

6.4 Conclusions.

6.1 Model presentation

The essential ingredients combined in the model are layers, principles and parameters. The layers constitute a stratified structure consisting of planning theory, linguistics of science and implementation as solid foundations of terminology planning (see Diagram 6: 1, Part A). Each of them has its own major principles/nodes with some subdivisions, minor principles/nodes (see Diagram 6: 1, Part B). The principles are flexible according to parameters resulted from various cultural thinking, i.e. viewing *language* and *science* in different ways, linguistic restrictions, degree of socio-economic development level all influencing planning goals (from revitalization, development, maintenance to modernization). Therefore, differences in terminology planning among various ecolinguistic situations lie in their own parameters. To put it simply, parameters determine the real form of the principles. Any decision making about different aspects of a principle necessitates extracting parameters. To do this, the model employs matrix tables. A matrix table is composed of two parts, potentialities and limitations (see Diagram 6.1, Part C: *Towards extracting parameters*). Data put into rows and columns (inputs) produce parameters (outputs).

For example, *dynamic forces*, as a major principle of the planning theory layer, is available in any terminology planning projects, for Persian and any other situations like African context, French and so on; it is a universal principle. But the availability of its minor principles such as *forces from top to down*, *forces from bottom to up* and *unexpected events* in a certain ecolinguistic environment is

subject to its sociolinguistic variables. For this reason, they are restricted principles. Finally, both universal and restricted principles appear in a wide range of forms (parameters) because of “values” put into a matrix table of potentialities and limitations.

The following explanation is about the model structure and how it works.

1. Modeling planning theory in the form of a diachronic and synchronic sociolinguistic analysis is the base affecting strategies of the other layers; it is a kind of deep structure which manifests itself in linguistics of science and implementation. The results of this layer bring to the fore discourse problems and also point in a direction. It includes identifying discourse problems from below and receiving an order from top, a synthesis of bottom-up and top-down approaches (see Webb 2002; Kaplan and Baldauf 1997 about this approach), like a tree taking its required substances from both roots and leaves as Capra (1982) states about living systems. It indicates that no general decree can be issued in advance but conflicting forces should be first diagnosed and their effectiveness is measured and then a balance between bottom-up (e.g. linguistic attitudes and the relation between users and government) and top-down (tightening language law/policy from top in such a way that to remove administrative barriers and, at the same time, to help promote language awareness from bottom) is made in an ecosystemic view.

Here the thesis is concerned with how to model the planning theory based on a diachronic and synchronic sociolinguistic analysis. The analysis shows what has sociolinguistically happened (cultural thinking) and how a language and its linguistic community have evolved (their strengths and weaknesses). It also explains that, for instance, Arabic words in Persian or Latin and Greek words in European languages are not unusual rather a natural trend. Therefore, policy and planning based on such a study could be closer to the reality, avoiding a predetermined prescription. It justifies keeping these words in the target languages as a strategy in terminology argumentation. As a result, purism or heavily borrowing can not be completely rejected or accepted; a solution for a specific situation may not be a remedy for another one.

All data gathered through a diachronic and synchronic sociolinguistic study can be summarized in the following formula; plus “+” and minus “-” signs indicate positive and negative quantities respectively:

- available linguistic specifications (+ LS)
- desirable linguistic specifications (- LS)
- available non-linguistic specifications (+ NLS)
- desirable non-linguistic specifications (- NLS).

The following formula at its embryonic form shows how a balance has to be made between availability and desirability by considering feasibility to arrive at goals and objectives (strategies for achieving goals). “Values” in parentheses, if, for

example, (– LS) is bigger than (+ LS), determine the final result of the brackets:

$$[(+ LS) + (- LS)] + [(+ NLS) + (- NLS)] = \text{Needs and aims}$$

This analysis is a device to transfer quantitative and qualitative data obtained from a real ecolinguistic situation to policymakers to define objectives. The results are also sent to the next layer to find solutions and they affect the last layer in terms of how solutions to be implemented (see Diagram 6.1, Part A).

2. Modeling linguistics of science in the area of terminology planning can be imagined in two major/universal principles: theoretical and practical. The first one deals with how language plays a role in creating meaning and new concepts. The practical principle considers internal and external structures of terminology in a systemic way. Since terms are used within grammar and sometimes they are created as texts progress, they cannot be separated from linguistic contexts (see Section 1.3.3.1 Systemic terminology). This principle also views terminology planning as an inseparable part of the language of science planning (corpus planning) interacting with the components of general language planning such as status, acquisition and diffusion planning, on the one hand, and science and technology planning, on the other hand (see 1.3.3.2 Systemic planning).

As a linguistic approach for resolving discourse problems unearthed by a sociolinguistic analysis from environments concerned with science, education or industry, the practical

principle has some minor principles such as terminology typology, terminology approach, terminology standardization (a restricted principle), terminology resources, terminology methods and terminology implantation criteria under the umbrella term “terminology argumentation”. In order to solve a problem, linguistics of science has to consider linguistic, social, cognitive and cultural aspects, especially in term formation methods and in term criteria. Thus, it is not a one-dimensional approach.

Minor principles have context-oriented manifestations. For example, terminological needs can be usually met from two universal resources: native terms and borrowing. The way of applying either of them or a combination of them by different degrees depends on sociolinguistic variables (see Diagram 6.1, Part C, Table 2 representing a matrix for terminology resources). The type of term-formation methods and their frequencies are a function of, for example, linguistic (e.g. derivation and compounding) and sociological (e.g. target users’ favorites) potentialities and historical background (e.g. language domination in Ukrainian and Lithuanian cases) limitations.

The results of typology researches and implantation studies can be linked to the previous layer (the planning theory) in a non-linear regression through a loop and the final solutions from this layer are also sent to the next one for implementation (see Diagram 6:1, Part A).

3. Modeling implementation means preparing infrastructures, creating networks for sending information flowed from an internal structure to external hands to reach intended users in such a way that to be implanted. Implementation is pursuing managerial strategies for offering solutions, for example, in the form of a terminological product. Major/universal principles embedded in this layer such as infrastructures, workflow, organization and dissemination implement policies.

3.1 Modeling infrastructures includes two minor/universal principles: human resources and technological capabilities. If linguistics of science is established as an academic discipline, it can lay the foundations for building human resources and also developing technological tools.

3.2 Modeling workflow generally includes minor universal principles like collecting data, preparing terminology records, coordinating with required sections, revising information, approving and presenting an end product to the target users.

3.3 Modeling organizational structure at maximum size consists of minor universal principles such as internal and external (national and supranational) components. From internal structure, help desk services can be of help as an evaluation process whose achievements are of crucial importance for taking policy decisions and linguistics of science strategies; it is done by a loop thrown back to two previous layers in the non-linear terminology planning system showing how the layers are interacting with each other (see Diagram 6: 1, Part A). From

external structure, supranational development is optional (a minor restricted principle), depending on the degree to which a language has diffused into other countries.

3.4 Modeling dissemination considers three minor universal principles:

- tenor of discourse (the people involved, their socio-academic positions and their relationships/networks);
- medium of discourse (e.g. media and electronic devices);
- and mode of discourse (instruction and discussion; speaking and writing).

The more efficient methods for spreading products, the more substantial improvement of linguistic consciousness. It in turn influences language attitudes, a dynamic force in the planning theory layer. In other words, a loop, curving back towards the first layer, carries the results; it provides another clue about the interaction among layers (see Diagram 6: 1, Part A).

4. Modeling evaluation refers to three evaluation tools embedded in the layers:

- a diachronic and synchronic sociolinguistic analysis in the first layer as a pre-terminology work research;
- terminology researches (typology) in the second layer as an intra-terminology work research;
- and help desk services in the third layer as a post-terminology work research.

Since the complex sociolinguistic system is both dynamic and adaptive, planning and evaluation should be sustained. Therefore, evaluation is neither a layer nor a principle but it is a periternology research covering pre-, intra- and post-terminology works as the above mentioned layers representing them. Then it is a bearing-evaluation model.

Finally, Diagram 6.1 illustrates a systemic terminology planning model in three parts:

- Part A is devoted to the three layers and their interactions.
- Part B goes into details and shows how the layers are interacting with each other through their principles.
- Part C is dedicated to finding parameters by forming matrixes (potentialities and limitations).

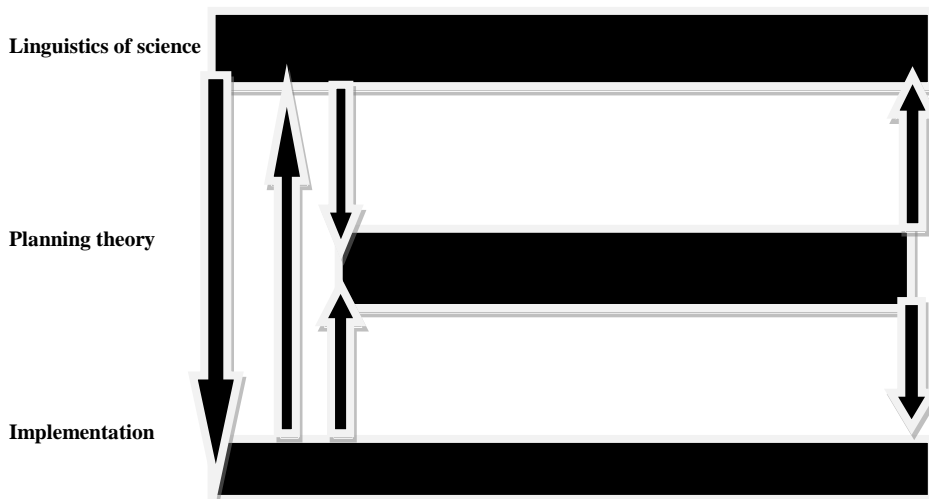


Diagram 6.1 (Part A): A systemic terminology planning model representing interactions among the layers

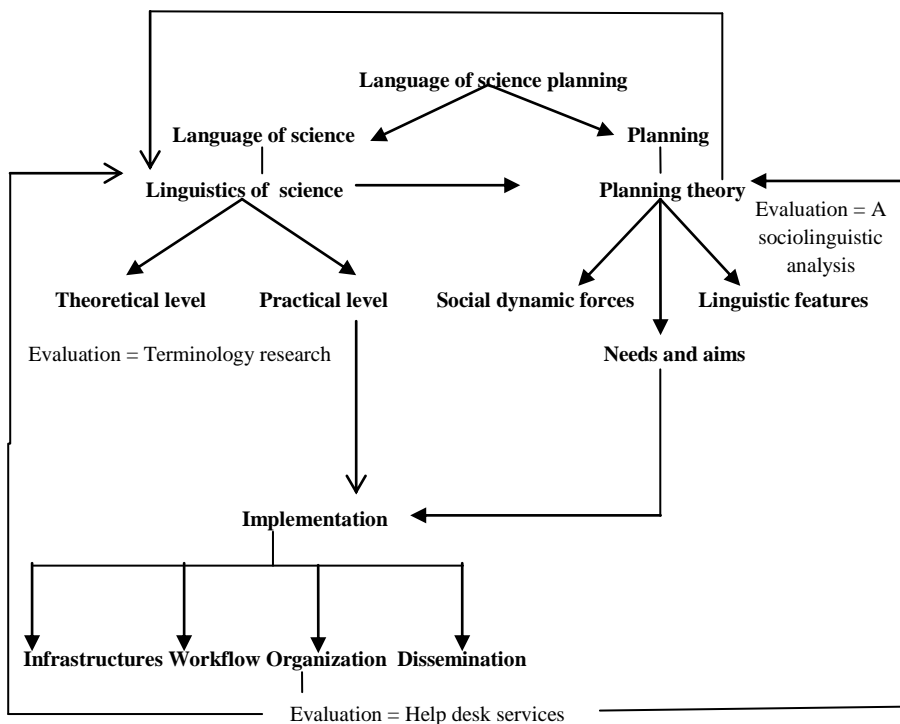
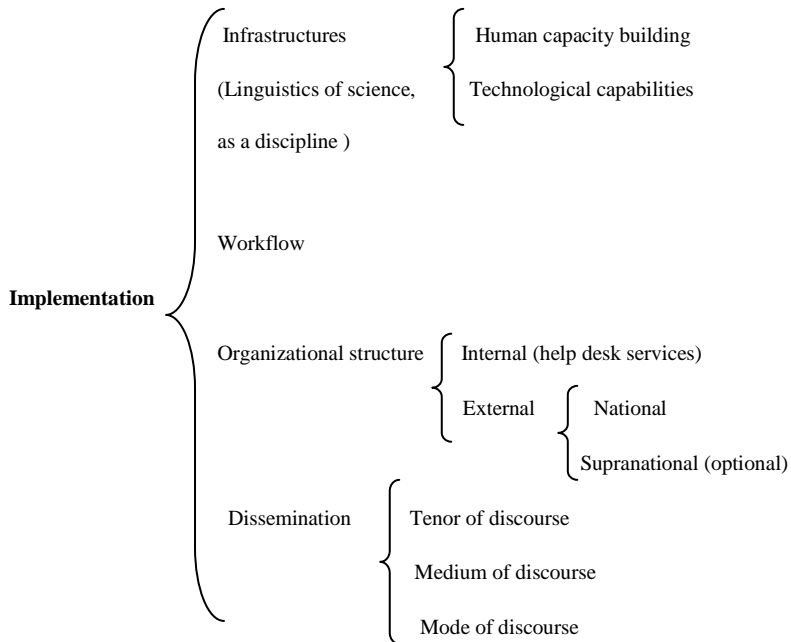
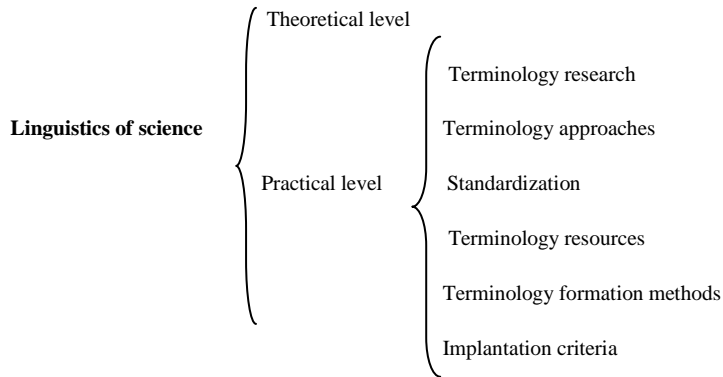
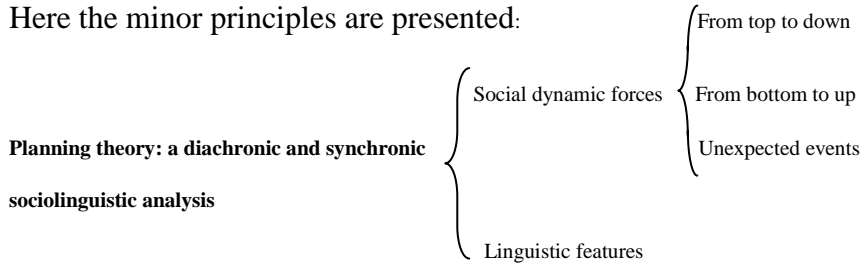


Diagram 6.1 (Part B): A systemic terminology planning model representing interactions among the layers through their principles

Here the minor principles are presented:



A matrix table for discovering parameters of “terminology resources”, a major universal principle, by considering the existing potentialities and limitations is shown by Diagram 6.1 (Part C). What makes different forms of terminology planning appear over the world is the sum of “values” placed on the matrixes.

	Limitations	Cognitive factors: teaching and learning	Social factors: intended users	Policy	Subject field
Potentialities					
Native terms					
Dialectal terms					
Archaic words					
Loan translation					
Foreign terms					

Diagram 6.1 (Part C): A systemic terminology planning model representing parameter extraction

Modeling terminology planning was discussed in a complex sociolinguistic adaptive system whose main determinant of changes is human being as a term creator (world interpreter) and a term user and, at the same time, a policy-maker, a planner and a performer. Consequently, recognizing his terminological competence, promoting his language awareness, engaging as far intended stakeholders as possible from bottom and also making policies from top to remove barriers are the keys. They will complete a

terminology planning work if accompanied by the three evaluation procedures set in the layers as bridges between ideals and realities.

It is not necessarily a stage-based model starting from A to Z. As explained above, it is a non-linear model whose layers (principles) affect each other through loops curving back. It is also worth mentioning that a terminology work can take the terminology planning train in any station depending on variables such as the level of socio-economic development, background in scientific activities and, subsequently, in the language of science, a precedent for language planning and so on. The departure point for French and Swedish, for example, is not the same as for African languages lacking a suitable infrastructure and they, in turn, are different from Persian or Catalan. Kaplan and Baldauf under “towards a model for language planning” state that:

We have tried to argue that language planning doesn't necessarily follow the several stages suggested in Haugen's 2 x 2 model of the process...; rather, we believe, language planning can begin at any point – it is not necessarily corpus driven, nor is it necessarily status driven. We have also tried to suggest that different polities (and different languages) may enter into the process at different points of development (Kaplan and Baldauf 1997: 321).

6.2 Model validation

The model authentication is to find out to what extent “models” suggested by Felber (1986), Krommer-Benz (1990), Budin (1992), Antia (2000) and Bhreathnach (2011) validate the systemic

terminology planning model presented in this thesis. To do this, the layers and their principles of the model come first in a numerical order (e.g. 1. Planning theory layer and 1.1 A diachronic and synchronic sociolinguistic analysis) and then materials from those researchers are thematically put under them (in italics) to show their suggestions for terminology planning are embedded in the model. For example, *evaluating linguistic situation and evaluating non-linguistic situation* suggested by Felber (1986) as a step in terminology planning corresponds with “Planning theory layer: A diachronic and synchronic sociolinguistic analysis” in the present model.

The arrangement below represents the key components of the model stressed by the others:

1. Planning theory layer

1.1 A diachronic and synchronic sociolinguistic analysis

-- *evaluating linguistic situation and evaluating non-linguistic situation* (Felber 1986);

-- *source and target language(s) selection* (Krommer-Benz 1990);

-- *practical level: linked to other existing methods of science and technology planning* (Budin 1992);

-- *terminology discourse and practice in Africa* (Antia 2000);

2. Linguistics of science layer

-- *preparing principles and methods* (Felber 1986);

-- *terminology research* (Felber 1986);

- *terminology building strategies* (Krommer-Benz 1990);
- *theoretical level: linked to other related sciences* (Budin 1992);
- *evaluation of a terminology resource, concept theory in terminology, collocations and communication, terminography and knowledge representation and terminology, text and technology and applications (the making of a legislative terminology resource)* (Antia 2000);
- *standardisation* (Bhreathnach 2011);
- *ad hoc research and project-based research* (Bhreathnach 2011);

3. Implementation layer

3.1 Infrastructures

3.1.1 Human capacity building

- *terminology training* (Felber 1986);
- *staff and equipment* (Krommer-Benz 1990);
- *training* (Bhreathnach 2011);

3.1.2 Technological capabilities

- *computerization* (Krommer-Benz 1990);

3.2 Organizational structure

- *preparation/planning (organizational structure, staff, budget, networks and relationships, resource planning, international involvement)* (Bhreathnach 2011);

3.3 Dissemination

-- *dissemination* (Felber 1986);

-- *dissemination (publication of term resources, interaction with the media, marketing and awareness-raising)* (Bhreathnach 2011);

4. Evaluation

-- *evaluation* (Budin 1992);

-- *evaluation and modernisation/maintenance* (Bhreathnach 2011).

It appears that the other works concerned with terminology planning, more or less, overlap the layers and their principles proposed by this thesis. It means that there is a general form of terminology planning that can be theorized in a systemic way as the thesis tried to do it.

Gordon (1991: 19) believes that “a good model is one that can be used for some purposes even in its simplest form, but can be expanded to include additional factors when their relevance to the problem in hand is suspected.” (p. 109) Avoiding prescription and considering universal and restricted principles and parameters, the thesis developed the model in such a way that can be adapted to any ecolinguistic situation with its specific sociolinguistic parameters. Accepting that some parameters can be generalized and inserted into terminology planning, for example “help desk services” from TNC and Termcat, the model can add them as principles to improve itself.

6.3 Contributions of the thesis

The role the thesis plays in the language of science planning, generally known here as terminology planning, comes significantly from new concepts (paradigm) which it has offered:

1. Systemic terminology (see Section 1.3.3.1)
2. Systemic planning (see Section 1.3.3.2)
3. Principles and parameters (see Section 1.3.5)
4. Planning theory (see Sections 3.4.2, 4.2.1. and 5.1)
5. Linguistics of science (see Section 2.4.1)
6. Peri-terminology work researches (see Section 5.2.1)
7. Dissemination through tenor, medium and mode of discourse (see Section 5.3.4)
8. Evaluation through three devices used in the layers (see Section 5.4)
9. Sociocognitive terminometrics (see Section 5.3.5).

The model was made not only of the real situations but also of some imagination. “You see things and you say, Why? But *I dream things that never were*; and I say, Why Not?” George Bernard Shaw said. The left wing of “Linguistics of science” in Diagram 6.1 (Part B) devoted to theoretical aspect can seek how much it is possible to develop new grammatical patterns/“genetically-modified patterns” (see Section 3.4.1.2).

Among them, linguistics of science as a new approach is potential to be developed to cover the language of science studies such as scientific rhetoric, specialized discourse analysis, LSP and

terminology. Introducing linguistics of science can be a step towards theorizing language of science planning.

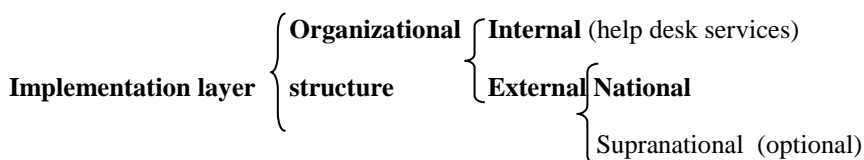
6.4 Conclusions

This part provides the answers of the questions put forward in Chapter 1 and makes the conclusions.

The questions and then their answers come as follows:

1. Can terminology planning, as the language of science planning activity, in different ecolinguistic situations be done under the same principles?

As explained earlier, the terminology planning model is constructed from three layers, each with their own principles. The principles are categorized into two levels: major and minor principles. The former is universal but the latter could be either universal or restricted. For instance, organizational structure, under the implementation layer, is divided into unavoidable internal and external (national) structures. But the supranational structure, as a subdivision of the external structure, is optional (a restricted principle) depending on the size of languages and the scope of their audiences. Hence, layers, major principles and some of minor principles are universal. They are summarized in bold type below:



2. Why have different organizations set their own specific rules (parameters)?

Any ecolinguistic situation has its own sociolinguistic potentialities and limitations rooted in its social, cultural and linguistic contexts which appear in the form of forces from top, down and sometimes from a totally unexpected source; they will end in parameters.

3. Can parameters be generalized and inserted into terminology planning circulation?

Generalizability is closely related to the degree of which a parameter has a positive effect on terminology implantation. For instance, help desk services at TNC and Termcat, a parameter of their internal structures, can be served as a model (a universal principle) for all terminology works, but based on their own capacities.

A generalizable parameter leading to a minor restricted principle is discussed by Alberts (2008). She refers to “rural and urban speech communities ... for documentation in the central terminology bank.” (p. 20) as a terminology resource for the Terminology Coordination Section (TCS) in South Africa. It can be of importance in ecolinguistic situations with linguistic diversity and a tradition in folk knowledge. Another example of generalizability is limited to languages with specific orthographic characters such as Japanese, Persian and Arabic in building their infrastructures (technological tools).

4. Can terminology planning, as an activity in the language of science planning, be theorized under a certain approach?

Linguistics of science, a notable achievement of the thesis, is suggested as a multi-dimensional approach for scientific language studies dealing with the relationship between *language* and *science*. A goal of linguistics of science is to develop a general theory for the language of science planning, paying regard to formal, functional, semantic and cognitive aspects. Since terminology is a component of the language of science, terminology planning can be theorized in the frame of this new approach considering systemic terminology, systemic planning, principles and parameters, terminology argumentation and sociocognitive terminometrics.

5. Could a model for terminology planning be formulated by putting the principles and generalizable parameters?

The whole scene depicted by the thesis is composed of three layers, major and minor principles and evaluation devices embedded in each layer. It appears that layers and their major principles are available in any situation but only some minor principles are confined to certain ecolinguistic situations. When principles, either universal or restricted ones, are actualized in real situations, they follow linguistic and non-linguistic characteristics of that situation and appear in the form of parameters. Parameters can come up to the level of a principle since principles themselves are the results of repeated specific practices.

To conclude, the thesis models terminology planning in a two-dimensional system made up of language and society. If language plays a role in cognition and if any language is a system of creating meanings based on human being's experience from the world and if society is a human being's creature resulted from a complex interaction between his language and environment, then language planning gains importance. In this approach, linguistics of science tries to discover avenues of how language influences human life and science.

Concerning the role of human being, the best language planning approach could be planning for raising language awareness because, among non-linguistic factors, language attitude seems a major determinant of success or failure of planning. If it happens, actors and stakeholders find their ways and perform as "language managers" and "language planners". It is like to increase general knowledge of the public regarding health. To achieve the goal, the model construction is provided with peri-terminology work researches connecting terminology planning process with target users.

Further researches

1. What is the philosophy behind organizations such as UN, UNESCO, OPEC and WHO? Because of some political and social changes over the world and real needs we finally decided to establish them. Now we can think of:

- Decline or death of languages and world language system;
- Issues such as education, health, policy, economics and categories like minority, revitalized, official, co-official, immigrated languages and languages in newly-independent countries;
- Issues such ecology and economics and language;
- World scientific communication and language;
- Universal issues such as peaceful co-existence, extremism, health care, economic crisis and language.

Then the results may lead us to ask ourselves why we do not have World Language Organization (WLO) and how we can set it up.

2. Fishman (2000: 50) believes that language planning for modernization “generally results in making languages even more capable of translating American life, even when suffusing the translations with the aura and the pretense of greater or lesser degrees of indigenization.” It can be measured to find out:

- Whether second term formations only imitates producers’ minds as a model;

-- Whether rethinking imported concepts can add anything to recipients' cognition;

-- Whether looking at a single concept, e.g. *relativity* in physics, by different languages has resulted in its progress.

Laying down criteria, planners can take a step forward to learn to what extent terminology planning has been effective to bring changes in a linguistic community. It is more than a simple short term evaluation but a long process for sociocognitive terminometrics.

3. When experts write their articles in English, it helps English to terminologically/conceptually become enriched. It is suggested to see whether the proportion of created concepts to languages can be calculated as a criterion in scientometrics, not only the number of articles.

4. Phraseology can be analyzed by employing Generative Transformatinal Grammar.

5. It appears that scientific thinking's methodologies are hidden in the languages of science. Therefore, linguistics of science can be of help for exploring them to be applied in the language of science planning.

6. Using a decision tree, the model can be employed in a certain linguistic community. Layers and major principles are the same but extracting minor principles and forming matrixes for parameters help to reach strategies for that sociolinguistic situation.

7. When languages such as English, French, German or ancient languages such as Greek, Persian and Chinese started to express scientific concepts, how much have they followed a similar pattern? In other words, are there any universal terminological and syntactic symptoms to indicate that a language begins to become a scientific language, a typological research?

8. Greek changes in the last 24 centuries are not greater than the differences between the language of Chaucer (1400 A.D.) and today's English (Papadaki 1994) but its historical changes must be more than the past five centuries of English. Why has not Greek changed proportional to its non-linguistic changes? A typological research between socio-political careers and linguistic changes among linguistic communities such as Persian, Greek and English can show how much they have reflected non-linguistic changes throughout history: advantages and disadvantages.

9. When a language dominates over a linguistic community, a pressure from top, it can cause old people and people with lower level of literacy and familiarity with the dominated language to be separated from the rest. Whether linguistic polarization in their environment may damage their health. It is a research in close cooperation with health organizations.

10. A comparative/typological study concerned with the role of tenor, medium and mode of discourse in a variety of ecolinguistic environments can lead to modeling dissemination.

11. It can be studied whether terminology planning agencies which have the evaluation equipments embedded in the layers are more successful than those do not.

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