



Trends Research ENabler for Design Specifications



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Procedure for the extraction of sociological and design trends through the web Workpackage 2 - Task 2.2

This document explains how to find Web sources (URL) according to sectors of influence defined by Conjoint Trends Analysis experts.

Acronym	TRENDS
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1 GENERAL INTRODUCTION

This document presents the deliverable D2.2 *Procedure for the extraction of sociological values with the list of specific web sources*. In order to explain this procedure, the context of WP2 is described in the following part.

1.1 WORK PACKAGE 2 OBJECTIVES: DESIGN OF THE SYSTEM ARCHITECTURE

The objective of WP2 is to develop and validate the methodology and procedures for the Conjoint Trends Analysis (CTA). The work develops along a panel of tasks to set up procedures and techniques required obtaining the sectors of influence as outlined in the following diagram. Relevant sources of inspiration and influences will be extracted at this stage, and the corresponding procedure will be explained. The inspirational process is considered as essential for the generation of creative solutions. The CTA method is based on considering that there is an underlying structure in designer information process which can be defined.

The application of the Conjoint Trends Analysis method will allow identifying the key elements and links for the software architecture definition. On the other side, general outlines of the interface design elements will be proposed in this work package in coherence with architecture and the needs analysis results.

To design the TRENDS software architecture, the work package activities will include:

- To elaborate an initial sociological and design trends database.
- To define a procedure for the identification of the sectors of influence.
- To define a procedure for the identification of the websites for the extraction of sociological and design trends.
- To define a procedure for the mono-sectorial mappings realization.
- To define a procedure for the ambience realization.
- To define a procedure for the pallets realization.
- To define a procedure for the statistics realization.
- To define interface graphic design specifications.
- To design the software architecture of the TRENDS system software presenting sociological and styling trends.
- To validate the software architecture with end users.
- To define the choice of the communications protocols and data transfer functions, protocols and structures.
- To define elements that will be used: computer, processors, programming language.
- To review technologies and artificial techniques to explore and test.
- To define general scheme of possible algorithms to search.
- To define general scheme of algorithm for intelligent web crawling.

1.2 DESCRIPTION OF WORK TASKS T21 AND T22

This report is related to the first phase with the following tasks of WP2:

- T2.1. Definition of the sectors of influence from an initial sociological and design trends database
- T2.2. Definition of a procedure for the identification of the websites

The first phase including T2.1 and T2.2 begins with an investigation about specific lexical information from websites showing the evolution of sociological values. From these results relevant sectors of influence can be identified and new websites found as sources for the image extraction. One of the deliverable resulting from the tasks T1.1 and T1.2 is the deliverable D2.2 *Procedure for the extraction of sociological values with the list of specific web sources*, which is presented in this report.

1.3 STRUCTURE OF THE REPORT

This report summarizes the different procedure to extract the sociological and design trends through the web. Part 2 introduces the Conjoint Trend Analysis Method from which all these procedures originate. It shows especially that the Conjoint Trends Analysis includes three phases which are the following:

Phase 1: Definition of the sectors of influence

Phase 2: Trends identification and formalization

Phase 3: Trends integration in the design project

In fact the procedure to extract the sociological and design trends is limited to the first phase of the CTA method. This phase will be detailed according to 2 approaches: the first one is the traditional manual procedure (Manual CTA method) while the second one is the new digital procedure leading to the sociological and design database (Digital CTA method).

2 INTRODUCTION TO THE CONJOINT TRENDS ANALYSIS

The design process consists in reducing abstraction through the use of various successive levels of representation integrating increasingly numerous constraints. We consider it is mainly based on the four following phases : (1) information, (2) generation, (3) evaluation and (4) decision, occurring more or less sequentially.

The information phase in industrial design activity is a crucial part of the whole design process. Designers integrate many categories of information that will be gradually formalized as design solutions throughout the design process. The information and data integrated by the designer can be categorized into project information and designer's own information including sources of inspiration, references and influences. Sometimes these are dominating over the information connected to the problem. Sources of inspiration come from previous designs (precedents) and other sources of inspiration named *sectors of influence* in the context of *Conjoint Trends Analysis method*.

The novelty of the design solutions mainly depends on this part, and on the manner to integrate this information during the generation phase too. The information process and especially the sources of inspiration have a major impact on defining the context for new designs, on design thinking by stimulating creativity, on structuring designers mental representations of designs and finally on showing and arguing the generation of individual designs.

Designers could be helped throughout their information gathering activity, because they have to manage and to categorize a huge amount of data during the information phase. That is the purpose of the TRENDS project.

2.1 PRESENTATION OF THE CONJOINT TRENDS ANALYSIS METHOD (CTA) [1]

Designers cognitive activity in the earliest phases of design was studied. The study outputs enabled the modelling of the Conjoint Trends Analysis method. The Conjoint Trends Analysis method makes it possible to enrich and to inspire the designers when designing a new product. It is positioned in the earliest phases of the design process, as follows:

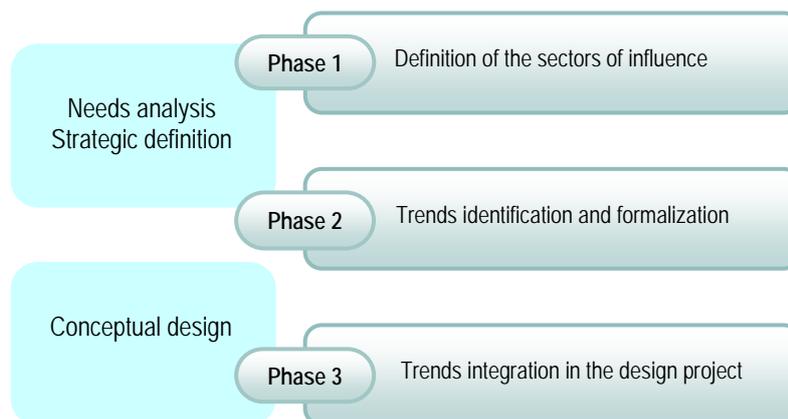


Figure 1: Position of the Conjoint Trends Analysis in the design process

This approach enables the identification of formal attributes linked to particular environments in order to use them in the early design of new products. More precisely, it involves the formalization of trend boards showing sociological, chromatic, textural, formal, ergonomic and technological trends through mainly visual information. The Trend boards are iconic compositions that enable to communicate a homogeneous atmosphere both in terms of style and consumers' sociological values. Particularly they highlight coherent representations with harmonies. Images and values words are selected and formalized under the form of *ambiances*. Global and discrete design elements are then extracted from these ambiances under the form of *pallets*. Then design elements are used for the generation of new design solutions.

The trend board offers a relatively exhaustive representation of the references usually used by the designers for their composition and plays an important role in stimulating idea generation while anchoring contextual matter. It reinforces the link and semiotic coherence between the consumers end values, functionalities in any domains of influence, and products attributes as form, colour, texture, and usability principles. Another purpose of the trends analysis is to define user-convenient principles and solutions that can be integrated in future products. Indeed designers often have to provide new designs using insufficient information about consumers. Trend boards show ambiances including people in context. Contexts are decisive in the attribution of a signification to the object.

The originality of the approach lies in the identification of sociological end values and in the use of various domains of influence in order to enrich the design solution space. The Trend Boards result from an investigation and formalization process. This process consists in gathering contextual information used for the composition of boards. These boards are worked out from iconic representations (reference products, sectors or context images) made up in such a way that visualisation of the board enables the observer to become impregnated with a formal impressionist synthesis also called *harmony*, *atmosphere*, or *ambiance*. This process facilitates the mental representation of contexts for imagining the future design solutions.

In conclusion, Conjoint Trends Analysis process sorts information into boards which can be digitised and regularly updated within the framework of a follow-up process. The results of trends studies are used either directly by the project team to conceive future product attributes, or used as arguments in favour of pre-conceived solutions. It is also a communication tool used in the project team or between the latter and the management team, or for external communication (distribution in press kits, sales brochures, trade fairs, etc.).

2.2 OVERALL PROCEDURE OF THE CONJOINT TRENDS ANALYSIS (CTA) METHOD

The trends analysis proceeds in the three following phases:

Phase 1: Definition of the sectors of influence

Fields of influence are worked out from an observation of the reference product, its environments, and the targeted population with its values;

Phase 2: Trends identification and formalization

This phase consists in gathering and selecting the relevant iconic sources for defining contexts before to categorise them into clusters; then the relations among the illustrations of a category are highlighted by the composition and a qualitative description and the generation of palettes;

Phase 3: Trends integration in the design project

Harmonies are extracted from the palettes and used in order to generate new designs (shape, colour, usage and texture elements in conjunction with the initial perceptual field).

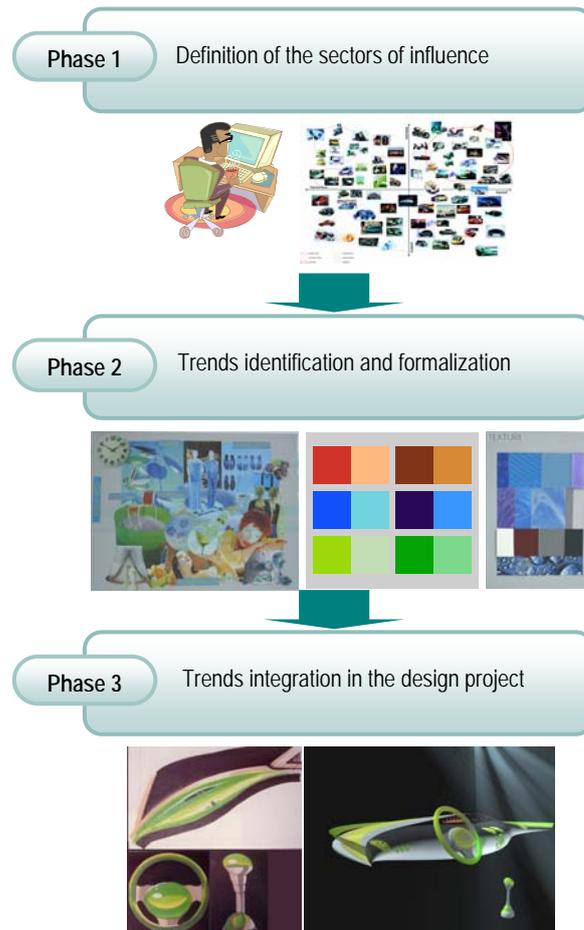


Figure 2: The three phases of the Conjoint Trends Analysis method

2.3 BENEFITS AND LIMITATIONS OF THE CONJOINT TRENDS ANALYSIS METHOD

2.3.1 Benefits

- The Trend board represents a powerful representation tool valuable to designers to identify, investigate and represent chromatic, formal, textural, or usability fields so as to understand their structure. It helps to position therein the options open with the generation of new concepts, to develop harmonies and styles. It reinforces the semiotic coherence between the end values of the consumers, the functionalities from any domains of influence, and the future products attributes.
- Contexts are decisive in the attribution of a signification to the object. The fact that the concept is in harmony with its context adds not only to its merely semantic contribution but also to its aesthetic contribution.
- The Trend boards constitute a visual synthesis of many sources of inspiration, enriching the generation of design solutions. This synthesis plays a major role in design, especially for the innovative side of the to-be-designed products.

2.3.2 Limitations

- The validity of Multi-sectorial Trend Analysis data depends on the replacement and update of developed tools. The follow-up approach is therefore important. Information originating from the achieved follow-up process is centralised, capitalized and redistributed using current Information Technology media (Web, CDROM, Database management systems, etc.).
- In the Conjoint Trends Analysis, current activity of information research integrates routine tasks which are manually and intuitively done. Some of them are laborious, time consuming, and provide incomplete results. The design watch activity, as the technological watch, is never exhaustive.
- Information gathering is currently done punctually when the need arises, and through a limited manner by a reduced (in time and space) and time consuming human treatment. A continuous and systematic watch tools from the Web could help the design team to gather the right words and images in order to improve the overall method.
- Need to transfer an empirical discipline to a computerized tool.

3 PROCEDURE FOR THE DEFINITION OF THE SECTORS OF INFLUENCE (PHASE 1 OF MANUAL CONJOINT TRENDS ANALYSIS (MCTAPH1))

3.1 INTRODUCTION TO THE PROCEDURE FOR THE DEFINITION OF THE SECTORS OF INFLUENCE

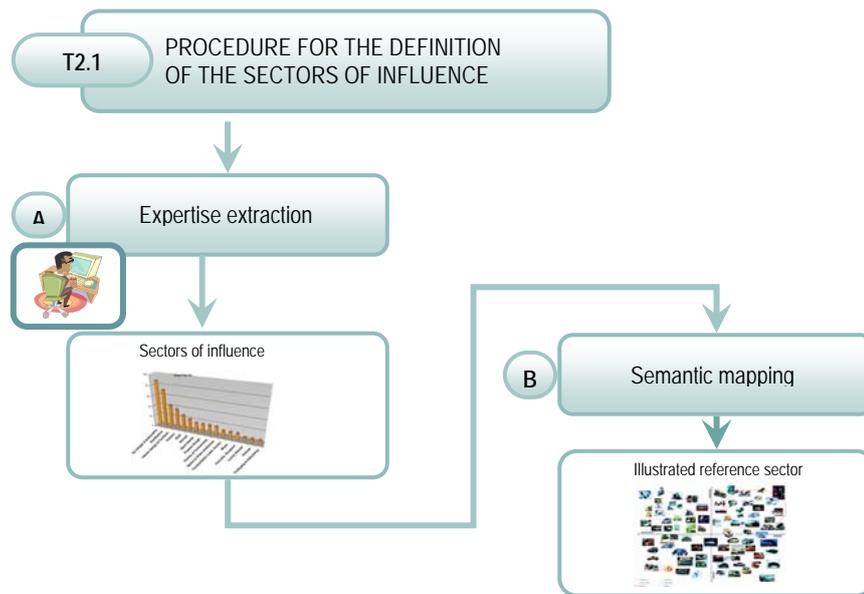


Figure 3: Procedure for the definition of the sectors of influence

The sociological values highlighted by the marketing departments in a particularly study, provide a strong initial orientation for the identification of sectors of influence. Then two complementary approaches were defined by LCPI¹ in order to define the sectors of influence:

A - The *extraction of expertise* by the designers, targeted on the inspiration sources they use and their process of integration in the design process. This part consists in analysing expert knowledge acquired by stylists and designers, by considering trends as their presumed sources of inspiration;

B - The *semantic mapping*: this second part entails the analysis of the iconic content, by considering trends as the result of intentions planned through the product.

In fact the second approach of *semantic mapping* is recommended in the framework of the Conjoint Trends Analysis method because of its efficiency in relative reduced delays. However, in TRENDS WP1, the first approach *extraction of expertise* was done. It is more appropriate in the case of an generic exploratory context without any particular project's brief.

¹ Laboratoire Conception de Produits et Innovation / Product Design and Innovation Laboratory

4 PROCEDURE FOR IDENTIFICATION OF WEBSITES, DATABASE ELABORATION, AND EXTRACTION OF SOCIOLOGICAL VALUES (PHASE 1 OF DIGITAL CONJOINT TRENDS ANALYSIS (DCTA PH1))

4.1 INTRODUCTION TO THE PROCEDURE FOR THE DEFINITION OF WEBSITES AND DATABASE ELABORATION

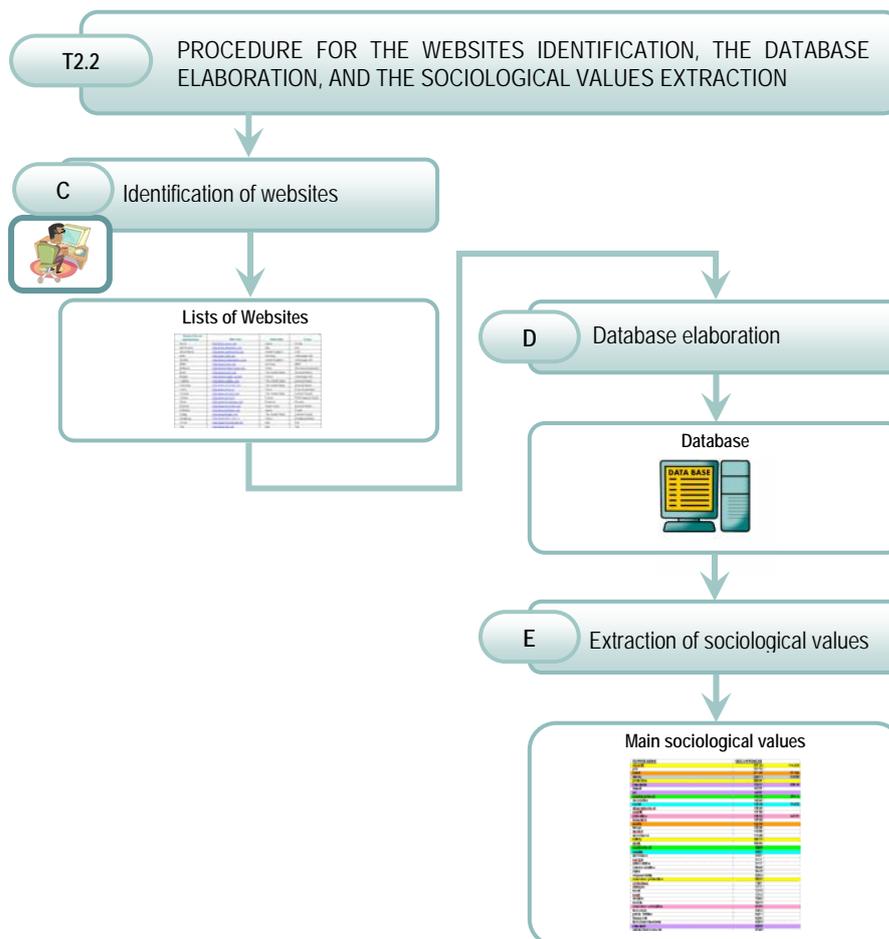


Figure 4: Procedure for the definition of the websites, database elaboration and extraction of sociological values

The two main following steps have been identified for the extraction of sociological and design trends through the Web:

C - The *identification of websites* by Conjoint Trends Analysis experts, from the sectors of influence. This part consist of identifying relevant websites using keywords from the sectors of influence, that correspond to the requirements of the CTA in terms of image quality and nature of contents;

D - The *database elaboration*: this part falls within the competence of the data processing specialists. It consists of gathering the content of the database from the internet using software called a *crawler*. This software explores the list of websites that have been previously pre-selected by the CTA experts. Then it makes a local copy of the sites: *html* pages and images are copied on the

computer's hard drive.

E - The *extraction of sociological values*: this part comes in complement to the images search. In fact, as it was confirmed in WP1, designers use keywords including *low level features*, *semantic adjectives* and *values words* in the sense of sociological values. In fact information about sociological values can be of great interest for the designers in defining the consumer needs. Some specific supports like advertising pages are extremely rich because they are able to show all these levels on the same support at the same time (keywords + images). The Conjoint Trends Analysis method recommends the investigation of the strongest current sociological values according to sociological studies found in specific bibliography. In the perspective of a digitalisation of the method, it seems interesting to use the advantages of the World Wide Web in order to gather relevant information about the evolution of sociological values on specialized websites. This can be an efficient way of gathering information about the consumers that will make easier for the designers to link the different levels. That is the purpose of this sub-procedure. The identification of strong sociological values can further help in linking the three previous levels (*low level features*, *semantic adjectives* and *values words*).

5 CONCLUSION

This report presented the required procedure for the extraction of sociological and design trends through the web. A first part was dedicated to the presentation of the first phase of the Conjoint Trends Analysis method: the definition of the sectors of influence. In fact this phase provides the relevant input data for the elaboration of the database.

Then a second part illustrated the proposal of new procedures aiming to digitalize the first phase of the CTA method through mainly three steps and sub-procedures:

- the identification of websites
- the database elaboration
- the extraction of sociological values

In fact the first encountered problems at this stage are linked both to the huge size of the final database, and to the difficulty to extract sociological values from lexical content without context. Improvement solutions for the overall system optimisation of the TRENDS system will be provided in the next steps.

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8 GLOSSARY

Sectors of influence

Sector of influence are all the industrial, artistic or natural sectors that are used for the transfer of some formal and functional attributes into the reference sector. For instance the *biomorphism* is a key sector of influence for car design.

Conjoint Trends Analysis method

The Conjoint Trends Analysis method is a scientific approach allowing to identify and describe design trends through the investigation of sectors of influence with respect to the reference sector.

Ambiences

Ambiences named atmospheres or environments in the context of trends analysis are iconic compositions of images revealing a coherent space including homogeneous, coherent in terms of style and consumers' sociological values and harmonic formal contents. The *ambiance* includes images, values words and semantic adjectives. It is entitled with a specific name of trend like *aquabio*.

Pallets

Pallets in the context of trends analysis summarize global and discrete design elements extracted from the ambiances under the form of *pallets*. They highlight the main harmonies being present in the ambiances. Pallets show concrete attributes that can be used for the generation of design solutions.

Consumer values

Values are our subjective reactions to the world around us. They guide and mould our options and behaviour. They are linked to beliefs of a person or social group in which they have an emotional investment (either for or against something); "he has very conservatives values". Values are principles, assumptions, convictions, or beliefs, abstract ideas and ideals accepted by some individual or group.

The values of the consumers guide their choices in their everyday life. They can have a great impact on the acceptance or reject of specific design solutions.

Semantic mapping

The semantic mapping is a planar representation of a set of models in a reference sector, according to two reference axis limited by semantic adjectives and their antonyms. The semantic mapping gives a semantic description of the different models in the 2D space.

Content analysis

The method of content analysis enables the researcher to include large amounts of textual information and identify systematically its properties, e.g. the frequencies of most used keywords (KWIC meaning "KeyWord In Context") by detecting the more important structures of its communication content. Yet such amounts of textual information must be categorised according to a certain theoretical framework, which will inform the data analysis, providing at the end a meaningful reading of content under scrutiny.

Reference sector

The reference sector is the sector in which the initial design has to be done. For example in our case in the TRENDS project the sector of reference is car design.

Semantic adjectives

Semantic adjectives are specific words frequently used by the corporation of designers in order to describe visual low level features according to feelings or emotions in front of a specific visual stimulus. They often use

metaphoric references in other sectors. For example the front face of a sport vehicle can be described as aggressive like a snake face.

Principal Component Analysis

In statistics, principal components analysis (PCA) is a technique for simplifying a dataset. It is a linear transformation that transforms the data to a new coordinate system such that the greatest variance by any projection of the data comes to lie on the first coordinate (called the first principal component), the second greatest variance on the second coordinate, and so on. PCA can be used for dimensionality reduction in a dataset while retaining those characteristics of the dataset that contribute most to its variance, by keeping lower-order principal components and ignoring higher-order ones. Such low-order components often contain the "most important" aspects of the data. But this is not necessarily the case, depending on the application.

Crawler

Web crawler (also known as a web spider or web robot) is a program or automated script which browses the World Wide Web in a methodical, automated manner. Other less frequently used names for web crawlers are ants, automatic indexers, bots, and worms (Kobayashi and Takeda, 2000).

This process is called *web crawling* or *spidering*. Many legitimate sites, in particular search engines, use spidering as a means of providing up to date data. Web crawlers are mainly used to create a copy of all the visited pages for later processing by a search engine, that will index the downloaded pages to provide fast searches. Crawlers can also be used for automating maintenance tasks on a web site, such as checking links or validating HTML code. Also, crawlers can be used to gather specific types of information from Web pages, such as harvesting e-mail addresses (usually for spam).

URL

A Uniform Resource Locator (URL) is a string of characters conforming to a standardized format, which refers to a resource on the Internet (such as a document or an image) by its location. For example, the URL of this page on Wikipedia is http://en.wikipedia.org/wiki/Uniform_Resource_Locator. An HTTP URL, commonly called a web address, is usually shown in the address bar of a web browser. The term is typically pronounced as either a spelled-out initialism ("yoo arr ell") or as an acronym (*earl* or *ural* as in the *Ural Mountains*).

HTTRACK

HTTrack is a free and open source website copier and offline browser by Xavier Roche licensed under the GNU General Public License. It allows you to download one, or a set of World Wide Web sites from the Internet to a local directory, building recursively all directories, getting HTML, images, and other files from the server to your computer. By default, HTTrack arranges the original site's relative link-structure. Simply open a page of the "mirrored" website in your browser, and you can browse the site from link to link, as if you were viewing it online. HTTrack can also update an existing mirrored site, and resume interrupted downloads. HTTrack is fully configurable by options and by filters (include/exclude), and has an integrated help system.

Morpho-lexical analysis

The objective is to retrieve the studied word as it appears in the text (we speak about the shape) in the lexicon and to recover all the related descriptive information. For instance, if we speak about *horses*, this step will allow to associate the following properties : common masculine plural name, coming from... Possible meanings: for doing this, a cross request is done in the lexicon depending on different criteria.

Hyperonyms/hyponyms

A word is a hyperonym if its meaning encompasses the meaning of another word of which it is a hyperonym; a word that is more generic or broad than another given word. To achieve the meaning without a loanword, consider German *Oberbegriff*, lit. "Overconcept" thus "superterm". Therefore, another term for a hyperonym is a superordinate. For example, *vehicle* denotes all the things that are separately denoted by the words *train*, *chariot*, *dogsled*, *airplane*, and *automobile* and is therefore a hyperonym of each of those words. A hyperonym is the opposite of a hyponym. For example, *plant* is hyperonymic to *flower* whereas *tulip* is hyponymic to *flower*.