

How we understand Terminology as a discipline, and its development

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Abstract

This article is a summary or a brief selection on the basis of a dissertation titled “The Reception of Eugen Wüster’s Work and the Development of Terminology” written by the Canadian scholar Ángela Campo. Meanwhile, in the end parts of this article, the author also adds some new developments in the Terminology field as she knows.

In the history of terminology, Eugen Wüster’s work, especially his general theory of terminology, has been an inspiration for terminology research studies. Nowadays, His legacy is still considered the cornerstone in the field of terminology. Wüster is recognized as an important founding figure in modern terminology, as a pioneer of terminology standardization, and as the first author to propose a theory of terminology. In the early 1990s, new theoretical approaches to terminology have coped with advances in technology and science, these approaches have also identified new methods, methodologies, applications and uses for terminology. However, most of them seemed strongly to have held a critical attitude towards Wüster’s work, esp. his general theory of terminology. The debate around Wüster’s work gave birth to new theoretical and practical approaches to terminology development which gained momentum until today.

The “methodology of scientific research programmes” proposed by Lakatos (1978), applied as an interpretive model, demonstrates that terminology is now perceived as a research programme. In Lakatos’ terms, Terminology is becoming a stronger theoretical and descriptive discipline.

Keywords: Eugen Wüster, terminology, terminology approaches, general theory of terminology, standardization.

1. Introduction

Until now, more than 40 years after Eugen Wüster’s death, his legacy remains a milestone in the field of terminology. In the history of terminology, the majority of research studies have dealt, in one way or another, with Wüster’s work, particularly his general theory of terminology. People around the world have some curiosities about this question: “How does terminology develop as a discipline?” After reading some academic articles written by terminology scholars in the western world, esp. A dissertation titled “The Reception of Eugen Wüster’s Work and the Development of Terminology” written by the Canadian scholar Ángela Campo, the author of this article summed up this

dissertation chronologically, in order to understand the development of the Modern Terminology much better. And She likes to share this one with all readers.

2. Where Eugen Wüster's Terminology Thoughts came from and What are His Fundamental Contributions to the Modern Terminology as a Discipline

2.1 Historial events influenting his thoughts significantly

Modern terminology was born in Austria in the 1930s by the outstanding Austrian engineer Eugen Wüster , his doctoral dissertation titled "*Internationale Sprachnormung in der Technik, besonders in der Elektrotechnik*" marked the start point in the history of Modern terminology .Wüster's major publications e.g.his doctoral dissertation (1931), *The Machine Tool dictionary* (1968b), *The Road to Infoterm* (1974a), the article on the general theory of terminology (1974b) and the posthumous publication of the general theory of terminology (1979a) as well as the series of books published by Infoterm around the 2000s, should be regarded as the basic theoretical documents for people who want to know what Terminology was and is.

Wüster's impact on our terminlogy field has been wide-ranging and conclusive worldwide, not only in the 20th century, but also his influence will continue beyond our 21th century.

Eugen Wüster's lifetime was influenced by a series of historical and intellectual events that played an important role in his productive terminological work. His lifetime was strongly influenced by three significant events. Firstly, The two World Wars which urged the development of the international neutral language--Esperanto. Secondly, there were the Vienna Circle focusing on the philosophy of science and epistemology that started as early as 1907. Finally, there was United Nations Educational, Scientific and Cultural Organization (UNESCO) which aimed for international understanding and peace after the United Nations set up in 1945. All above historical events have influenced Wüster's professional orientation, and they guided Wüster's contribution to terminology science.

2.1 .1 The Esperanto Movement

The Russian ophthalmologist Ludovic Lazarus Zamenhof ,who developed Esperanto in the late 19th century, considered that Esperanto would promote understanding between people from linguistically diverse countries. Dr. Zamenhof wanted to promote peace and international understanding through Esperanto. And in Wüster's opinion, both Esperanto and terminology served this same purpose. Esperanto, as a planned language, its functions is clearly found in

Wüster's work on terminology in his *Enciklopedia Vortaro Esperanta-Germana* (1923-1929), and in his doctoral dissertation *Internationale Sprachnormung in der Technik, besonders in der Elektrotechnik* (1931), as well as in the project of an international key to terminology. Wüster is well-known among Esperantists today, and it should be admitted that the Esperanto movement in the early 20th century had a noticeable influence on Wüster's thoughts as a means of international communication.

2.1 .2 The Vienna Circle (the logical positivism)

The Vienna Circle was one of the most important philosophical movements of the 20th century. Along with its epistemological origins was the concept of scientific language (see Stadler, 2003). This concept was a discussion between ideal and normal language which influenced Wüster's ideas. Some representative figures of the Vienna Circle (Neurath, Hahn, & Carnap, 1996, p. 340) were Hans Hahn, Philipp Frank, Otto Neurath, Viktor Kraft, Rudolf Carnap and Moritz Schlick, who is also the leader of the Vienna Circle.

The Vienna Circle focused their attentions on the logic of science and the elaboration of a common language to all the sciences. Their tenets of the *Scientific Conception of the World* had an enormous influence on Western philosophy where philosophical discussions gave birth to the modern school of philosophy called logical positivism, also known as logical or scientific empiricism. Logical positivists tried to bring two premises into philosophy: First, that the only source of knowledge is experience and second, that through logic one could solve any philosophical problem.

Ángela Campo highlighted in her/his dissertation the significance of logical positivism for the philosophy of language. Logical positivists believed that science could be expressed through the language of logic and mathematics, they believed the idea of a unified science where all sciences share the same language, laws and method. It is the same search for precision and accuracy, as well as for a neutral language that reduces the problems of ambiguity in ordinary language. In fact, univocity, precision and coherence were, after all, the common values of European philosophy concerning scientific language. These same values can be seen in Wüster's ideas.

At the time of the Vienna Circle (1920-1930), Budin (2006, p. 93) points out that normative theories of language were popular, planned languages such as Esperanto found favor and scientists, linguists and philosophers tried to solve worldwide communication problems by encouraging the use of a universal language.

According to Budin, “Wüster’s systematic approach to terminology has essentially the same fundamental questions as philosophy has had for centuries: What is reality and how can we grasp it? What are objects in reality and how can we observe them? How can we communicate about reality? How can we name objects?” (Budin, 2006, p. 95). Both Wüster and Logical Positivism grew up in a European philosophy context where philosophy was understood as a language-oriented activity. A view that was adopted by Wüster and that focuses on the conception of science as a concept system and the Vienna Circle ideal’s goal: unambiguous communication and an exact language of science. In a word, for the Vienna Circle, the language of mathematics, physics and mechanics was a rich topic for reflecting on the limits of common language to express specialized knowledge. People can see Wüster’s the same kind of thinking from his article “The Wording of the World Presented Graphically and Terminologically” (Wüster, 2003a).

The difference between general language and scientific and technical language as well as the search for common understanding among scientists were two of the main topics of study for the scholars associated with the Vienna Circle, and they were also present in Wüster’s work. Wüster’s collaboration with UNESCO and other international organizations allowed him to put his ideas on common understanding into practice.

2.1.3 The United Nations ,UNESCO and ISO

The United Nations(UN) was established in 1945 as an international organization committed to maintaining peace and international security, developing mutual understanding among nations etc. Its purpose has always been cooperation in the solution to political, economic, social, cultural and humanitarian problems.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) was set up as an agency of the UN in 1945. As an educational organization, its work is to facilitate universal access to information and knowledge, which unavoidably requires establishing standards. The idea of collecting and disseminating knowledge led to the creation of UNESCO’s World Scientific Program for Information called Universal System for Information in Science and Technology (UNISIST) which is specifically dedicated to the dissemination of scientific information. As language was the common denominator in all these initiatives, it became evident that UNISIST should concentrate on matters related to scientific and technical communication, multilingual translation and terminological activities.

As UNESCO put this programm, terminology was essential for accomplishing this goal and UNESCO had to become a key player worldwide. The then head of this programm, Mr. J. Edwin

Holmstrom insisted on the importance of improving terminology. As a result, when the need for terminological work became evident, it was the turn for Wüster to be in charge at UNESCO. In 1961, Wüster was elected Chairman of the Sub-Committee on Proposals for Multilingual Dictionaries (see UNESCO, 1961). In addition, as the leader of the Secretariat of Technical Committee ISO/TC 37 “Terminology (Principles and Co-ordination)”. Later on, and because of the growing demand for international communication and cooperation, “in 1970, UNESCO on behalf of the UNISIST Programme charged Wüster (Austria), ... with the preparation of two reports on the state-of-the-art of terminology. These reports were: Report 1: Inventory of Sources of Scientific and Technical Terminology; and Report 2: A Plan for Establishing an International Information Centre (Clearinghouse) for Terminology” (Galinski, 1982, p. 104). These two reports are known as The Road to Infoterm (see Wüster, 1974a).

Soon after, UNESCO recommended the establishment of a permanent secretariat for the co-ordination of lexicographical and terminological activities (see UNESCO, 1964). In autumn 1971, Infoterm was officially founded in Vienna, Austria, by contract with UNESCO, and the Österreichischer Normenausschuß [Austrian Standards Institute] (ÖNA) put in charge of its implementation” (Infoterm, 2004, p. 5). Wüster’s cooperation with UNESCO, which lasted for almost twenty years (1955-1974) (see Wüster 1955a, 1955b, 1959b, 1964a and 1974a), also had a very practical side. During the period from 1959 to 1973, Wüster worked to collect and document information on new monolingual glossaries, which were published regularly in the journals DIN-Mitteilungen, Lebende Sprachen, and Babel (Felber, 1973, p. 184) as the addenda to the UNESCO bibliography of standardized monolingual scientific and technical glossaries. The socio-historical and intellectual context of Wüster’s life played a great role in shaping his Ideas and it was equally important impact upon modern terminology.

Besides, after the second World War, the demand of the Industrial Revolution was insistent on bringing about object standardization, language standardization, especially in terms of terminology and standardization of terminological principles. Linked to this idea was the regulation of terms where Wüster’s work played an important role, standardizing terminological principles and methods. As some authors have indicated (Felber, Manu, & Nedobity, 1987; W. Blanke, 1988; Galinski & Hjulstad, 1998; Galinski, 2003), the first attempts to regulate international terminology in the field of technology were made in the 1880s by the International Electrical Congress, which was the predecessor of the International Electrotechnical Commission (IEC). Its tasks were to standardize and coordinate terminology, to provide the equivalence of terms and to prepare an International Electrotechnical Vocabulary (IEV)

(Krommer-Benz, Manu, & Budin, 1999, p. 2120). At that time, specialists from several disciplines realized that organizations were necessary to achieve harmonization. The regulation of terminological principles and methods arose accordingly. “The base for it were the relevant papers by engineers (for example, Duval, Kapp, Lotte, Schломann, Wüster)” (Galinski & Nedobity, 1988, p. 8). For instance, Wüster’s book *Internationale Sprachnormung in der Technik, besonders in der Elektrotechnik* (1931) laid the foundations for the standardization of technical terminology and was the starting point for the founding of the International Federation of the National Standardizing Associations (ISA) (see Felber et al., 1987; Galinski & Nedobity, 1988), the agency primarily concerned in promoting technical terminological standardization known today as the International Organization for Standardization (ISO). In 1952, the ISO established a special technical committee for the international standardization of terminology, entitled “ISO/TC37: Terminology (Principles and Coordination).”, its most significant work was actually to be completed in the field of international technical standardization of terminology including the six-language International Electrotechnical Vocabulary prepared by the International Electrotechnical Commission (IEC) which has since become a section of ISO, and the same principle had also been followed in the Vocabulary of Machine Tools, giving definitions and illustrations, which were completed under the direction of E. Wüster and about to be published. Eugen Wüster prepared many drafts in the preparation of ISO recommendations and standards, using analysis based on material from the Wieselburg collection. Between 1967 and 1973, the TC37 of the ISO published six ISO recommendations (ISO/R) and one ISO standard on terminology (see Felber 1973, 1976, 1978a, 1980a). The ISO/R 1087 contains the vocabulary for the theory of terminology. ISO/R 704 and ISO/R 860 deal with terminological principles. ISO/R 919 contains guidelines for terminology work. ISO/R 1149 describes methods for terminological lexicography, and ISO/R 639 and ISO/R 1951 contain symbols for languages, countries and authorities, as well as symbols to be used in vocabularies.

As clearly summarized by Galinski, “in 1936, the Technical Committee ISA/TC 37 “Terminology” of the International Federation of the National Standardizing Associations (ISA) was founded. It worked until 1939. In 1951, ISO/TC 37 “Terminology (principles and coordination)” of the International Organization for Standardization (ISO) was founded. It started to operate in 1952. In February 2001, TC 37 was renamed “Terminology and other language resources” and widened its scope towards language resource management” (Galinski, 2003, p. 116). The scope of the ISO/TC 37 was extended accordingly to the standardization of principles, methods and applications relating to terminology and other language and content

resources in the contexts of multilingual communication and cultural diversity. According to Galinski (2009), “Infoterm took over the Secretariat which it held until it was transferred to China at the end of 2008” (p. 19). Today the ISO/TC 37 has five subcommittees:

- TC 37/SC 1 Principles and methods
- TC 37/SC 2 Terminographical and lexicographical working methods
- TC 37/SC 3 Systems to manage terminology, knowledge and content
- TC 37/SC 4 Language resource management
- TC 37/SC 5 Translation, interpreting and related technology

2.2 Eugen Wüster’s Major Works

According to Ángela Campo, Wüster’s work in terminology spans nearly 60 years and is known for his contributions to Esperantology, planned languages, language planning, information and library science, the Universal Decimal Classification system as well as thesauri, lexicography, terminology standardization and terminology science. Wüster published in major linguistic journals early in his career (see Felber, 1998; A. Lang et al., 1979). A number of his papers, which proved to be seminal to the theory of terminology, were accepted by linguistic journals notably *Linguistics*, *Le Langage et l’Homme* and *International Journal of the Sociology of Language*.

Ángela Campo and her colleagues selected five of Wüster’s best known publications, They are the *Internationale Sprachnormung in der Technik, besonders in der Elektrotechnik* (1931), *The Machine Tool: An Interlingual Dictionary of Basic Concepts* (1968b), *The Road to Infoterm* (1974a), “Die allgemeine Terminologielehre - ein Grenzgebiet zwischen Sprachwissenschaft, Logik, Ontologie, Informatik und den Sachwissenschaften” (1974b, 1976a, 1981) and *Einführung in die allgemeine Terminologielehre und terminologische Lexikographie* (1979a, 1985b, 1985c, 1998). Obviously, Wüster published much more than these five works . Although Eugen Wüster was involved in professional work in several fields, it was terminology, together with associated work in standardization and documentation, which became his principal interest. He is remembered mostly for his general theory of terminology, which remains both influential and debated.

2.2.1 Internationale Sprachnormung in der Technik

Internationale Sprachnormung in der Technik, besonders in der Elektrotechnik

[International Standardization of Language in Engineering, Especially in Electrical Engineering] (1931) was Wüster's first major publication. His book became a standard work in applied linguistics and was translated into Russian in 1935. It represents the pioneering document for terminology in a specific technical domain and for terminology standardization. It is considered Wüster's seminal work as it served, for the International Federation of the National Standardizing Associations (ISA), as the driving force for the establishment of a technical committee under the name TC37 "Terminology (principles and co-ordination)" (Felber, 1976, p. 281). The committee concentrated on formulating general principles and rules for terminology standardization.

Nowadays, there is a general consensus that modern terminology was born in the 1930s with this work of Wüster in Vienna. In his doctoral dissertation, Wüster established the groundwork for working methods and principles for terminology (Cabr , 1999a), with the aim of standardizing scientific language. According to Felber (1981), Wüster laid the foundations for terminology as an independent discipline and afterwards established terminology science. Wüster's doctoral dissertation may be the first systematic model of terminology and the first description of language for specific purposes, focusing on standardizing technical language.

2.2.2 The Machine Tool

The Machine Tool: An Interlingual Dictionary of Basic Concepts (1968b) remains one of Wüster's important publications. It is an innovative English-French technical dictionary, with a German supplement. It comprises an alphabetical dictionary and a classified vocabulary of machine tools with definitions and illustrations systematically organized according to the UDC system. It was prepared under the auspices of the United Nations, Economic Commission for Europe (UNECE). It reflects the total volume of work Wüster was able to coordinate from the 1950s to the 1970s.

In order to test the structure of the multilingual term bank of the European Commission, known as EURODICAUTOM, the compilation of Wüster's dictionary *The Machine Tool* started as a contract between the European Commission and Infoterm. EURODICAUTOM, created in 1975, was the pioneering terminology data bank of the European Commission (formally the Commission of the European Communities). This project had two main objectives: i) to undertake a pilot project parallel to the elaboration of terminological principles and methods to be derived from practical experience in order to test applicability and efficiency, and ii) to have *The Machine Tool* in machine-readable form, initially for use by translators and other Commission staff (see Felber et al., 1986; Goffin, 1997). The system of concepts expressed

using terms became the basis for the ordering and the transferring of knowledge, the storage and retrieval of information, and for knowledge engineering. In 2007, the inter-institutional terminology database Inter-Active Terminology for Europe (IATE) replaced EURODICAUTOM.

Although it is said that Wüster's ideas mainly on prescriptivism, the dictionary also takes a descriptive approach as confirmed by Felber et al. (1986). Certainly, the conceptual basis is vital. The most striking features of this dictionary are described by Felber et al. (1986, p. 32):

1. There is one entry for every concept.
2. Definitions are based on precise methods. The conceptual cross-references reveal relationships within the conceptual system.
3. Standardized terms and definitions or parts of the definition are marked by authority symbols.
4. Any deviation in the correspondence of terms assigned to a concept (synonymy, degree of equivalence) is indicated by terminographical symbols based on the symbols used in logic and mathematics.
5. A difference is made between logical (genus-species) relationships and ontological (only whole-part) relationships in cases of homonyms representing similar concepts.

The Machine Tool can be regarded as a textbook on terminography and as a model for international projects.

2.2.3. The Road to Infoterm

The Road to Infoterm: Two Reports Prepared on Behalf of Unesco (1974a) represents a major accomplishment for terminology studies. The two reports, "Inventory of sources of scientific and technical terminology" and "A plan for establishing an International Information Centre (Clearinghouse) for Terminology", illustrate the rapid progress of science and technology and provide fundamental reasons for the creation of an international terminology center known today as the International Information Centre for Terminology (Infoterm). Its foundation dates back to 1949 when UNESCO proposed that an "International Terminology Bureau" be founded under the common auspices of UNESCO and the ISO (see Holmstrom, 1949, p. 50). Infoterm became a reality in 1971. It was established by UNESCO and the Austrian government. The focal point of Infoterm, since its very beginning, was to promote, support and organize cooperation in the field of terminology worldwide.

The objective of the publication of *The Road to Infoterm* was to record scientific literature, including dictionaries and thesauri, from all over the world with the aim to exchange

scientific information at the international level. The terminology activities of terminologists, linguists, subject and classification specialists, translators and interpreters, lexicographers, technical writing teachers, as well as documentalists and librarians are needed for the development of the discipline.

The Road to Infoterm presents an authoritative summary of relevant facts on terminological standardization, both national and international. It constitutes a clear guide to institutions, organizations, committees, working groups, and the like. It provides extracts from important UNESCO documents enclosed in the annexes. Terminological and lexicological information is not limited to particular subject fields although there is a preference for natural sciences and technology. Kocourek (1974) in his book review of *The Road to Infoterm*, said that “being worded in English, it is likely to be especially gladly received by those English-speaking readers who are unable to benefit from Professor Wüster’s fundamental terminological writings published in German and unavailable in an English translation” (p. 106). Kocourek (1974) also recognized that thanks to the publication of this book the terminology community would appreciate how far terminology had come: “Wüster’s two reports are a concise but eloquent proof that terminology studies have developed into a complex and flourishing area of human knowledge” (p. 106).

2.2.4. Die allgemeine Terminologielehre

“Die allgemeine Terminologielehre - ein Grenzgebiet zwischen Sprachwissenschaft, Logik, Ontologie, Informatik und den Sachwissenschaften” (1974b) was published in the journal *Linguistics*. For the first time, Wüster explicitly describes a general theory of terminology. In the article, Wüster explains that this general theory of terminology spreads into other disciplines such as linguistics, logic, ontology, information science and other sciences; a fact that makes terminology an interdisciplinary field.

The first French version of this article is an extract from the German article. The extract corresponds to the lecture Wüster gave in Montreal, Canada, in 1975, during the fourth international colloquium organized by the Régie de la langue française du gouvernement du Québec. It was published in the *Actes du Colloque International de Terminologie* in 1976, under the title “La théorie générale de la terminologie – un domaine interdisciplinaire impliquant la linguistique, la logique, l’ontologie, l’informatique et les sciences des objets” (Wüster, 1976a). The second French version was published in 1979 in the journal *Le Langage et l’Homme* under the title “La théorie générale de la terminologie – (I) et (II)” (Wüster, 1979b, 1979c). A third translation is found in *Textes choisis de terminologie* (Vol. 1, Fondements théoriques de la terminologie), published in 1981. The title of this third version is “L’étude scientifique générale

de la terminologie, zone frontalière entre la linguistique, la logique, l'ontologie, l'informatique et les sciences des choses" (Wüster, 1981).

As to the link between linguistics and terminology, Wüster (1976a, p. 51) contrasts language for general purposes (LGP) to terminology in an effort to distinguish LSP from LGP. In a review of the book *Terminologie und Wissensordnung. Ausgewählte Schriften aus dem Gesamtwerk von Eugen Wüster* (Picht & Schmitz, 2001), a collection of Wüster's writings already mentioned, Antia (2002) refers to the article "Die allgemeine Terminologielehre" and says that "Wüster seems to be claiming a place within linguistics for LSP/terminology, ... Rather than imply polarity, Wüster appears to be indicating what is and what is not worthwhile for linguistics to study in LSP/terminology" (p. 105). Antia's conclusion is that "Wüster had a positive attitude towards linguistics" (Antia, 2002, p. 106). However, Wüster also states that the difference between terminology and linguistics depends on the approach to language. A synchronic approach to terminology would deal with the state of the language characterized by the primacy of concepts over terms and the primacy of vocabulary over grammar. The diachronic approach takes into consideration the evolution of language, exemplified by the awareness of word formation, the international nature of language and the primacy of written forms over oral forms (Wüster, 1979b, pp. 61-63).

Wüster showed that logic and ontology can also be applied to terminology. He referred to logic and ontology in terms of the possible relationships between concepts in a system of concepts and between objects in real life. Additionally, since linguistics does not study concepts on their own, but in relation to word formation, he states that "le travail en terminologie part de la notion. Il ne lui reste donc, en ce qui concerne le côté notionnel, qu'à s'appuyer sur les sciences qui ont dans leur compétence les relations entre les notions et entre les individus, c'est-à-dire la logique et l'ontologie" (Wüster, 1979c, p. 59). This statement leads us to the relationship between objects and concepts, therefore to the study of the theory of objects and the theory of concepts. As stated by Picht (1994/1995, p. 141), the current linguistic theories at the time, dominated by Chomsky's ideas or by the structuralists, did not provide other solutions to the practice of terminology as suggested by Wüster.

Wüster also indicates the potential contributions of information technology to terminology and documentation. Computers stock information, but the information has to be recovered in some way. The idea of terms as labels to record and retrieve information is clearly expressed in Wüster's terms (Wüster, 1979c, p. 67) .for example, indexing terms such as key words and descriptors serve to recover information. Nowadays, the relationship between computer science

and terminology, as dreamed of by Wüster, is no longer an illusion. A Terminology and information technology have contributed to the development of corpus linguistics, to the growth of artificial intelligence, to the establishment of expert systems, to the move to computer-aided translation, to the creation of terminological data banks and to the appearance of concordancers. In fact, the internet allows one to gather and search corpora of electronic texts. Thus, terminologies are important for ordering, transferring, disseminating, translating, storing and retrieving information and/or knowledge.

The “multidisciplinary nature of terminology” which Picht (1994/1995) clearly described actually is an idea that was well stated in Wüster’s article and that probes the multidisciplinary view of terminology.

2.2.5. Einführung in die allgemeine Terminologielehre und terminologische Lexikographie

Eugen Wüster’s fame bases itself on his general theory of terminology (1979), which has been one of his most controversial works. The original version of *Einführung in die allgemeine Terminologielehre und terminologische Lexikographie* [Introduction to the General Theory of the Terminology and Terminological Lexicography] was published in Germany in 1979, shortly after the death of Eugen Wüster. As pointed out by Picht (1994-1995), Wüster’s death prevented him from finishing this work. Thus, “the work is a fragment, but one which is so complete in itself that, after the careful attentions of Wüster’s colleague of many years standing, Professor Helmut Felber, it offers today what is probably the most complete presentation of Wüster’s theory” (Picht, 1994/1995, p. 142).

Einführung in die allgemeine Terminologielehre und terminologische Lexikographie is based on the lectures Wüster gave at the University of Vienna between 1972 and 1974. Helmut Felber, his long-term colleague, compiled and published posthumously the manuscript, which is considered by F. Lang (1998, p. 21) as Wüster’s leading achievement. In 1985 and 1991, two reprints of the German version were published respectively; implying that the book had quickly become a model.

Research on the different translations of *Einführung in die allgemeine Terminologielehre und terminologische Lexikographie* shows that the textbook has never been officially published in English or French, although there is a working translation in English and another in French, both dated 1985 (see Wüster, 1985b, 1985c). Both translations were sponsored by the Secretary of State of Canada [Girsterm - Université Laval; Secrétariat d’État; Gouvernement du Québec-Office de la langue française] and are of limited accessibility. Just one library worldwide holding the book, this is the Library and Archives Canada in Ontario. In Spanish, there is only one officially published translation. The first Spanish version appeared in 1998. A second

Spanish edition appeared in 2003. By the way, the first Chinese version of this book (directly translated from German version) was published in 2011 in the P.R. China by the Commercial Press, its translator is a senior terminologist in the China national Committee for Terms in Sciences and Technologies (CNCTST).

Wüster's general theory of terminology arose from many years of reflection as expressed in his doctoral dissertation *Internationale Sprachnormung in der Technik, besonders in der Elektrotechnik* (1931), *The Machine Tool* (1968b), *The Road to Infoterm* (1974a), his work on the ISO committee and his work for UNESCO. The general theory of terminology met the need to guarantee a systematic methodology for terminology. With the general theory of terminology, Wüster proposed order. Professional communication and knowledge transfer needed technicians and scientists to standardize their terminology, both terms and concepts, since the rapid growth of concepts in all fields of knowledge gives rise to communication problems. All scientific and technical concepts have to be represented by terms which allow for better information retrieval. The general theory of terminology is concept-centered and subject-field oriented. According to Felber (1984), the general theory of terminology is a subject field oriented approach. "It places the concept and its relationships to other neighboring concepts as well as the correspondence concept-term and the assignment of terms to concepts in the centre of its reflections" (Felber, 1984, p. 96). Therefore, the general theory of terminology is fundamentally an onomasiological approach to terminology. It implies that concepts and the relationship between them, rather than between terms, are the objects of research in terminology. For the general theory of terminology, terms are labels, which refer to concepts; their linguistic attributes are somehow irrelevant. The basic axioms of the general theory of terminology are summarized in Nuopponen (2003, p. 225):

- TW [Terminology Work] starts from a concept (cf. lexicography) and its goal is to clearly delimit the concepts from each other
 - Concepts and terms are seen as separate units
 - Emphasis is on a synchronic perspective
 - Concepts and terms can only be studied in relation to the related concepts and terms.
 - Organization of terminological entries is systematic or thematic instead of alphabetic
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- . "Wüster's research was based on theories established by Ferdinand de Saussure (the difference between language as a system, *langue*, and speech, *parole*) and by Schlomann (systematic ordering of a specialized terminology in specialized vocabularies)" (Felber, 1980a, p. 11).

The general theory of terminology has been developed from practice and for practical purposes. Standardization and language planning are the main goals of this theory. It is the basis of terminology work and illustrates the application of terminological principles and methods. It is intended to be used nationally and internationally to carry out unified terminology work. The practical goal was international language standardization to offer experts better access to both the structure of the subject-field and unambiguous communication. As Felber pointed out, "the

GTT is the theoretical background to the standardization of terminological principles” (Felber, 1980b, p. 67).

An examination of the general theory of terminology from the point of view of the interdisciplinary nature of terminology reveals the connection between terminology and several other disciplines, such as linguistics, that have produced methods in language planning, lexicography, logic, ontology and information science.

The most salient characteristic of the general theory of terminology is that it focuses on concepts, and guides terminology work towards the standardization of terms and concepts. This is done, primarily, to guarantee univocity in professional communication at a national and international level. This is why appraising the approach of the general theory from the point of view of the ideas proposed by the Vienna Circle is correct. The approach is based on logics, on the search for the universal language and on the uniformity of communication. In accordance with these tenets, the general theory of terminology’s main characteristic is its working method, characterized by the use of the onomasiological approach, in contrast to the semasiological approach of lexicography; hence a preference for systematic ordering.

The general theory of terminology has inspired a great number of terminology works carried out up to the present day. The fact that it is considered, until now, the only theoretical proposal with clear methodological principles means that it is appreciated in the field of terminology. According to Ángela Campo, the importance of Wüster’s general theory of terminology for terminology research and practice cannot be underestimated. Nowadays, Computer assisted translation, language engineering, terminology management, knowledge organization, technical writing, just to mention some subjects, are fields in which Wüster’ general theory of terminology has made significant contributions.

3. New Theoretical Approaches to Terminology since 1979

Since Eugen Wüster’s death in 1977, along with broad technological developments and a profusion of new approaches, novel methods have been applied to terminology from a variety of disciplines, social contexts and languages.

Before introducing these new theoretical approaches to terminology, it is necessary to briefly describe the main characteristics of the traditional approaches i.e. the so-called schools of terminology. For the Prague School, the Soviet School and the Vienna School, the main characteristic is the use of onomasiological methodology. Today these schools are classified as the traditional schools of terminology (e.g. Rondeau, 1981; Temmerman, 2000b; Cabré, 2003a).

They share the same traits concerning theoretical principles, similar research projects, and common research methodologies. Though Wüster may not have known about these schools (see Felber, 1981), he and they share two methodological characteristics: first, the concept is the starting point of any terminological analysis, and second, language standardization is the underlying motivation. The new theoretical approaches to terminology outlined by Ángela Campo depart from these methodological principles by criticizing traditional methods of terminology research.

In Ángela Campo's dissertation, the term "approach" is used to describe the actions intended to deal with specific methodological problems within a terminology situation. The approaches to terminology to be described here mostly from the sociolinguistic perspective. Names like socioterminology (e.g. Gaudin, 1993b, 2003), communicative theory of terminology (e.g. Cabré, 1999a, 2003a), sociocognitive terminology (e.g. Temmerman, 2000b), cultural terminology (e.g. Diki-Kidiri, 2000a, 2000b) and textual terminology (e.g. Auger & L'Homme, 1994/1995; Bourigault & Slodzian, 1998/1999; Condamines, 2005) may be classified broadly as sociolinguistic oriented approaches to terminology.

3.1 Sociolinguistic Approach to Terminology

Sociolinguists have lately questioned the validity of the general theory of terminology in what they nowadays call Wüsterian terminology. Criticism comes from the assumption that terminology is a phenomenon that takes place in specialized communication, which is framed by the sociolinguistic influence of culture. Explicitly, language is seen as a social tool created by different communities that continuously improve to fulfill communicative needs. This is the principal aspect that conditions individual behavior through the social communicative interaction that takes place in a situation determined by historical, geographic and cultural factors (Pavel, 1993, p. 23).

Authors, mostly from France and Quebec, Canada have distanced themselves from structuralism and from what they see as prescriptive Wüsterian terminology. They question the principles of terminology in a new terminological turn that is known as socioterminology (Gaudin, 1993b, 2003). Socio-terminological reactions to the general theory of terminology propose that:

1. Concepts and definitions evolve all the time because the disciplines where they belong evolve and develop over time meaning that concepts are not static.
2. Polysemy and synonymy belong to the nature of language so they inevitably occur in specialized discourse.

3.Specialized subject fields are impossible to define because almost all of them involve, in some way or another, interdisciplinary knowledge.

4.Experts belonging to research groups in science and technology neither share the same professions nor interact with other subject specialists so that they do not form homogeneous groups.

As the term socioterminology indicates, this approach studies terminology within the real use of language and is clearly framed in a specific social context. The approach entails a descriptive method that replaces the prescriptive position proposed by the classic or traditional postulates. Socioterminology, defined in Gaudin's words as a "conception sociolinguistique" of the discipline (2003, p. 154), is directed towards the study of terms in relationship with the contexts in which they appear, that is to say the linguistic, pragmatic, social and historical contexts. It is, in fact, a sociolinguistic approach to terminology that takes into account the analysis of terms (emergence, formation, consolidation and relationships), considering them from a linguistic perspective in social interaction. In this sense, socioterminology is a practical discipline of terminology work that is based on the analysis of the social and linguistic conditions of the circulation of terms.

Socio-terminological ideas were first suggested by specialists in charge of language planning who worked on language standardization in academic or working environments. This approach can be traced back to the 1970s in France and Quebec, Canada. The term socioterminology was adopted at the beginning of the 1980s by Jean-Claude Boulanger and gained a conceptual depth in the 1990s with Yves Gambier, Louis Guespin and François Gaudin. According to Gaudin (1993c, p. 293) an important year for socioterminology is 1987 when Yves Gambier published his article "Problèmes terminologiques des pluies acides: pour une socioterminology" in the journal *Meta*, volume 32, issue 3. In fact, Gambier's paper was given at a conference on "La fertilisation terminologique dans les langues romanes" in October 1986, in Paris. The conference was organized by Françoise Algardy, Pierre Lerat et Jean-Pierre van Deth. Gaudin considers that Gambier's article indicates the emergence of a theoretical effort, or at least the existence of an original and supported position, that one can connect to the term socioterminology. The link comes from combining sociolinguistics and terminology. Gaudin (1993c, p. 293) also states that it was, in fact, at the Université de Rouen, under the direction of Louis Guespin, that both the term and the concept began to emerge. Socioterminology was born from diverse terminographical practices with companies and administrations arising from the difficulty of specialized editing, from articles that describe a situation of terminological planning and, finally, from the problems found within the "wüsterian paradigm" (Gambier, 2001, p. 107). Representative authors in the field are Louis Guilbert, Jean-Claude Boulanger, Yves Gambier,

Fançois Gaudin, Louis Guespin who have formed a social network in the field of socioterminology (see Castro-Prieto & Olvera-Lobo, 2007). Not all of them work at the Université de Rouen.

Socioterminology concentrates on many other theoretical aspects of terminology. For socioterminology, the concept is not a fixed entity placed before the discovery of designations (L'Homme, 2005, p. 1115). Rather, concepts are built in discourse where they suffer many tensions and changes according to social and historical variables (Gaudin, 2003). By the same token, Gambier (1987, p. 320) affirms that behind the dream of an unambiguous language profiled by the traditional terminology, an idealistic voluntarism is expressed which serves sometimes to shape intervention, the normative obsession of international terminological organizations. From the point of view of socio-terminologists, this idea leads to a dictatorial design of language that fixes norms to control language and blinds the evolution and the development of knowledge in discourse communities in practice. Another problem socio-terminologists have found in the theoretical assertions of traditional terminology is that its idealistic rationalism and its mystic objectivism are in contradiction with both its methodology and its practice, which according to socioterminology must take into account terms in their social context (Gambier, 1987, p. 320).

Today, socioterminology has spread to South American countries such as Argentina, Uruguay, and Brazil. It has also reached Norwegian countries. Johan Myking, in particular, has developed a variant of socioterminology in Scandinavia. In Finland, Yves Gambier has contributed several publications in the field. Socioterminology is based on sociolinguistic concepts and approaches (see Guespin, 1995, p. 210). The theoretical basis of the sociolinguistic approach to terminology which claims to be at the center of a scientific, industrial, commercial and linguistic approach is based on contestable postulates of the traditional theory of terminology as stated by Gambier (1987, p. 319). Gambier points out that some principles such as transparency, biunivocity, monosemy and the ideal motivated term are postulates which ignore polysemy and the possible degrees of equivalence from one language to another making thus ruling out synonymy.

Socioterminologists have found problems that the general theory could not solve. Gambier (1987) first stresses the fact that there cannot be terminology without history since concepts evolve as they change along with the realities they express and thus incorporate old knowledge. Furthermore, borders between fields of knowledge change and allow for new vocabulary. He then stresses that there cannot be terminology without social practices since discourse communities determine conditions of enunciation where terms are not objects in themselves that

can be attached to limited definitions of any scientific or professional practice. Finally, he stresses that terminology is connected to the production of science and technology; concepts do not exist at all in abstract conceptual networks (Gambier, 1987, p. 320). Gambier criticizes the “langue limpide” proposed by Wüster as created by monoreferential, motivated and transparent terms and concepts that represent a logical system within a subject field (Gambier, 1991a, p. 41). Postulates such as ‘domaine’, ‘biunivocité’, ‘univocité’, ‘synonymie’ “ne permettent pas à la terminologie de faire face aux réalités terminographiques : problèmes de la définition de notions, du découpage des termes, de l’inflation terminographique, du contexte, des niveaux de langue qui ne sont pas l’apanage exclusif de la langue dite générale” (Gambier, 1991a, p. 43). He concludes that the general theory of terminology is merely utopian.

Socioterminology has a double aim (Gaudin, 1993c, p. 298). On the one hand, socioterminology describes a particular linguistic situation; on the other, it explains language practices. Concerning its objectives, socioterminology seeks:

2. To analyze the needs of language players (technicians, translators, editors, professors, researchers and so on) and the relation between scientific and technical production
3. To understand the conditions and difficulties of knowledge dissemination taking into account the conditions and difficulties of the emergence of concepts and terms
4. To strengthen the evolution of terminology
5. To study the term from the linguistic point of view, towards social interaction since traditional terminology did not explain linguistic behavior of users (Faulstich, 1996, p. 240)

Socioterminology also takes into account the process of language planning for the reason that it inherited many conceptual and methodological features from sociolinguistics.

The point of view of the Rouen research group is that socioterminology must be based on sociolinguistics, a more mature discipline, in order to go beyond the precepts of the general theory of terminology that, according to socioterminologists has reached its limits.

Sociolinguistically speaking, socioterminology privileges descriptive methods over prescriptive ones. Before taking language planning decisions this method needs a long period of observation not only from the point of view of the practitioner but from the outsider (Guespin, 1993, p. 218). The observation of terminological variation implies engaging in the study of scientific and technical vocabulary in its real usage and in all scientific and technical communities (Guespin, 1993, p. 219).

From a methodological point of view, socioterminology proceeds from a descriptive position (Gaudin, 1993c, p. 295). It departs from traditional methods such as discussions with experts, works on limited corpora, disregards the oral dimension and constitutes globally, a more linguistic attitude. Linguistics, in its primarily descriptive branch, supposes that terms be studied in their interactive and discursive dimension. The terminologist apprehends the concept from the lexical stock provided by discourse (L'Homme, 2005, p. 1115). This step, clearly semasiological, conflicts with that recommended by the general theory of terminology. In addition, socioterminology highlights the importance of variation, a linguistic fact that is not a problem to be solved, but rather a phenomenon that is important to describe.

Among publications in the field, François Gaudin and Allal Assal edited in 1991 an issue on “Terminologie et sociolinguistique” in the *Cahiers de Linguistique Sociale*. The same year, Monique C. Cormier and Jacques Lethuillier (1991) edited volume 36, issue 1 “La terminologie dans le monde : orientations et recherches” in the journal *Meta* where Gambier published a classic in the field (see Gambier, 1991b). For an overview of the socioterminology points of view of the Rouen group, it is interesting to consult the special issue on “Socioterminologie” in the journal *Le Langage et L'homme*. The issue, Vol. 28, No. 4 was edited by Yves Gambier and François Gaudin in 1993. In the same year, François Gaudin published his doctoral dissertation entitled *Pour une Socioterminologie: Des Problèmes Sémantiques aux Pratiques Institutionnelles*. Other contributions on the topic of socioterminology were published in 1995 in the special issue of *Meta*, Vol. 40, No. 2 under the title “Usages sociaux des termes: théories et terrains” edited by François Gaudin and Jean-Claude Boulanger. In 2003, François Gaudin published his book *Socioterminologie: Une Approche Sociolinguistique de la Terminologie*, an updated version of his 1993 work. In 2007, the ISO published the first edition of the *Practical guidelines for socioterminology* ISO/TR 22134:2007, which are the guidelines for socioterminology principles, methods and vocabularies. It contains the general principles of socioterminology.

3.2 Communicative Approach to Terminology

María Teresa Cabré is the main representative of this approach. She worked at the University of Barcelona from 1970 to 1993 and then joined the faculty of Pompeu Fabra University, where she directed the Catalan Linguistics Unit in the Translation Department. She directed and founded, as well, the Institut Universitari de Lingüística Aplicada (IULA). In the IULA, she is the coordinator of the language processing research group and the research unit for lexicon structure, neology and terminology. She is also a founding member of the Centro de Terminología de la Lengua Catalana (TERMCAT) of which she was the director from 1985 to 1988 (see Cabré, 1998). It is, therefore, mostly in the work of Cabré (1999a) and her colleagues (e.g. Rosa Estopá, Judit Feliu, Mercè Lorente, Judit Freixa and Carles Tebé) where the theoretical and methodological pillars of the communicative approach to terminology are found. The article “Theories of Terminology - their Description, Prescription and Explanation” published in 2003 also contains the basis of this approach. In brief, most of the publications related to the communicative approach to terminology come from researchers at the University of Pompeu Fabra in Spain.

Although Sager (1990) had already discussed the cognitive, linguistic and communicative dimension of terms, Cabré advocates a communicative approach to terminology in which “each one of the three dimensions [the cognitive, linguistic and communicative], while being inseparable in the terminological unit, permits a direct access to the object” (Cabré, 2003a, p. 187). The communicative approach to terminology is an interdisciplinary approach enriched by the theory of knowledge, the theory of communication, and the theory of language as proposed by Cabré (1999a). It was motivated by the insufficiencies of the general theory of terminology and it has transcended its developmental stage. This approach assumes that communication is not uniform because there is denominative and conceptual variation. From both theoretical and methodological points of view, the communicative approach relies mostly on linguistic variation. In terms of Cabré (2001b, p. 32), the main characteristic of the communicative approach is that it takes into account the representation of knowledge *in vivo*, the spontaneous and natural production of language against the representation of knowledge *in vitro*, standardized language. The analysis of the representation of knowledge *in vivo* favors the descriptive method applied by the approach instead of the prescriptive one. That is why the approach deals with whether one wants to control linguistic variation or not. The approach addresses terminology not as a denominative activity in the sense of identifying concepts and

naming them but as a communicative activity where a term represents a specific concept depending on the situation and setting (Cabr , 1999c, pp. 109-127).

Three terminology works contributed to the development of terminology in Catalonia. Those mentioned by Cabr  (2001a) are, *M thodologie de la Recherche Terminologique* by P. Auger and L.-J. Rousseau (1978), *Introduction   la Terminologie* by G. Rondeau (1981) and the *Manuel de Terminologie* by H. Felber (1987). It was not until 1985 with the creation of the Centro de Terminol gia de la Lengua Catalana (TERMCAT) that Catalan terminology was officially established. Their first interest was in promoting the usage of Catalan in science and technology, and in establishing a standardized and internationally recognized terminology. The inspiration for Catalan terminology come from Quebec and from Vienna where W ster’s ideas were being implemented at the same time (see chapter 2, section 2.4.5.1). Nevertheless, as both Quebec and Catalonia put their terminological practices into work, they witnessed the birth of a more socio-terminological approach in Quebec and a communicative approach in Catalonia. Both approaches distinguish themselves from the approach proposed by W ster, as stated by Cabr  (2001a, p. 136).

In the communicative approach to terminology, it is considered that terms are part of natural language whose meaning changes over time. This idea conflicts with one of the principles of the general theory of terminology. According to one of the tenets of the general theory of terminology, meaning of common language words may change whereas the meaning of terms must remain unchanged. Although, the basic linguistic factor is the nature of terms, the main criticism of the general theory of terminology coming from the communicative approach is that it does not take into account the complexity and the diversity of specialized units in their global communicative environment (Cabr , 1999a, p. 70). That is why “at the core of the knowledge field of terminology we, therefore, find the terminological unit seen as a polyhedron with three viewpoints: the cognitive (the concept), the linguistic (the term) and the communicative (the situation)” (Cabr , 2003a, p. 187). In this sense, the communicative approach moves away from the general theory of terminology as it considers different angles or “doors” for the analysis of terminology. According to Cabr ’s terminological polyhedron, the general theory of terminology accounts for just one dimension of the polyhedron, namely the conceptual aspect, and consequently, it fails to consider the other dimensions of the polyhedron. This does not mean that the general theory of terminology is in danger because terminological units are such complex and multidimensional phenomena that they can hardly be analyzed from all the “doors” at once. From the point of view of the communicative approach, it means, however, that the

general theory of terminology may only be an ancillary component in a more comprehensive theory.

Principles of the communicative approach are summarized in Cabré (1999a, pp. 122-124, 131-133):

- The object of study is the terminological unit (TU) itself, which is part of natural language.
- TUs are lexical units that are activated by their pragmatic conditions and are adjusted to a given type of communication.
- TUs are also units made of form and content in which content and form match.
- Concepts in a given specialized area maintain different types of relationships with each other.
- The value of a term is established by the place it occupies in the conceptual structure of a given field according to the criteria established in a terminology project.
- The objective of theoretical terminology is to provide formal, semantic and functional descriptions of units that can acquire terminological value.
- The objective of applied terminology is to compile the units of terminological value.
- The purpose of compiling and analyzing units with terminological value in a given field is diverse and allows many applications.

In addition, the communicative approach states that each terminological unit,

Regarding the working method, Cabré indicates that the communicative approach is both theoretically coherent and flexible enough to account for the range of situations and goals where it applies. The method is centered on *adaptability* because each terminology work adopts its own method according to subject field, objective, context, and available sources. The working method is not rigid; on the contrary, it is flexible although it does not violate the principles (Cabré, 2001b, p. 32). Additionally, it is certainly a descriptive method that entails the compilation of real TU used by specialists in different communicative situations (Cabré, 2001b, p. 34). The diversity of communicative situations presupposes a representative and heterogeneous corpus. Finally, the method has to take into account the main focus of the approach, which is the linguistic and conceptual variation as the main characteristics of terminological data (see Cabré, 2001b, p. 36).

Cabré (1999a, pp. 12-13) suggests that it is impossible to account for the complexity of terminology with a single theory and that instead a number of integrated and complementary theories are required to deal with the different components of terms. In later works, Cabré (2000a, 2002, 2003a) ventures to propose a model, metaphorically named, “the theory of doors.” “This model attempts to represent the plural, but not simultaneous, access to the object; and in

such a way that, whether starting from the concept or the term or the situations, the central object or terminological unit, is directly addressed” (Cabré, 2003a, p. 186). It claims that the research object of terminology is not the concept, but rather the terminological unit and it emphasizes that each one of the three dimensions (cognitive, linguistic and communicative), while being inseparable in the terminological unit, permits a direct access to this object. Cabré’s proposal sought to try to create the basis for a new, open theoretical model, which allows for the description of terminological units in all their complexity and for their location within a multidimensional linguistic and textual theory.

3.3 Sociocognitive Approach to Terminology

The sociocognitive approach to terminology has its origins in the Centrum voor Vaktaal en Communicatie (CVC), a research group that belongs to the Department of Applied Linguistics of the Erasmushogeschool Brussel. The research group is co-ordinated by Rita Temmerman and its research concentrates on languages for special purposes (LSP). Terminology research carried out by this group focuses mainly on case studies of categorization and naming in the life sciences such as biology, genetics, microbiology, molecular genetics, biochemistry, biotechnology, as well as in social sciences.

Although vaguely defined by Hjørland (2007), the sociocognitive approach to terminology grew out of a strong opposition to the traditional theory of terminology propounded by the Vienna, Prague, and Soviet schools, and to the objectivist premises implied within that point of view. The approach is presented as another solution for the insufficiencies of the traditional theory of terminology. Based on a sociocognitive approach, the terminological reality that the research group of the Centrum voor Vaktaal en Communicatie (CVC) faces in specialized texts is very different from that described by the traditional approach to terminology. In order to carry out a descriptive study, Temmerman (2000b) offers a new methodology, rooted in cognitive semantics.

By analyzing a corpus of scientific texts, Temmerman (2000a) realized that the principles of the Vienna School of Terminology did not account for the terminology of the life sciences. The author’s findings showed some inconsistencies in relation to what was stated by the traditional theory of terminology. First, the majority of the terms were not clearly delineated. Second, very few of these terms were unambiguous; it was not possible to define a concept based on its position in a hierarchical structure or system of concepts. Third, synonymy and polysemy were present. Finally, category and meaning of these terms changed over time. Temmerman’s findings led her to conclude that the traditional terminology impedes a pragmatic and a realistic

description of a large number of categories and terms in the life sciences for which standardization proved to be less essential. Furthermore, traditional terminology principles were not sufficient to establish a realistic description of life sciences terminology (Temmerman, 2000a, p. 58).

Temmerman's criticism of traditional terminology (Figure 6) is directed, first, at its objectivist views in which reality is independent of human understanding. Second, she criticizes its dogmatic nature whereby the application of traditional terminology principles seem to be unquestionable. Third, she criticizes its view of standardization by which it concentrates on making terminology efficient and unambiguous rather than on facilitating subject field communication (Temmerman, 2000b, pp. 16-17). Temmerman (2000b, p. 19), therefore, holds that the scientific study of terminology gets confused with the pragmatic activity of standardization.

Temmerman does research on "the terminology of the life sciences in linguistic contexts, i.e. in textual information" (Temmerman, 2000b, p. 34). The observations were a source of inspiration for defining a descriptive theory of terminology based on sociocognitive principles (see Temmerman, 2000b, p. 16). Temmerman (1998/1999, 2000a, 2000b, 2001) formulated five principles for terminology to replace the traditional ones that were shown to be impractical as they only concentrated on terminological standardization, and not on the realistic description of the meaning of terms in the life sciences. The main principles of this approach reveal a combined semasiological and onomasiological perspective. Two ideas are of particular importance: that synonymy and polysemy play a functional role in specialized languages and that the diachronic approach is unavoidable (Temmerman, 2000b).

The sociocognitive approach is inspired by cognitive semantics and by sociolinguistics. In cognitive semantics, the lexical meaning corresponds to a concept held in the mind and based on personal understanding; in this sense, meaning does not exclusively refer to a thing in a real or possible world as proposed by the traditional theory of terminology. Cognitive semantics "elaborates on the full potential of the interaction between the world, language, and the human mind; and from the insight that the elements of the semantic triangle function in a social setting" (Temmerman, 2000b, p. 61). In sociolinguistics, language is seen as a cognitive instrument and as sociological data in the process of understanding.

The sociocognitive approach aims at offering new principles and methods for analyzing and describing terminological data. Its main support covers textual data and corpus-based scientific discourse. It starts from the unit of understanding (UU); a term assigned "pour désigner les

catégories de structure prototypique et pour les notions clairement délimitables” (Temmerman, 2000a, p. 59), rather than the concept. In general, units of understanding have a prototype structure and are in constant evolution. In the life sciences, categories that do not show prototypical structure are considered concepts as defined by traditional terminology. On the other hand, “units of understanding which show prototype structure are categories” (Temmerman, 2000b, p. 43) which are used in the process of classification.

The sociocognitive approach developed by Temmerman supports a model for category analysis that includes synchronic as well as diachronic accounts for the meaning of concepts. Accordingly, based on an empirical study of categorization and lexicalization processes in a corpus of scientific publications on the life sciences, the approach questions the principles of traditional terminology. As stated by Temmerman, the sociocognitive view “takes a semasiological approach to the study of categories in the life sciences by starting from the terms that designate units of understanding and investigating how these units of understanding and their designations are defined and explained in texts” (Temmerman, 2000b, p. xiv). This view promotes a methodology for concept analysis that reflects how terminology is used within discourse communities. The alternative starting point is not the concept but the term as found in texts written by field specialists (Temmerman, 1997b, p. 53). Three methods of terminology description are used in this approach: prototype structure analysis, cognitive model analysis and diachronic analysis (Geentjens, Temmerman, Kerremans, & De Baer, 2006, p. 10); these methods are part of cognitive semantics as Temmerman (2000b, p. 229) affirms.

From a sociocognitive point of view, terms represent categories, which are as fuzzy and dynamic as those represented by words in general language (Temmerman, 2000b, p. 223). The idea behind this statement is to go beyond what Temmerman defines as the “objectivist structuralist principle” of traditional terminology given that words cannot be held to have meaning objectively but can only be understood in a linguistic communication process (Temmerman, 2000b, p. 42).

Research on sociocognitive terminology started at the end of the 1990s with Rita Temmerman’s doctoral dissertation on terminology and standardization at the Catholic University of Leuven. It focused on language and categorization in the life sciences. The dissertation was published as *Towards new ways of terminology description. The sociocognitive approach* (see Temmerman, 2000b). One of her first articles deals with “questioning the univocity ideal” and stresses the difference between sociocognitive terminology and traditional terminology (Temmerman, 1997a). In the same year, Temmerman published another article on

the process of lexicalization in the life sciences (Temmerman, 1997b). Subsequently, she gave reasons “why traditional terminology impedes a realistic description of categories and terms in the life sciences” (Temmerman, 1998/1999). In 2000, she published an article describing a realistic theory of terminology (Temmerman, 2000a). The book *Towards new ways of terminology description: The sociocognitive approach* (2000b) is the first comprehensive overview of the approach. Afterwards, other presentations and articles have appeared on the topic (Temmerman, 2001, 2003a, 2003b; Temmerman & Kerremans, 2005) and on the methods and applications of the approach (Geentjens et al., 2006; Temmerman & Kerremans, 2003).

In summary, the sociocognitive focuses on the implementation of the sociocognitive theory of terminology (Temmerman, 2000b). Its attention is also centered on studying metaphors, on creating multilingual terminological resources, on studying terminological variation, on developing terminology software, and on working on terminological information for ontology structures. Resulting from the research activities, the group has developed the termontography approach in which theories and methods for multilingual terminological analysis are combined with techniques and guidelines for ontology engineering. The term “termontography” comes from terminology, ontology and terminography. Its purpose is to describe ontologies with (multilingual) terminological information and to structure terminological resources with ontologies.

Temmerman’s work is indicative of the many roads that can be taken when studying terminology. However, it is also pertinent to put into perspective the limited scope of the approach. If one is to believe Temmerman and her emphasis on the insufficiencies of traditional theory of terminology for doing terminological work in the life sciences, then it would be expected that every discipline would require its own theoretical approach to terminology. The methodology is applied to other fields of knowledge such as social sciences among others.

3.4 Cultural Approach to Terminology

Research on the cultural approach to terminology is inspired by the specific situation of African languages and societies mentioned by Diki-Kidiri (2001). Diki-Kidiri (2000b, p. 27) suggests that it is the way to see the world that determines the way people classify, order, name and categorize everything that is perceived or conceived, and in fact their own identity. Diki-Kidiri adds that culture is what conditions the way people perceive the world and that the cultural approach to terminology takes into account that man is the only one with access to the real world through mentally- and culturally- conditioned representations. Because of globalization and the fact that “la langue et au cœur du développement” (Diki-Kidiri, 2008d), the development of scientific terminology in African languages needs an important work in

terminology. This development requires a new working method based on a cultural approach to terminology, an approach that re-evaluates certain aspects of the classic theory of terminology i.e. the Vienna School of Terminology (see Diki-Kidiri, 2008b; 2008c). Cultural terminology has already a rich bibliography and though it differs methodologically from traditional terminology, it is true that Wüster's work is rarely criticised and little cited or mentioned in its publications which may account for why little reference to Wüster or his work is made here. The rejection of classic terminology is basically because it was designed to satisfy the need for technical standardization which was the major challenge at Wüster's time. The cultural approach of more contemporary times looks to the way of living of a group or community for understanding terminology.

The cultural approach to terminology was born from the necessity to manage languages by focusing on their development, especially in Sub-Saharan Africa.

Diki-Kidiri, a linguist from the Central African Republic, living and working in France, and his colleagues Edema Atibakwa and Henry Tourneux, work at the Centre National de la Recherche Scientifique (CNRS). As Diki-Kidiri (2002) holds, the approach considers culture as a set of lived experiences and knowledge generated by a human community that lives in the same space and time and shares the same culture. For that reason, new things, that is, everything that does not comprise the base of experiences and knowledge registered in memory is the reflection of the diversity of cultures as much in space as in time. Man only has access to that real world by means of mental representations, which are culturally conditioned. Similarly, Basey Antia's research interests are in the area of cultural terminology. Antia (2000) and Antia and Kamai (2006) have concentrated efforts on issues regarding terminology and language planning in Africa. Although Antia's research is rooted in the cultural approach to terminology, he does not criticize Wüster's approach. His approach to the development of national languages in Africa as a developing world takes into account cultural and communicative dimensions of terminology in order to provide access to specialized knowledge. Both Antia and Diki-Kidiri began terminology research from a cultural approach at the beginning of the 2000s.

For cultural terminology, neology takes an important place in this process. Suffice it to add here that for Wüster (1979b, 1979c), terminology is defined as the systematic study of designation of concepts. The approach to terminology and specialized languages that provides a theoretical framework for cultural terminology is based on the principles of descriptive linguistics.

In Diki-Kidiri's words (2000b, p. 27), the cultural approach takes into account, in its theoretical foundation and in its working method, socio-cultural, historical, phenomenological

and psychological dimensions, as well as linguistic and technical dimensions. Some fundamental concepts in this approach refer back to the linguistic sign and to the term. The linguistic sign in relation to the signifier and the signified can be arbitrary though it can also be motivated as it becomes a term, that is to say, when the new technical name describes a concept that has previously been analyzed. The term is considered a linguistic sign yet the cultural approach to terminology redefines the linguistic sign as a unit with three components: the signifier, the signified and the concept (Diki-Kidiri, 2000b, p. 29). The difference between the signified and the concept allows the cultural approach to conceive multiple and particular perceptions of the same object. These perceptions are culturally motivated, and as a result, everything is more easily interpreted and easily understood when people share the same symbolic references (see Diki-Kidiri, 2000b, pp. 28-29).

Designation is another important concept in the cultural approach as it entails the study and the analysis of motivation, metaphorization, and word formation. General language and specialized language are also taken into account. In other words, instead of accounting for specialized languages, cultural terminology suggests specialized discourse.

Whatever the object, one can observe diversity in its perception, this happens because there is variety of cultures. Being aware of this diversity, as Diki-Kidiri (1999a, p. 66) states, is the first step for a procedure that leads to the elaboration of a methodology of terminology management.

The cultural approach to terminology has a short but rich history. From 1999, Marcel Diki-Kidiri has published articles dealing with terminology and its relationship to society and culture. The first two articles “La diversité dans l’observation de la réalité” and “Terminologie pour le développement” were published in the book *Terminología y modelos culturales* (1999b), edited by María Teresa Cabré. In 2000, the journal *Terminologies Nouvelles* (Diki-Kidiri, 2000a) concentrated on Terminologie et diversité culturelle where Diki-Kidiri wrote the “avant-propos” and an article describing the cultural approach to terminology. In 2001, an article describing the methodology for the cultural approach to terminology was published in the journal *Actualité Scientifique* edited by André Clas, Henri Awais and Jarjoura Hardane (Diki-Kidiri, 2001). The subject of the issue was “L’élégance de la différence: La voix de l’autre.” In 2002 the first Spanish article on the topic was published under the title “La terminología cultural fundamento de una verdadera localización” (Diki-Kidiri, 2002). The article was presented at the VIII Simposio Iberoamericano de Terminología, *La terminología, entre la globalización y la localización*. In 2007, “Éléments de terminologie culturelle” was published in *Cahiers du Rifal* (Diki-Kidiri, 2007). *Le vocabulaire scientifique dans les langues africaines:*

Pour une approche culturelle de la terminologie edited by Diki-Kidiri (2008a) contains a compilation of research findings and observations dealing with the methodology for cultural terminology.

3.5 Textual Approach to Terminology

In pace with recent developments in corpus linguistics and computational linguistics, terminography practices are now generally carried out through a corpus-based approach (see Aussenac-Gilles & Condamines, 2007). Corpora also provide means to better identify the subject field. In addition, corpora provide links with real-world terminology and make it is easier to illustrate how different contexts allow for term variation.

Without doubt, one of the greatest advantages of working with corpora is that it becomes possible to do linguistic analysis at different levels, i.e., lexical, syntactic and discourse. In this sense, the description of a specialized language and, in particular, its terminology, starts from the study of corpora that contain specialized texts. Indeed, it was the possibility of studying the lexical, syntactic and pragmatic aspects of terms in terminology studies that contributed to the rise of a textual approach to terminology. As L'Homme (2006a, p. 181) clearly puts it, the amount of criticism the general theory of terminology is receiving is due to new proposals that comprise the incorporation of lexical semantics in terminology, work that integrates corpus-based methods and computational approaches. In fact, though corpus linguistics and automatic Natural Language Processing (NLP) are somewhat related and use different methods, scholars interested in corpus and text linguistics have also used NLP in their studies to manage great quantities of textual data in electronic form.

The textual approach to terminology can be defined as a descriptive working method used to explore and describe the textual data collected on a predetermined set of texts in electronic form. Textual terminology is a methodological approach increasingly used for a descriptive analysis of terms in context.

Already in 1994, Auger and L'Homme (1994/1995, p. 19) noted that terminology description and terminological analysis were based more and more on textual analysis with the help of computational tools, and that the study of the lexicon of specialized language focused on lexical, intra-lexical, and extra-lexical aspects of terms. In this way, terminology description started benefiting from the advantages of terminometric analysis (lexical unit frequency). In this sense, the history of the textual approach to terminological descriptive studies is closely linked to the development of natural language processing technologies.

In Europe, particularly in France, linguists have concentrated efforts on doing research on NLP, specifically the construction of terminologies starting from a corpus. Condamines (1995) noted

that “the new needs in terminology have arisen through advances in artificial intelligence and natural language processing” (p. 220). The roots of textual terminology can, afterwards, be placed in the working group Terminologie et Intelligence Artificielle (TIA). The TIA group, which meets every two years, is composed of researchers in linguistics, artificial intelligence and natural language processing, among others. They have organized workshops, meetings and conferences held since 1995. Theoretical and methodological research is published in proceedings in the context of these academic conferences. Formal content represent a variety of subjects such as semantics and corpora, computational terminology, and application-driven terminology engineering. Among the members of the group, people can mention Nathalie Aussenac-Gilles, Didier Bourigault, Anne Condamines, Monique Slodzian, and Sylvie Szulman. According to the members of the TIA group, textual terminology proposes to circumscribe terminology within applied linguistics. It has been implied that the main line of research to be developed within the textual approach should be the linguistic analysis of terminology (see Condamines, 1995). “Linguistic knowledge maybe relevant for making hypothesis concerning conceptual systems, or more precisely, that linguistic knowledge may be used to identify terms, links between terms and concepts, and relations between concepts” (Condamines, 1995, p. 220). In fact, “textual terminology focuses on processing discourse, all categories of linguistic signs must be considered, i.e., not only noun forms, as in most terminological databases, e.g., adjectives, verbs, including those for which the notion of concept seems very abstract” (Condamines, 1995, p. 221). This point of view adopted by the proponents of the textual approach underlines their divergent position with respect to the general theory of terminology.

Advances in terminology extraction over the last years have caused a substantial revision of the “conceptual approach to terminology” as expressed by the Vienna School, mostly in the works of Eugen Wüster. The conceptual approach is viewed by the proponents of textual terminology as directly related to a prescriptive trend in language planning, which in general has neglected the real use of terms in texts. In addition, research conducted on a number of specialized corpora studies has shown by observation that there is diversity in terminologies. For the researchers who adopt the textual approach to terminology (e.g. Bourigault & Slodzian, 1998/1999), “la variabilité remet en cause le principe de l’universalité des terminologies” (p. 30).

The traditional approach to terminology has been called into question by the textual approach to terminology. According to the TIA group, the terminological tradition founded by Wüster in the 1930s made terminology standardization the main goal and the essential application of research in terminology. The TIA group also take exception to the onomasiological approach

to terminology; the idea that concepts are at the center of any terminological study. They disagree with the idea that the work of the terminologist should be the reconstitution of some form of conceptual system in every subject field in order to place terms within that system and establish the corresponding terminologies. Instead, proponents of textual terminology argue that rather than thinking about absolute subject field terminologies, it is appropriate to consider various terminological products corresponding to various types of applications. From this standpoint, the TIA group proposes a terminological analysis that aims at producing a description of lexical structures identified in texts. As can be seen, corpus linguistics is at the core of terminological work. Bourigault and Slodzian (1998/1999) state that the main advantage of the textual approach is that en attribuant au terme la fonction de dénommer les concepts, la terminologie classique privilégie les noms. En s'éloignant de cette approche référentielle très limitative, on est en mesure d'accueillir les autres catégories du discours (verbes, adjectifs, adverbes, prépositions, conjonctions), ainsi que des unités linguistiques plus ouvertes (syntagmes nominaux, verbaux, adjectivaux...). (p. 31)

Consequently, textual terminology moves towards text linguistics considering the text as the point of departure for a terminological analysis. It is a question of building a lexical network by starting from the analysis of real terms in context. That is why Bourigault and Slodzian suggest that "c'est dans le cadre d'une linguistique textuelle que doivent être posées les bases théoriques de la terminologie. ... Le texte est le point de départ de la description lexicale à construire. On va du texte vers le terme" (Bourigault & Slodzian, 1998/1999, p. 30). The lexical network is not considered as a single terminology; indeed, the network is primarily associated with a group of specialized subject-field speakers but also with a particular application. From the point of view of text linguistics, the difference between word and term is not as marked as it is for traditional terminology. The objective is to give texts the place they deserve as they represent the real textual practices of a community of specialists, observes Slodzian (2000).

The methodology used in textual terminology was suggested by the TIA group (see Bourigault & Slodzian, 1998/1999). This approach presupposes that the essential information for terminology construction (terms and relations between terms) can be found in a corpus of texts produced within the field to be studied. The methodology requires that terminology description starts from specialized texts or corpora. The specialized text (oral or written) is the source of terminology work. It constitutes the source of observation and the description of terms. Textual terminology examines terms in context such as polysemy, synonymy variation, neology, syntax and semantic aspects. It also allows term description in graphic, phonic, morphosyntactic, morphosemantic, lexical, semantic, discursive and pragmatic forms. "La tâche d'analyse terminologique vise alors avant tout la construction d'une description des structures lexicales à l'œuvre dans un corpus textuel à partir d'une analyse réglée de ce corpus" (Bourigault & Slodzian, 1998/1999, p. 30).

This methodology is used as the basis for terminology work at the Centre de Recherche en Ingénierie Multilingue (CRIM) which was created in 1986. It belongs to the Institut National des Langues et Civilisations Orientales (INALCO). Broadly, the methodology focuses on the following tasks:

- Creation of a corpus
- Exploration of corpora for terminological acquisition
- Exploration of corpora to find relations between terminological units
- Validation of candidate terms and relations between these candidate terms with a subject-field expert
- Exploration of corpora to detect multilingual equivalents in target languages and validation of these proposals by experts

Currently, corpus linguistics and machine-readable texts are becoming increasingly important for corpus-based terminology extraction. A working method that has already been implemented in Europe and the Americas has adopted an approach characterized by the opposition and criticism to the one suggested by traditional terminology. Among the criticisms of traditional terminology, one can identify the role of the term in the specialized text and the relation between the term and the text. Years ago, Auger and L'Homme (1994/1995), for instance, did not agree with the fact that traditional terminology considers the term as a conceptual unit as opposed to a linguistic unit.

L'Homme (2006b, pp. 61-62) explains that in Canada two research groups place terminology within a “corpus-based paradigm.” Both, the conceptual corpus-based approach followed at the University of Ottawa and the lexico-semantic corpus-based approach established by the Observatoire de linguistique Sens-Texte (OLST) at the Université de Montréal, combine computer applications and terminology and apply corpora and computer tools for research in terminology. Even though textual terminology follows the same corpus-based paradigm, its research concentrates on the linguistic properties of terms. The lexico-semantic corpus-based approach “has deliberately chosen to abandon conceptual analysis and to replace it by lexico-semantic and semasiological approaches very close to those used in lexicography” (L'Homme, 2006b, p. 64). In this regard, L'Homme underlines that “the GTT [general theory of terminology] forms the backbone in most Canadian approaches (except the lexico-semantic approach); other models complement the GTT in order to meet specific needs” (L'Homme, 2006b, p. 66).

Recent advances in computational linguistics and its application to language studies brought changes in terminology practices that allowed mutual enrichment and a questioning of traditional terminology. That traditional terminology does not take into account the text is the salient criticism coming from textual terminology. The increasingly systematic choice of corpora finally makes it possible to see the value of the text as a real communicative event accounting for the linguistic dimension of terms, and the needs of terminology users. Nowadays, professional terminologists can use corpus-based tools to accelerate the terminology analysis process. Concordancers, for example, allow terminologists to collect information from texts about the meaning of terms and how terms are used in specialized contexts. Linguistics can help terminology in this sense because both can use the same mechanisms as the general lexicon to describe terms as lexical units. In textual terminology, the term “description” includes the field expert observations of their own specialized language usage. In that sense, terminologists, in collaboration with field experts, build terminologies.

4. Ángela Campo ’s Conclusion: A Lakatosian Interpretation of the Development of the Modern Terminology

Imre Lakatos (1970 and 1978) outlined a theory of scientific development that bears similarities to those of both Karl Popper (1962) and Thomas Kuhn (1962) and explains the role of criticism in that development. Thus, in order to describe the development of a discipline, it is better to consider the different theories within that discipline as elements of the structure of the program. According to Lakatos’s “scientific research programme” concept, academic fields, including the field of terminology, need to have theories that are broad enough to preserve some kind of coherence within the field. In this sense, knowledge does not necessarily grow when one theory seems to be more successful than others. Instead, he maintained, scientific growth is better understood in terms of a scientific research program (Lakatos 1970: 47).

For terminology, this general scheme of Lakatos is particularly attractive because the discipline can be analyzed as a set of theories and approaches, what Lakatos (1978: 33) considers “[...] a series of theories rather than isolated theories.” The scientific research program supposes a three-dimensional structure composed of a “hard core”, a “protective belt”, and a “heuristic”. These three layers of dialectic organization constitute the terminology research program. The “hard core” includes the basic, essential assumptions of the program; it comprises everything that is fundamental to its existence (Lakatos 1978: 48). In our adaptation of Lakatos’s work, the General Theory of Terminology (GTT) constitutes the hard core of the program because it provides the essential framework of the discipline and contains the general theoretical statements that play a legitimate role in the historical development of this discipline. Therefore, this hard core can turn into a set of guidelines or a set of heuristic principles for the development of the research program. The hard core has a protective belt called the “negative heuristic”. It consists of the tacit and implicit assumption that the hard core of the program must not be modified. The most external layer of the scientific research program is known as the “positive heuristic”, which is represented by the general directives used to explain well-known phenomena or predict new ones (Lakatos 1978: 49-52).

The distinctive characteristic of the terminological research program is its hard core. It is shaped by general theoretical hypotheses that constitute the base from which the program is developed. By using the “program” concept, the discipline of terminology will benefit from these different approaches and theories which tend to cluster and support each other in various ways; they also provide historical continuity despite changes in the status of testable theories. (<https://www.erudit.org/fr/revues/meta/2005-v50-n4-meta1024/019913ar.pdf>)

4.1 Terminology as a Scientific Research Programme

Now it is time to portray terminology as a scientific research programme. In Lakatos’ terms, these new propositions cannot be considered in isolation from their context in the practice of terminology but as components of a research programme. The importance of these terminology approaches with different degrees of guiding hypotheses is to shape the protective belt of the research programme.

A philosophical evaluation of the growth of knowledge in terminology suggests that disciplines begin with general assumptions. Wüster gave considerable attention to the development of a methodology for shaping terminology research. He suggested that by applying systematic procedures, we would be able to make progress. At this point, it should be clear that Wüster’s primary focus was on unambiguous international communication, both past and present. Perhaps the aspect of Wüster’s ideas that most often is found disturbing for his critics is his emphasis on terminology standardization. In general, critics seem unable to get past this issue to look objectively at other features of Wüster’s contribution to terminology. From the critics view, this limiting approach lead to the proposing of new theoretical approaches to terminology.

The current debate in terminology based on positive and interpretive research. This interpretation provides a legitimate place for the criticisms and for the emergence of the new approaches to terminology. In fact, these new terminology approaches are contributing to the development of terminology and are part of a terminology research programme. Ángela Campo’s justification for a terminology research programme is based on criticism, which usually comes in the form of testing hypotheses or theories. Once a hypothesis, a theory or an approach is introduced, it becomes a competing theory. In terminology, it may be difficult to determine which theory or approach is better. Yet, from a positive point of view, progress in terminology has shown that criticism has played an important role in the development of more sophisticated research endeavors. For example, at present there is not just one approach to how to carry out terminology work, but various competing approaches. Some new approaches imply drastic changes for the practice of terminology, at least for everyday terminology practice. Due to the different approaches, various methodologies and conceptualizations of terminology exist. If we look at the situation from an empirical point of view, up to now we do not have convincing empirical findings to demonstrate that one approach is better to explain what terminology as a whole entails nor it is our objective. Much more research is necessary to clarify and to assess the process of competing approaches that are to modify and elaborate new propositions within the terminology programme.

The consideration of the current state of terminology as a discipline, unlike the general theory of terminology, seems to lack a general unifying element. Even within the interdisciplinary theory proposed by Wüster, there are many different approaches to terminology work. The advantage of the scientific research programme is that it underlines the existing multidisciplinary character of terminology. In fact, the same terminology approaches may be seen as research programmes by themselves in their internal structure. In this respect, it is important to highlight that terminology approaches might be complementary and not antagonistic as Lakatos suggest.

Scientific practice is normally built around theories or hypotheses. Some practices are contrary to what the facts show, and yet they are not rejected. The concept of Lakatos’ scientific research

programme is an attempt to bring order to these practices which emerge as what could be the fundamental components of a discipline. Although the summary presented here may seem simplistic, we believe that these practical notes give a good picture of the current situation in terminology. Each scientific research programme consists of four basic elements that can be paired for a better understanding. The hard core (the basics of the programme) pairs with the negative heuristics (paths of research to avoid) and the protective belt (chain of theories and assumptions) with the positive heuristics (paths to pursue). The first part refers to the premises of the discipline and the second, to what can or cannot be done with the elements of the programme. If terminology is a Lakatosian research programme as we suggest, then it should be possible to identify its four elements.

We trace the beginning of terminology as a research programme back to the 1930s. During this period, the programme was formed with the first branch of research proposed by Wüster with the standardization of international terminology based on an onomasiological approach. The explosion of the programme in the present configuration began with the discussion and criticism to Wüster's ideas followed by the emergence of new theoretical approaches to terminology.

As it seems understandable to see terminology as a research program, applying Lakatos' model to terminology may encompass a methodological difficulty. This hard core of terminology is the main characteristic of the programme; it takes the form of some basic general theoretical hypotheses that form the basis from which the programme is to be developed. How does Wüster's work fit into this program? To overcome the problems facing international scientific and technical communication, Wüster proposed an interdisciplinary field of study with a theoretical methodology based on logics, ontology, information science, linguistics and other sciences. The research agenda that emerged from Wüster's general proposal generated an analytical response, which set the ground for the hard core of the programme and for future research.

"The research programme also has a 'heuristic', that is, a powerful problem-solving machinery, which, with the help of sophisticated mathematical techniques, digests anomalies and even turns them into positive evidence" (Lakatos, 1978, p. 4). In terminology, the negative heuristic refers to recommendations to the scientific community focussed on keeping the elements of the hard core. It states that falsifying a theory should not affect the elements of the hard core just mentioned. For any disagreement between facts and theory there may be a new assumption in which the elements of the hard core are kept unchanged. This is exactly what the new approaches to terminology have done so far. They have proposed new points of view about terminology but the main elements of the programme are stable.

The protective belt refers to the elements around the hard core that may be changed without substantially affecting the main characteristic of the programme. The protective belt of terminology is a flexible set of auxiliary hypotheses rearranged and readjusted as directed by the positive heuristic, i.e., a series of theories or approaches that share the same hard core as the program. Current terminology may not have a universal theory but a set of approaches with widely differing basic assumptions concerning terminology methodology. Clearly, such differing assumptions cannot form the basis for a coherent research programme but for a protective belt surrounding the hard core of the programme (see Lakatos, 1978, p. 4). New theoretical approaches are accommodated adapting the "protective belt" of auxiliary hypotheses to the new theoretical and methodological needs. That is why according to practical needs, this protective belt is expanded, customized and updated each time a new approach is needed. The belt works as a buffer in which the required adaptations are made (see Lakatos, 1978, pp. 48-50). The protective belt of terminology consists of terminology approaches, namely, socioterminology; sociocognitive terminology; communicative terminology; textual terminology, and cultural terminology.

Table 1. Terminology as a Scientific Research Programme

The hard core	The academic discipline that studies the concepts and terms used in specialized languages, a set of theories and methodologies, and finally, a set of terms, such as in the machine tool terminology.
The negative heuristics	The recommendations to the scientific community indicating to keep the elements of the hard core. New approaches have proposed new points of view about terminology but the main elements of the programme are stable.
The protective belt	Terminology approaches, namely, socioterminology; sociocognitive terminology; communicative terminology; textual terminology, and cultural terminology.
The positive heuristics	<p>Articulated set of suggestions to approach terminology:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Linguistic view including a social and a cognitive perspective <input type="checkbox"/> Social and descriptive viewpoint taking into account terminology variation <input type="checkbox"/> Cognitive sciences concentrating on understanding the nature and development of specialized language <input type="checkbox"/> Methodological perspective to examining corpus of specialized texts in order to extract data for describing definitions, terms and concepts <input type="checkbox"/> Language planning position aiming to facilitate the acquisition of new knowledge and new technology

Given that two heuristics guide terminology researchers to situations in a developmental programme keeping the hard core intact, “the positive heuristic consists of a partially articulated set of suggestions or hints on how to change, develop the ‘refutable variants’ of the research programme, how to modify, sophisticate, the ‘refutable’ protective belt” (Lakatos, 1978, p. 50). As supported by Chalmers (1999, p. 135) the importance of the positive heuristic is emphasized in the programme because it determines the degree to which the programme is organized to

guide future investigations; therefore new theories and approaches ensure some type of success in upcoming research(see table 1).

Since modern terminology is composed of approaches that have developed a terminology programme, we may ask, how do new terminology approaches contribute to the program? What, exactly, is their contribution? Generally speaking, all approaches have struggled to advocate new paths for terminology research. For example, the heuristic of the communicative approach to terminology has offered a linguistic view including a social and a cognitive perspective (see Campo & Cormier, 2005). Socioterminology has proposed a social and descriptive viewpoint taking into account terminological variation; its methods are applied to the study of general language. The sociocognitive approach has suggested a perspective from the cognitive sciences concentrating on understanding the nature and development of specialized language. The textual approach has recommended a methodological perspective consisting of examining corpus of texts produced by experts in order to extract significant data for describing definitions, terms and concepts. Finally, the cultural approach has advised a language planning position aiming at facilitating the acquisition of new knowledge and new technology for people while maintaining their cultural heritage.

As it is better explain in Lakatos' terms, "the positive heuristic sets out a programme which lists a chain of ever more complicated models simulating reality: the scientist's attention is riveted on building his models following instructions that are laid down in the positive part of his programme" (Lakatos, 1978, p. 50). At this time, it is important to note that the hard core and the positive heuristic represent the program; they comprise the criteria for identifying the program. In this sense, the development of a research programme can be represented as a sequence of successive changes, each of which arises from the pioneering ideas of Wüster by some theoretical modification performed in the protective belt.

In brief, what do the new theoretical approaches mean for terminology? These different approaches in the growth of terminology should be acknowledged. Previously, Budin (2001) proposed a critical evaluation of state-of-the-art of terminology theory from the perspective of the philosophy of science. The importance of his study for our project lies in the idea of a construction of a "cluster of theories" in terminology, as Budin (2001, p. 20) suggested. His view is closely related to our proposal as this cluster of theories may be seen as a scientific research programme. Moreover, criticism should be recognized as a legitimate means to contribute to the growth of knowledge in terminology. This is how a significant amount of knowledge in the field of terminology has developed. Finally, recognition should be given to the fact that each approach is based on the theory and practice of terminology. With this in mind, has the debate on the reception of Wüster's work been solved? Perhaps not right away. Nevertheless, an indication on how the reception of Wüster's work needs to be reinterpreted in light of the growth of knowledge in terminology based on scientific research programmes has been offered. This is an avenue to confront the emergence of new theoretical approaches and therefore a more positive view of terminology than the one proposed by Toft and Picht (2001) with terminology at the crossroads.

4.2. Terminology: A Progressive Research Programme?

It now remains to demonstrate that terminology is a progressive research programme. According to Lakatos (1978, pp. 33-34), a research programme may be progressive or degenerating. As previously mentioned, a programme is progressive when it is both theoretically and empirically progressive. If a programme is not progressive, then it is said to be degenerating. In Lakatos own words, "a research programme is said to be progressing as long as its theoretical growth anticipates its empirical growth, that is, as long as it keeps predicting novel facts with some success" (Lakatos, 1978, p. 112).

The methodology of scientific research programmes upon which we focus our attention is Lakatos' criterion for appraising scientific progress. The condition of progress requires that

changes within a programme be at least theoretically progressive and that empirically progressive modifications be accomplished. In this sense, a particular problem is explored that terminology researchers face in trying to build a coherent body of knowledge. This problem of how knowledge grows provides a central question that underlies the development of terminology as a research programme where systematic criticism plays a crucial role. With the aim of appraising terminology as a research programme in Lakatosian terms, Ángela Campo started by placing modern terminology in its historical context, i.e. the social, economic and academic conditions that have marked the setting for terminology and have had an impact on its relevance. Advances in disciplinary and technological knowledge also reflect progress in terminology as the new approaches have benefited from the developments made in related disciplines as Wüster's once envisaged.

Eugen Wüster provided the first formal body of knowledge with the basic texts for the consolidation of modern terminology. Since his time, terminology has evolved in response to certain problem situations and has been shaped by the criticism of his terminological ideas. The change has been a continuing process which is not complex to understand in Lakatosian terms. Explicitly, the appraisal of modern terminology as a research programme must address three basic issues.

First, there is a relationship between the elements of the hard core and the hypothesis of the protective belt. In modern terminology, each approach has attempted to subscribe to the elements of the hard core of the programme. Socioterminology explores terminology in its social context to analyze the usage, which theoretically implies placing terminology at a sociolinguistic level. The sociocognitive view focuses on a methodology for analyzing and describing concepts that are used within discourse communities. The communicative approach to terminology concentrates on terminological variation, harmonization, term usage in texts, and terminological application design. The textual approach to terminology analyses terms in corpus of scientific and technical texts (oral or written) to extract conceptual and terminological description. The cultural approach to terminology studies terminology to enrich Sango towards a cultural development in the African French-speaking world.

Second, there are empirical findings new terminology approaches account for. Theoretical approaches to terminology have emerged over the years and numerous explanatory works have been carried out with the aim of providing new methods for terminology work. The information gained by means of terminology research comes from many disciplines. "Examples include cognitive psychology, cognitive linguistics, theories on the evolution of languages,

knowledge ordering (e.g. ontologies), classification and representation and the ever-increasing host of electronic tools for terminology research and management” (Antia et al., 2005, p. 4).

Third, certain empirical facts are predicted by the new approaches. Since the main indicator of the success of a research programme is the successful prediction of novel facts, we now go on to briefly present important novel facts in terminology. It is through continuous research that terminology approaches have unveiled novel facts. It has been shown that terminology provides a more explicit understanding and description of specialized language with the introduction of new disciplines. In the beginning, it was thought that terminology was to standardize international terminology. Nowadays, it has found other applications such as facilitating the process of human-machine interaction, translation memory systems, artificial intelligence, ontologies and knowledge representation, automatic processing of multilingual terminology, to cite just a few in the field of technology. Research has also revealed novel facts about the development of national languages such as language planning in the case of French Africa and linguistic policies in some other regions.

Through interpretation of the issues above, we outline the procedure that terminology has used in its explanation of terminological data, and argue that it qualifies as a progressive research programme. Every approach to terminology is linked to the elements of the hard core. The empirical findings demonstrate, in a variety of new terminological settings, the possibilities that exist for innovative research. Terminology has made novel predictions in Lakatos’ terms, demonstrating a clear trend towards interdisciplinary challenges. In this regard, the key aspect of the development of terminology is that its progress has been the result of a sequential internal growth in the programme. In other words, the protective belt, with a positive heuristic, generated the approaches to terminology meant for further theoretical and empirical progress.

As our understanding of terminology deepens, and as advances in science and technology develop, other terminological approaches may well be adapted to serve as a theoretical basis for conceiving a more sophisticated research program. In this sense, terminology is “theoretically progressive” because the theories or approaches to terminology, guided by the positive heuristic, have generated new theoretical content and have predicted new facts. In addition, “the Infoterm Symposia organized in 1975, 1981, 1991 and 1998 can be viewed as milestones in the development of the subject field” (Infoterm, 2004, p. 11). It is also “empirically progressive” because the practical and descriptive content generated by the new approaches is supported by observed facts, that is to say, the concrete terminological data analyzed in real communicative situations.

To sum up, terminology is a progressive research programme. It certainly requires revision, extension and refinement. Despite the obvious and incontestable progress, which it has only been possible to outline here, only a small selection from the available body of knowledge that already exists has been made. Through the new terminology approaches, terminology is perfectly capable of guiding terminology researchers theoretically and empirically and must remain open to new approaches. “It must also be said that future developments are beset by a number of problems, to which no adequate solutions have as yet been proposed” (Picht, 1994/1995, p. 155). One essential issue that needs to be addressed is the formulation of a wrapping framework capable of accommodating the new approaches which have become known over the past 20 years in such a manner as to incorporate them into one complete theoretical structure. In this sense, we agree with Laudan (1977, p. 68) that progress is achieved within a discipline when a series of theories suggest increasing problem-solving techniques.

5. Conclusion and Some added information by the Author

Actually, today, there is a consensus worldwide that three figures dominate the literature of modern terminology. In Eastern Europe, Ernest Drezen and Dmitrij Semënovič Lotte and in Western Europe, Eugen Wüster. The first historical foundations of modern terminology started simultaneously in Austria with Wüster, and in Russia with Drezen, Lotte ,three engineers considered the fathers of modern terminology, as pointed out by Picht (2007).

As the auothor knows, today in Spain, Prof.Pamela Faber, who is a famous American/Spanish linguist ,is best known for her cognitive theory of Terminology called Frame-Based Terminology.She holds the Chair of Translation and Interpreting at the Department of Translation and Interpreting of the University of Granada since 2001.Frame-Based Terminology is a recent cognitive approach to Terminology developed by Pamela Faber and colleagues at the University of Granada. It was conceived within the context of the Functional Lexematic Model and Cognitive Linguistics.

Frame-Based Terminology focuses on:(1).conceptual organization;(2).the multidimensional nature of terminological units; and (3).the extraction of semantic and syntactic information through the use of multilingual corpora.

Within this context, Faber's current major project is called EcoLexicon, a terminological knowledge base on the Environment.(<https://hal.archives-ouvertes.fr/hal-01180280>)

Besides, in France, prof.Christophe Roche, the Head of the Condillac Research Group on “Terminology & Ontology” – LISTIC Lab. University Savoie Mont-Blanc (France), and the Chairman of the TOTh Conference("International Terminology and Ontology:Theories and Applications" Conference),as well as the Chairman of the AFNOR Commission on Terminology (X03A),the Project Leader of the ISO Standards on Terminology (ISO 1087-1 & ISO 704), is

also famous for his “Ontoterminology” :“The new paradigm of ontoterminology, i.e. a terminology whose conceptual system is a formal ontology, emphasizes the difference between the linguistic and conceptual dimensions of terminology while unifying them. A double semantic triangle is introduced in order to link terms (signifiers) to concept names on a first hand and meanings (signified) to concepts on the other hand. Such an approach allows two kinds of definition to be introduced. The definition of terms written in natural language is considered as a linguistic explanation while the definition of concepts written in a formal language is viewed as a formal specification that allows operationalization of terminology”(https://hal.archives-ouvertes.fr/hal-01180280).

The above-mentioned new trends in the modern terminology should also belong to “the protective belt” of this Scientific Research Programme for Modern Terminology which Ángela Campo advocated, both (and other inspiring terminology trends , which have emerged ,are emerging and will emerge) serve as the positive heuristics too.No doubt ,they will bring much more useful nutritions into our robustious Terminology.

We expect the more and more brilliant future of the development of Terminology, as a discipline ,and as a practice.

(Note: This article is a summary or a brief selection on the basis of Canadian scholar Ángela Campo’s dissertation titled “The Reception of Eugen Wüster’s Work and the Development of Terminology” .After reading through it, I found it is very useful for Chinese readers to konw how Terminology developed as a discipline. Here I also like to share it with readers here.

If readers want to read this dissertation in detail, please click here:

https://papyrus.bib.umontreal.ca/xmlui/bitstream/handle/1866/9198/campo_angela_2012_these.pdf?sequence=2)

References:

Please see :

(https://papyrus.bib.umontreal.ca/xmlui/bitstream/handle/1866/9198/Campo_Angela_2012_these.pdf)

and

“"The Role of the Communicative Approach in the Development of Terminology"

<https://www.erudit.org/fr/revues/meta/2005-v50-n4-meta1024/019913ar.pdf>

