

Towards an Electronic Specialized Dictionary for Learners

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Abstract

This paper describes the strategies devised in order to convert the *DiCoInfo*, *Dictionnaire fondamental de l’informatique et de l’Internet*, a specialized lexical database, into a learners’ dictionary. Our main goal is to obtain a user-oriented dictionary (i.e. that meets specific user needs). Firstly, we defined the types of users towards which our dictionary is targeted: translation students are our first intended users. Then we determined the use situations and the functions of our dictionary: it should provide assistance in communicative and cognitive situations (Tarp, 2008). We made several changes to adapt the data categories of the DiCoInfo to these functions and user needs. In addition, we simplified the presentation: layout, display of data categories, access to data and addition of multimedia. In this user-oriented version, the data is presented in such a way that users who do not have a background in linguistics can easily interpret the contents of the data categories. Finally, different technologies were integrated in the process and hopefully contribute to make the new version even more accessible.

Keywords: electronic dictionary; learners’ dictionary; specialized dictionary; dictionary functions; user needs

1. Introduction¹

Many studies on online general learners’ dictionaries contribute to better understanding the needs of users and to design more efficient reference tools (Dziemianko, 2010; Lew, 2012; Lew & de Schryver, 2014). However, little research has focused on specialized electronic dictionaries and few specialized dictionaries for learners have been published up to now (a few notable exceptions are Pyne & Tuck, 1996 and Binon et al., 2000). We believe that students studying translation and technical writing require dictionaries to help them in vocabulary acquisition, but also to assist them when reading, translating or producing specialized texts. However, many questions remain unanswered: What are the properties of a specialized learners’ dictionary? What should a specialized learners’ dictionary look like in order to meet specific user needs?

This paper describes the method developed in order to convert an existing specialized lexical database into a learners’ dictionary taking into account specific categories of users

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and predefined use situations. Furthermore, we devised different strategies to present the data in a more user-friendly and simple way.

The lexical database for which this work was undertaken is the *DiCoInfo*, *Dictionnaire fondamental de l'informatique et de l'Internet* (hereafter DiCoInfo), a multilingual database that contains basic terms from the fields of computing and the internet. In previous work, user-friendly displays and access routes were designed for specific data categories (collocations, Jousse et al., 2011; actantial structures, L'Homme, 2014b). However, this work affected only parts of the articles. The new interface described herein is based on a work carried out by Marjan Alipour in her Master's dissertation (Alipour, 2014) who analyzed the entire structure of the DiCoInfo and devised a user-oriented dictionary based on the theory of lexicographical functions (Bergenholtz & Tarp, 2003; Tarp, 2008). We also took the opportunity to explore the potential of using new technologies to ensure that our user-oriented and user-friendliness objectives were met.

The paper is organized as follows. Section 2 gives a brief description of the contents of the DiCoInfo. Section 3 gives more details about the types of users we target and the cognitive and communicative situations that the DiCoInfo is now designed to meet, and describes the rationale behind each change made to the original interface for creating a user-oriented version.

2. The DiCoInfo

The DiCoInfo is an online specialized resource that contains English, French, and Spanish terms related to computing and the internet [En. *browse*, *configuration*; Fr. *naviguer*, *configuration*; Es. *navegar*, *configuración*]. It describes terms that belong to various parts of speech: nouns [*email*, *printer*], verbs [*download*, *print*], adjectives [*dynamic*, *virtual*] and adverbs [*dynamically*, *online*]. Currently, the DiCoInfo contains approximatively 1,100 entries in French, 850 entries in English, and the Spanish version is under development. The content data is encoded in XML files (stored in an eXist database) and converted using customized XSLT stylesheets into HTML pages so that it can be published on the Internet (Jousse et al., 2011).

Articles that are completed have the following data categories (L'Homme, 2014a, b):

- *Headword*: The lemma associated with a sense number.
- *Grammatical information*: The part of speech, along with gender (for nouns in Spanish and French) and government pattern (for verbs).
- *Status*: The degree of completion of the entry, the editing is completed or still ongoing.
- *Actantial structure (AS)*: The actants and their semantic role are defined.

- *Definition*: A statement of the meaning of the headword, where actants (labeled with semantic roles) are highlighted with different colors.
- *Synonyms and variants*.
- *Contexts*: Three sentences are displayed to show how the term is used in specialized texts. In some entries, up to 20 contexts are annotated and users can access them on demand.
- *Lexical relations*: A list of terms that share paradigmatic relations (antonyms, other parts of speech, derivatives, etc.) and some syntagmatic relations (those that are described in the category labeled *Types of*).
- *Combinations*: A list of terms that share syntagmatic relations with the headword (mostly verbal collocates).

The DiCoInfo is original when compared with other specialized dictionaries since most of them are conceptual in nature and give encyclopaedic information (for instance, the *Dicofr.com* provides definitions and, in some cases, additional explanatory notes). Resources seldom provide information on syntagmatic and paradigmatic relations between terms of the domain. Unlike these resources, the DiCoInfo provides a complete description of the lexico-semantic properties of terms. In addition to providing definitions², the DiCoInfo supplies information about their linguistic behaviour, such as a statement of the actantial structure in which the semantic actants are labeled with a system of semantic roles (Agent, Patient, etc.) and typical terms (L’Homme, 2010; 2014a, b).

Example: Actantial structure³ for *keyboard*

a keyboard: ~ used by **user**_{1{Agent}} to act on **command**_{1{Patient}}, **data**_{1{Patient}}

In addition, as was mentioned above, the DiCoInfo describes the multiple relationships between terms, which can be paradigmatic (e.g. synonyms or near-synonyms [Ex. *browse: surf*], antonyms [Ex. *download: upload*], word families [Ex. *boot: bootable, reboot*], etc.) or syntagmatic (i.e. collocations [Ex. *document: save a ~; attach a ~*]) (L’Homme, 2010). These relationships are encoded with lexical functions (LFs) based on Explanatory and Combinatorial Lexicology (Mel’čuk et al., 1984–1999; 1995) and further described with a natural language explanation.

² Several French entries contain definitions. In English, this data category is available only for approximately 100 terms for the time being.

³ In the DiCoInfo, two systems are used to label the actants. First, a typical term is supposed to be indicative of the kinds of terms that can be used to instantiate an actant. Then, semantic roles (such as Agent, Patient, Destination, Instrument) indicate the relationship between the actant and the term. When users hover the mouse over a typical term (e.g. *user*₁) in the definition or the actantial structure, a tooltip pops up to show its role (e.g. Agent).

Finally, a set of sentences (up to 20) are extracted from specialized corpora and added to entries. These sentences are annotated based on the methodology developed in FrameNet (Ruppenhofer et al., 2010). Annotated contexts allow users to visualize how headwords combine with actants (and also non-obligatory participants) in real texts.

Originally, the DiCoInfo was designed as a research tool for exploring the potential of lexical semantics frameworks to account for the linguistic properties of terms. Little effort had been made to adapt it to user needs. Later on, work was carried out to simplify the presentation of specific data categories, namely collocations and actantial structures (Jousse et al., 2011; L’Homme, 2014b). This previous work showed that we could take advantage of the contents of the entries while presenting parts of them in a more user-friendly way. In addition, we could change the way the data is presented without affecting the initial structure of the database entries or the encoding methodology followed by lexicographers. However, we did realize that much more could be done to simplify the presentation of entries (change the overall display of data categories, keep the linguistic metalanguage in the background, take advantage of new technologies, etc.).

All these characteristics certainly contribute to making the former version of the DiCoInfo a rich resource. First, terminologists and lexicographers browse it to explore the linguistic properties of terms and use it as a means of formalizing hypotheses on them. We also believe it could prove useful for other users, such as translators, whose work often requires access information on the behaviour of terms in specialized texts (L’Homme, 2014a). But is all the information supplied in the DiCoInfo relevant for non-expert users who do not necessarily have a background in linguistics or in lexicography? Is the presentation of the data adapted to their needs? In fact, we think that the data contained in the DiCoInfo can be useful for students in translation and technical writing since it describes the functioning of terms in texts. However, we also believe that some data should be presented in a different way in order to facilitate their understanding and increase their usability. Next, what about the metalanguage used in the DiCoInfo? In fact, this metalanguage can be quite opaque for users such as translators. For example, lexical functions (LFs) are represented with labels that can be difficult to decipher for anyone who is unfamiliar with them, not mentioning the fact that some labels may be very complex (e.g. **IncepReal**₁: “to start using”; **FinReal**₁: “to stop using”; **Caus**₁**Able**₁**Func**₀: “cause something to be able to occur”). An alternative solution was required for this metalanguage in order to make the dictionary more user-friendly and efficient for our types of users. The strategies devised for this purpose are described in the next section.

3. Strategies Developed for the Conversion of the DiCoInfo

To develop our conversion method, we first determined the types of users and use situations of our dictionary based on the system of lexicographical functions (Bergenholtz & Tarp, 2003; Tarp, 2008; Fuertes-Olivera et al., 2012). We then explored different ways to adapt the data categories of the DiCoInfo to these functions. One of our objectives was to use all the information available in the resource, but present it in such a way that would readily meet the needs of specific users. Finally, we used various available technologies (mostly from the *jQuery UI* framework, Sarrion, 2012) to implement these changes in the new version interface that we think is now more dynamic and responsive.

3.1 Types of Users and Use Situations

The dictionary is intended for French, English and Spanish users who are not experts in the domain of computing and the internet. More specifically, the main targeted users are, on the one hand, translation students and translators who have little experience in this field; and terminologists or terminographers, on the other hand. Other users such as proofreaders and technical writers are also targeted.

We aimed to design a learners' dictionary that could provide help for understanding, producing, or translating specialized texts: these situations are related to communicative situations as defined in Tarp (2008). In addition, the dictionary should be helpful for acquiring knowledge about factual or linguistic matters related to the lexicon of computing. This latter situation corresponds to cognitive situations as defined in Fuertes-Olivera and Nielsen (2012). These functions (presented in more detail below) are based on previous work by Leroyer (2013) who defined lexicographical functions for the former version of the DiCoInfo.

1. Communicative Functions and Use Situations

- Translation of texts: In this situation, the dictionary should assist with translating technical terms and collocations. For example, users who want to translate a text about browsers from English into French may look up the entry *browser*. Then, not only does the DiCoInfo provide a French equivalent, i.e. *navigateur*, it also provides translations for the word family [Ex. *to browse*: *naviguer*; *browsing*: *navigation*], and for different kinds of browsers [Ex. *user-friendly browser*: *navigateur convivial*]. In addition, the information helps users to correctly handle collocations [Ex. *run a browser*: *lancer un navigateur*].
- Reception of texts: In this situation, the dictionary should help users solve problems related to the understanding of terms and expressions while reading texts.

For example, while reading a text on *cables*, users might have to distinguish between a *female connector* and a *male connector*.

- Production of specialized texts: In this situation, the dictionary assists users in solving problems while producing texts. Thus, they can learn how to express an idea correctly by using the exact collocation. For example, they will learn how to produce a phrase with a specific verb and select the right preposition (Ex. *connect a computer to the internet with a cable*).
- Editing and proofreading texts: In this situation, the dictionary can help solve problems that arise while editing or proofreading a text. Users, for example, may identify an erroneous usage of a word or a collocation with the help of information supplied by the dictionary. Thus, if the collocation *disconnect from the Internet* is translated into French as *déconnecter de l'Internet* (that contains errors in the verb usage and the structure of the collocation), they will be able to correct it to *se déconnecter d'Internet*.

2. Cognitive Functions and Use Situations

- Learning terminology of computing: In this situation, users can browse the dictionary in order to acquire knowledge about linguistic matters related to the field of computing.
- Systematic study of the field of computing: In this situation, users can consult the dictionary in order to meet occasional information needs, for preparing a translation for example.

3.2 Changes Made in the DiCoInfo

Once the functions of the dictionary were determined, we then compiled a list of changes to be made to obtain a user-oriented version. The modifications were suggested according to two parameters: simplifying the presentation and ensuring that the functions of the dictionary were fulfilled. After analyzing the former version of the DiCoInfo, we identified two broad categories: 1. Information that already meets the targeted user needs as defined in Subsection 3.1, and thus that should be kept as is; and 2. Information that should be used but displayed in a different way or placed in the background. Modifications were made at several levels: to the interface and its layout, to the data categories, and to the organization of data inside data categories. It is worth mentioning that all the changes mentioned in this paper apply without distinction to all language content, but that some data category contents in English and Spanish have not yet undergone all the changes. Hence the examples given are in French; English translations are provided when possible.

3.2.1 Changes Made According to the First Parameter: Simplification of the Presentation

a. The Homepage

Since the DiCoInfo is designed as an online dictionary, we were able to take advantage of various electronic media for presenting and organizing the data in a clearer and more user-friendly way. The interface of the former DiCoInfo was basic; therefore, efforts were made to improve the attractiveness, simplicity and conciseness of the new version (Figure 1).

b. The Search Interface

In the new version, a much simpler search field than that of the former version was implemented (as can be seen in Figure 1).



Figure 1: Homepage of the former version (above) and new version (below)

An auto-completion search field was added: when two characters are entered, a list of suggestions corresponding to the terms of the DiCoInfo is displayed. Users then select the term they are looking for and the system retrieves the corresponding entry. The interface still provides the possibility to filter the search results by means of options, but in the new version, icons are used to group and present them. Therefore, users can narrow down the search results according to the language, the search mode (a term, a lexical relation, etc.), or the precision level (exact term, term beginning with a specific substring, expression containing substring, etc.). A simple click on the corresponding icon is required to display the options (Figure 2).

c. The Content Layout

In the new version of the DiCoInfo, the interface was adapted to make it more intuitive; data categories are now presented on tabs, a mode that appears to be preferred by users (Müller-Spitzer et al., 2012). These tabs are organized according to data categories along ribbons (Figure 3). Users can navigate easily from one tab to the other to obtain the information they need according to specific use situations. In addition, to allow users to readily visualize what information is contained in each tab, we changed some of the tab names that were rather technical and could be confusing. For example, *Autres parties du discours et dérivés* (En. Other parts of speech and derivatives), was changed into *Famille de mots* (En. Word family).

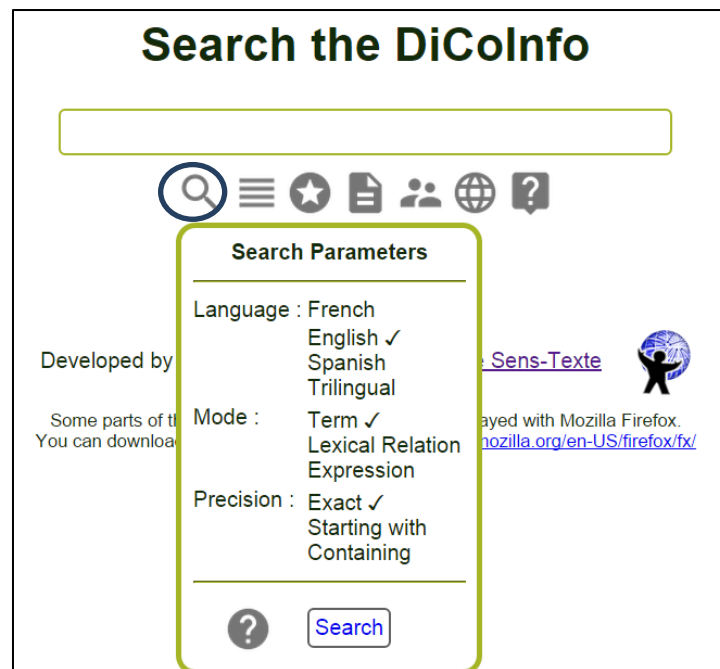




Figure 2: Search options

d. Other Features

In order to ease the search process, we implemented a help dialogue explaining all the options by means of a help icon  (Figure 2). In addition, to make the content data more readable and understandable, we added information dialogues on each data categories ribbon. A simple click on the corresponding information icon  displays an explanation about the specific data category (Figure 3).

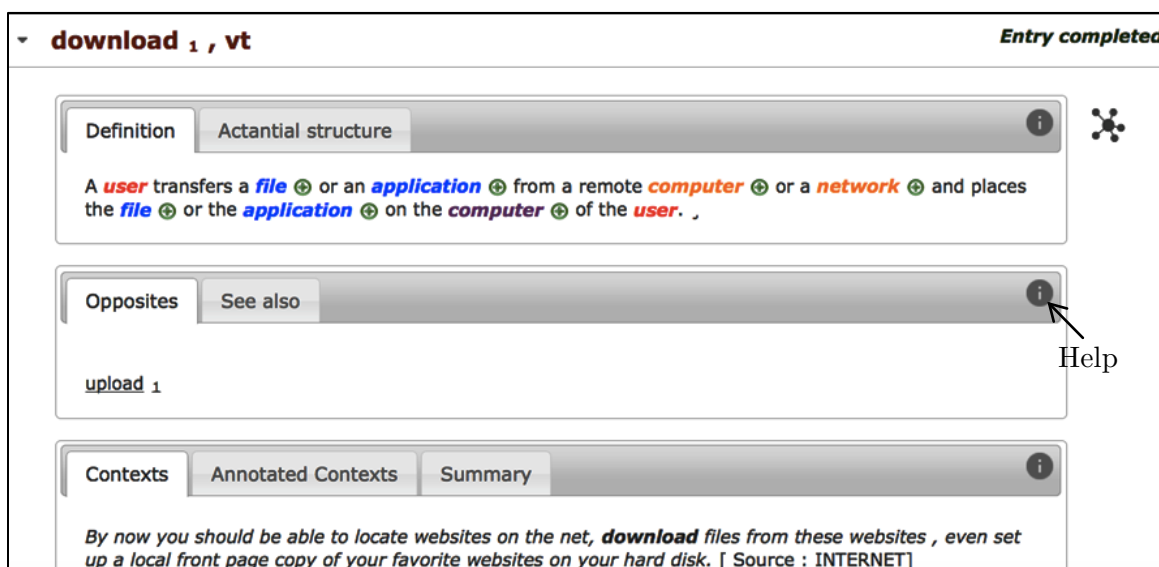


Figure 3: System of tabs in the new version

3.2.2 Changes Made According to the Second Parameter: the Functions of the Dictionary

In this section, the changes made according to the lexicographical functions of the DiCoInfo (described in Subsection 3.1) are explained.

a. Modifications in the Presentation of Data Categories

Since we wanted users to find answers to different problems related to communicative or cognitive situations quickly and efficiently, the presentation of certain data categories was revised.

- *Headword*

The presentation of the headword has changed (Figure 4). The information that is considered essential in communicative situations is summarized when entries are first retrieved. Figure 4 shows the summary given after the search for *Web*.

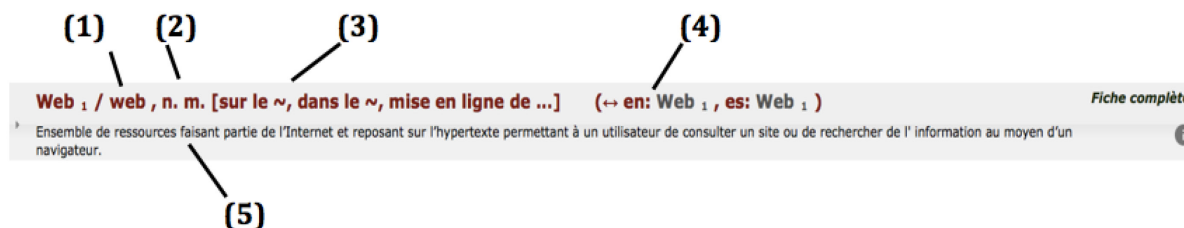


Figure 4: Summarized headword display

As seen in Figure 4, the following information is provided: variant forms of the headword [*Web/web*] (Figure 4:1), grammatical information (Figure 4:2), constructions with prepositions [*Web: on the ~*] (Figure 4:3), and translation equivalents (Figure 4:4). In fact, the variant forms, the constructions with prepositions, and the equivalents are presented immediately so users do not spend time searching for them inside the articles. The constructions with prepositions information, for example, allow translators to see immediately what are the typical prepositions to use with a specific term. The definition (or the actantial structure when no definition is yet available) is also shown to present the meaning of the term (Figure 4:5).

Former version →

clavier ₁, n. m.

un clavier : ~ utilisé par *utilisateur* ₁ pour intervenir sur *commande* ₂, *données* ₁ ⊕

Définition : Périphérique utilisé par un *utilisateur* pour entrer des *données* ⊕ dans un ordinateur ou envoyer des *commandes* ⊕ à l'ordinateur.

Synonyme(s) : clavier d'ordinateur, clavier informatique

Contextes

Liens lexicaux

Combinatoire lexicale

New version →

clavier ₁, n. m. [au ~]

Définition Structure actancielle

Périphérique utilisé par un *utilisateur* pour entrer des *données* ⊕ dans un ordinateur ou envoyer des *commandes* ⊕ à l'ordinateur .

Synonyme(s) Voir aussi

clavier d'ordinateur, clavier informatique

Contextes

Pratiquement tous les portables disposent de connecteurs qui permettent de recevoir un moniteur et un clavier en externe . [Source : PCEX96]

Si les paramètres font ici généralement appel à des combinaisons de touches et si le **clavier** apparaît un peu mou à notre goût, l'ensemble se distingue par une ergonomie poussée [Source : PCEX96]

La partie la plus à gauche est le bloc des touches de fonctions . Celles-ci sont numérotées de {F1} à {F10}. À l'autre extrémité on retrouve le **clavier** numérique ou le **clavier** curseur (touches de déplacement du curseur). [Source : MSPCDOS1]

Famille de mots Sortes de Autres liens

Utiliser / Ne pas utiliser

Figure 5: Data category display for *clavier* (En. *keyboard*) in the former version (above) and the new version (below)

- *Data category display*

We also considered the way data categories should be displayed on the page. Once again, decisions were made according to the usability of data in communicative and cognitive situations, and users' profiles. Thus some changes were made in the new version (Figure 5).

The data categories *Definition*, *Synonyms/Opposites* and *Context* are opened by default. The reason for this is to provide some assistance to users who might be unsure about which term to use in a specific context (e.g. in case of synonymy), and how to use it. These data can help them to understand, produce or translate a text (communicative situations). They can also become familiarized with the meaning of terms (cognitive situation). In addition, these data categories do not contain a lot of information, which would otherwise overload the page. Thus we decided to make them appear opened by default.

Some questions arose about the way that the *Actantial structure* data category was presented in the former version (see Section 2): the actants being already available in the definitions, this data category became somehow redundant. In addition, as our users are not expert in linguistics, the way the statement was displayed (with actantial roles and isolated typical terms) might be confusing. After careful consideration, we opted to keep it as a formal alternative to the definition. Thus the tab presenting the actantial structure is placed on the same ribbon as the *Definition* data category and is presented opened to users only if no definition is available. Otherwise, it is placed in the background, so users are able to access it if necessary⁴ (Figure 6).



Figure 6: *Definition* and *Actantial structure* display for *blogue* (En. *blog*) in the former version (above) and new version (below)

⁴ For terms that do not yet have a definition, the *Actantial structure* data category is displayed automatically.

The *Lexical relations* data category (word families, hypernyms and collocations) contains information that should provide help for understanding, producing and translating texts (communicative situations), as well as in mastering the computing terminology (cognitive situations). However, this section contains a considerable amount of information that could also overload the content presentation. Thus the tabs that contain these data categories are not displayed on demand. The organization of lexical relations will be described in the next section. Furthermore, we changed the title of some data categories (*Related meaning* to *See also*) or simply removed them (e.g. *Lexical relations*); again to avoid confusing users with technical metalanguage.

Lexical functions			LF
Explanation	Lexical function	Related term	
Related Meanings			
≈	QSyn	document 1	
Other Parts of Speech and Derivatives			
Exploite un ensemble de f.	[Meta]	métafichier	
Dans un f.	Loc-in	dans un ~	
Types of			
Que l' <i>utilisateur</i> vient de créer	Hypo - Situation	nouveau ~	
Qui a une durée limitée	Hypo - Durée	~ temporaire	
Qui est de grande taille	MagnTaille	gros ~ ~ lourd	Former version
Qui est de petite taille	AntiMagnTaille	petit ~	
Qui peut être utilisé	Able2Real@	~ lisible ~ éditable 1a	
Qui ne peut pas être utilisé	AntiAble2Real@	~ illisible	
Un f. qui n'est plus en mesure de fonctionner adéquatement	A2Caus@Degrad	~ corrompu 1	
<div> Word family Types of Other lexical relations </div>			
<div> ▶ Forme / Format / Taille </div>			
<div> ▶ État </div>			
<div> ▶ Fonction / Utilisation </div>			
<div> ▶ Fonctionnement / Performance </div>			
<div> ▼ Tout </div>			
Explanation	Related term		
Que l' <i>utilisateur</i> vient de créer	nouveau ~		
Qui a une durée limitée	~ temporaire		
Qui est de grande taille	gros ~ ~ lourd		
Qui est de petite taille	petit ~		
Qui peut être utilisé	~ lisible ~ éditable 1a		
Qui ne peut pas être utilisé	~ illisible		
Un f. qui n'est plus en mesure de fonctionner adéquatement	~ corrompu 1 ~ endommagé 1		

Figure 7: Lexical relations displayed for *fichier* (En. *file*) in the former version (above) and the new version (below)

As mentioned in Section 2, the relationships between terms are encoded by means of LFs and the labels used to do so can be quite opaque. We thought about the relevance of this information for the targeted users. We consider that while LFs are useful for describing and organizing lexical relations, their labels are difficult to decipher. So we still use them during the encoding process, but hide them in the online version. Therefore, users can find assistance to translate a collocation or a phrase correctly (communicative situations) without being confused by abstract formulae (Figure 7).

- *Data organization*

As mentioned in Section 2, the DiCoInfo lists the numerous lexical relations that exist between the headword and other terms. Related terms are listed in a table (Figure 7). Explanations of the relationships are presented in the left column that describes the LFs (Mel'čuk et al., 1984–1999; 1995). We decided to reorganize the lexical relations, i.e. the collocations and the *Types of data* category (e.g. *key: backspace; Enter ~*).

The procedures for organizing both these data categories are similar. Concerning collocations, previous work had been carried out for classifying them (L'Homme & Leroyer, 2009; Jousse et al., 2011). The solution implemented for collocations consisted of a system of classes in which specific collocations were classified according to their general meaning. For instance, all verbal and deverbal collocates expressing typical uses of an object denoted by a term are placed in a general class called UTILISER/NE PAS UTILISER (En. USE/NOT TO USE). Instead of having all collocates presented at once, users can select the class that is closest to the meaning they wish to express (USE, CREATE, MOVE, and so on).

We used the same general principles to classify the different items appearing under the *Types of data* category. In the previous version of the DiCoInfo, the list of terms was very long, and without a specific organization scheme. In order to facilitate the accessibility of these data, we classified the related terms according to a system of classes defined in L'Homme & Jia (2015). The LFs are used to define our system of classes, and again they are not displayed in the online version: users only have access to the explanation in natural language. First, we group the related terms into *intermediate classes* (IC); then *generic classes* (GC) are defined in which we group the intermediate ones (Figure 8). It should be noted that for the time being these changes have been applied only to the French version, thus the examples are given in French.

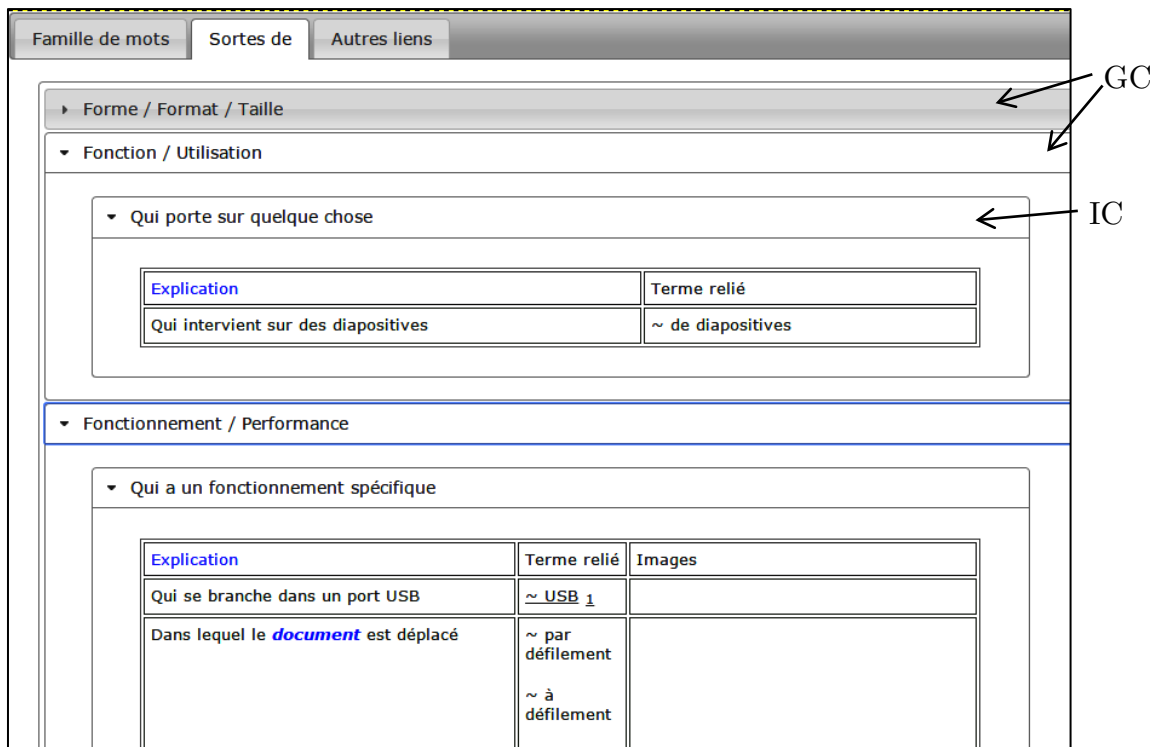


Figure 8: Generic (GC) and intermediate classes (IC) for *numériseur* (En. *scanner*)

As shown in Figure 8, in the new version, we set up a system of accordions that consists of collapsible content panels for presenting the semantic classes. Thus, nested accordions are shown according to the lexical links found in an entry. At the top level, accordions corresponding to the *generic classes* are listed. When expanded, each accordion panel shows in turn inner accordions that correspond to the *intermediate classes*.

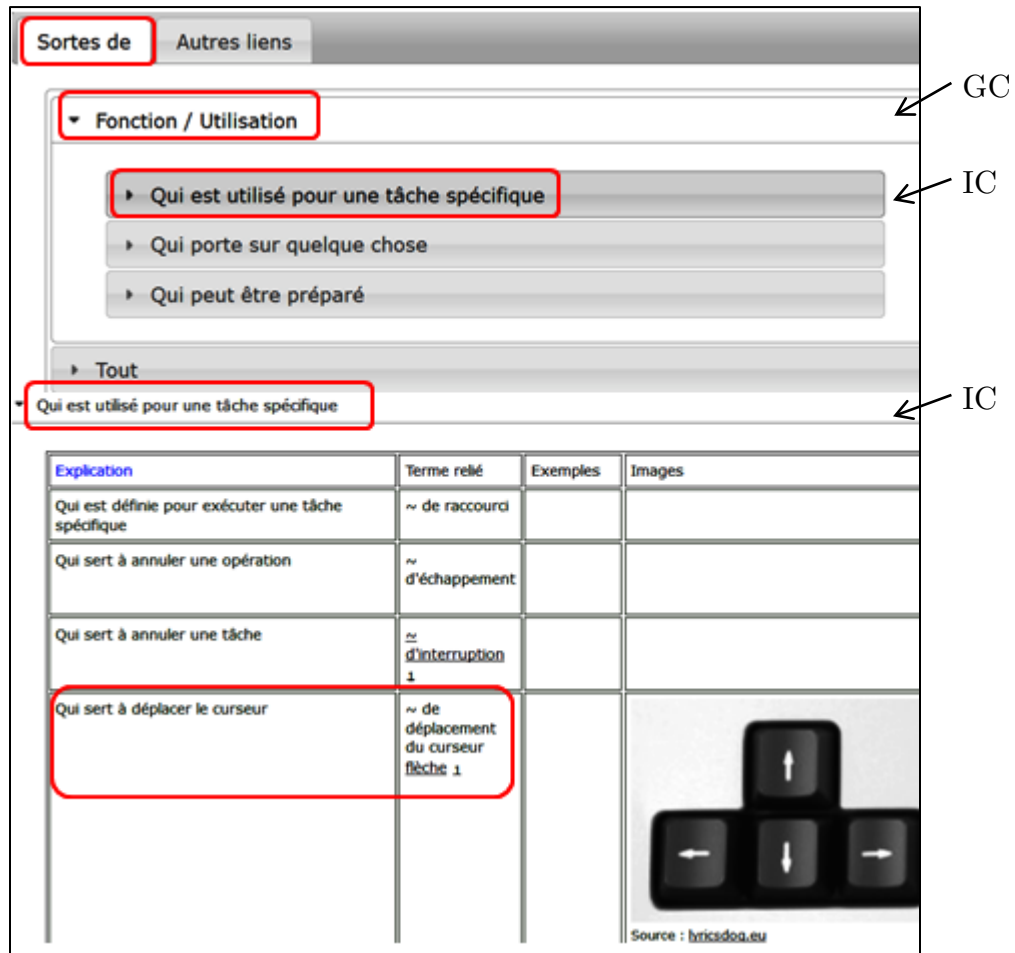


Figure 9: Navigation through the *Types of data* category

In this way, users may look up a related term by considering its meaning, e.g. FONCTION/UTILISATION (En. FUNCTION/USE); FORME/FORMAT/TAILLE (En. FORM/FORMAT/SIZE); MODE DE FONCTIONNEMENT (En. FUNCTIONING MODE), etc. We will illustrate the way users can access a related term with the example *touche* (En. *key*). In this example, it is assumed that a given user wishes to find the French translation of *arrow key* and that he has to go through these four steps (Figure 9):

1. Activate the SORTES DE (*Types of*) tab in the *touche* (En. *key*) entry.
2. Expand the accordion corresponding to the generic class FONCTION/UTILISATION (En. FUNCTION/USE).
3. The accordion containing the intermediate class UTILISÉ POUR UNE TÂCHE SPÉCIFIQUE (En. USED FOR A SPECIFIC TASK) is already opened (i.e. not collapsed) since there is just one item to display.
4. By means of the explanation “Qui sert à déplacer le curseur” (En. “That is used

to move the cursor”), the user accesses the right expression *touche de déplacement de curseur* followed by its synonym *flèche*.

b. Addition of Multimedia

Since “images enhance textual comprehension and complement the linguistic information provided in other data fields” (Faber et al., 2006: 757), pictures were added to some entries (Figure 10). In addition it has been demonstrated that images have a positive effect on vocabulary acquisition (Lew, 2012), and become very useful in cognitive situations. The terms for which they were added represent concrete objects (i.e. *keyboard*, *mouse*, *printer*, etc.). Some pictures were also added within the entries and associated with some related terms in the *Types of data* category (*Key: arrow ~*) (Figure 9).

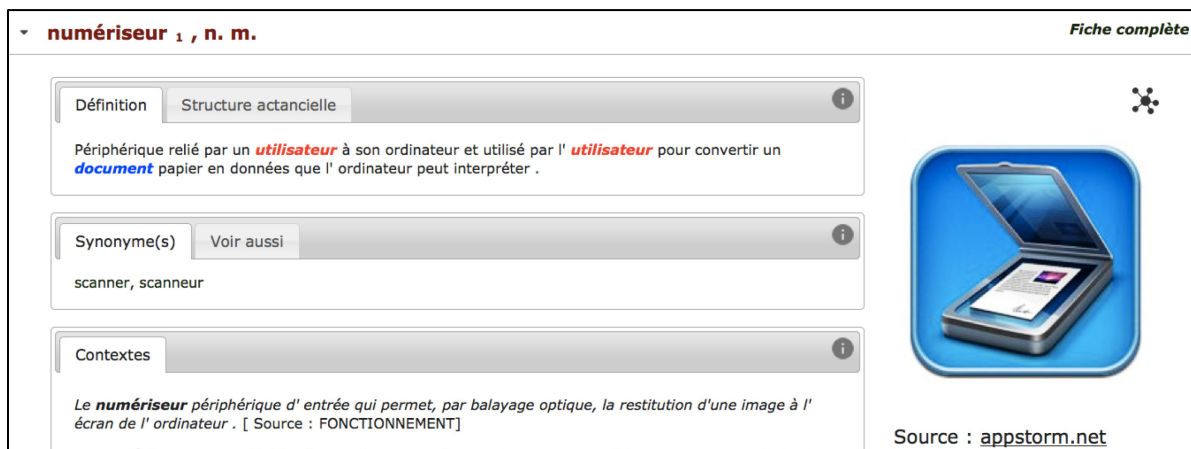


Figure 10: Image for *numériseur* (En. *scanner*)

Relatif à l'utilisateur		
Explication	Terme relié	Exemples
Dont l' utilisateur n'est pas connu	~ anonyme 1b	Si aucun nom d'utilisateur est donné il s'agit alors d'une connexion anonyme , le login sera alors anonymous et la coutume veut que le mot de passe d'une session anonyme soit son adresse e-mail.

Figure 11: Example given in *Types of data* category for *connexion* (En. *connection*): *connexion anonyme* (En. *anonymous login*)

c. Addition of Examples

In order to assist users in communicative situations, we chose to associate some examples with related terms in the *Types of* data category (Figure 11), so that users can see the way related terms are used in specialized contexts. This strategy was also adapted in the DAFA (Binon et al., 2000).

4. Conclusion

In this paper we presented various strategies to convert a specialized lexical database into a learners' dictionary. We defined our learners' dictionary as one that meets specific user needs in specific situations based on the principles of functional lexicography (Tarp, 2008). We redesigned its presentation and layout using technologies that allowed us to take these needs into account in the online version. The targeted users are first and foremost translation students and translators with little experience and whose specific needs are both communicative and cognitive.

The database we adapted is the *DiCoInfo*, *Dictionnaire fondamental de l'informatique et de l'Internet* and its transformation raised a certain number of challenges. The database contained technical metalanguage that needed to be placed in the background or hidden altogether. In addition, each entry contained various data categories whose presentation required simplifying. Decisions were made about which modifications were necessary and how they should be carried out. Our objective was to preserve most of the information already provided in the DiCoInfo while presenting it in such a way that it would meet the defined user needs. Finally, these changes were made according to two parameters: simplification of the presentation, and the newly implemented lexicographical functions of the DiCoInfo. Modifications have been made in the interface and its layout. In addition, the presentation of data categories was completely revised; multimedia was also added.

However, there is still some room for improvement. We are currently exploring the possibility of adding images in entries for verbs (*download*, *write*), as well as in other entries describing terms that denote activities (*compilation*). We are also aware that some explanations for lexical relations should be revised in order to improve their readability. In addition, up to now we have focused on improving the presentation of the DiCoInfo, however additional work could be carried out on the accessibility of the information contained in other data categories in order to make the information spotting simpler and faster. Finally, it would be interesting to collect user feedback on the changes we have made to date and compare the reactions of professional translators with those of translation students.

5. References

- Alipour, M. (2014). *Méthodologie de conversion de dictionnaires spécialisés en dictionnaires d'apprentissage: application au domaine de l'informatique*. Masters Dissertation. Université de Montréal.
- Bergenholtz, H., & Tarp, S. (2003). Two opposing theories: On the H.E. Wiegand's recent discovery of lexicographic functions. *Hermes*, 31, pp. 171-196.
- Binon, J., Verlinde, S., Van Dyck, J., & Bertels, A. (2000). *Dictionnaire d'apprentissage du français des affaires : Dictionnaire de compréhension et de production de la langue des affaires*. Paris: Didier.
- Clark, J. (1999). XSL Transformations (XSLT), Version 1.0. W3C Recommendation 1999. *World Wide Web Consortium*.
- DiCoInfo. *Dictionnaire fondamental de l'informatique et de l'Internet*. Accessed at: <http://olst.ling.umontreal.ca/cgi-bin/dicoinfo/search.cgi>
- Dziemianko, A. (2010). Paper or Electronic? The Role of Dictionary Form in Language Reception, Production and the Retention of Meaning and Collocations. *International Journal of Lexicography*, 23(3), pp. 257-273.
- Faber, P. F., Arauz, P. L., Velasco, J. A. P. & Reimerink, A. (2006). Linking images and words: the description of specialized concepts. In E. Corino, C. Marello & C. Onesti. (eds.) *Atti del XII Congresso Internazionale di Lessicografia*: Torino, pp. 751-763.
- Fuertes-Olivera, P. A. & Nielsen, S. (2012). Online Dictionaries for Assisting Translators of LSP Texts: the Accounting Dictionaries. *International Journal of Lexicography*, 25(2), pp. 191-215.
- Goguy, E. (1999-2014). *DicoFR: Dictionnaire de l'informatique et d'internet*. Accessed at: <http://www.dicofr.com>.
- Jousse, A. L., L'Homme, M. C., Leroyer, P. & Robichaud, B. (2011). Presenting collocates in a dictionary of computing and the Internet according to user needs. In I. Boguslavsky & L. Wanner (eds.) *Proceedings of the 5th International Conference on Meaning-Text Theory*. Barcelona, pp. 134-144.
- Leroyer, P. (2013). *Projet de recherche terminographique. Évaluation du DiCoInfo – Tests utilisateurs 2013 – Université de Montréal. Descriptif du test et résultats*. Report.
- Lew, R. (2012). How can we make electronic dictionaries more effective? In S. Granger & M. Paquot (Eds.) *Electronic Lexicography*. Oxford: Oxford University Press, pp. 343-361.
- Lew, R. & de Schryver, G. M. (2014). Dictionary users in the Digital Revolution. *International Journal of Lexicography*, 27(4), pp. 341-359.
- L'Homme, M.-C. (2010). Designing terminological dictionaries for learners based on lexical semantics: The representation of actants. In P.A. Fuertes-Olivera (ed.) *Specialized dictionaries for learners*. Berlin/New York: De Gruyter, pp. 141-153.

- L'Homme, M.-C. (2014a). *Manuel de DiCoInfo*. Accessed at: <http://olst.ling.umontreal.ca/dicoinfo/manuel-DiCoInfo.pdf>.
- L'Homme, M.-C. (2014b). Why Lexical Semantics is Important for E-Lexicography and Why it is Equally Important to Hide its Formal Representations from Users of Dictionaries. *International Journal of Lexicography*, 27 (4), pp. 360-377.
- L'Homme, M.-C. & Jia, Z (2015). Combinaisons lexicales spécialisées à base nominale dans un dictionnaire d'informatique. *Cahiers de lexicologie*, 106, pp. 228-251.
- L'Homme, M.-C., & Leroyer, P. (2009). Combining the semantics of collocations with situation-driven search paths in specialized dictionaries. *Terminology*, 15(2), pp. 258-283.
- Meier, W. et al. (2011). *eXist : an Open Source Native XML Database*. Accessed at: <http://exist-db.org/exist/apps/homepage/index.html>.
- Mel'čuk, I. A., Clas, A. P., & Polguère, A. (1995). *Introduction à la lexicologie explicative et combinatoire*. Louvain-la-Neuve: Duculot.
- Mel'čuk, I. A. et al. (1984 - 1999). *Dictionnaire explicatif et combinatoire du français contemporain : recherches lexico-sémantiques*. Volumes I. II. III. IV. Montréal: Presses de l'Université de Montréal.
- Müller-Spitzer, C., Koplenig, A., & Topel, A. (2012). Online dictionary use: Key findings from an empirical research project. In S. Granger & M. Paquot (eds.) *Electronic Lexicography*. Oxford: Oxford University Press, pp. 425-457.
- Pyne, S., & Tuck, A. (1996). *Oxford dictionary of computing for learners of English*. Oxford: Oxford University Press.
- Ruppenhofer, J., Ellsworth M., Petruck M., Johnson, C., & Scheffczyk, J. (2010). *FrameNet II: Extended Theory and Practice*. Accessed at: <http://framenet.icsi.berkeley.edu>.
- Sarrion, E. (2012). *jQuery UI* (1st ed.). Sebastopol (CA): O'Reilly Media.
- Tarp, S. (2008). *Lexicography in the borderland between knowledge and non-knowledge general lexicographical theory with particular focus on learner's lexicography*. Tübingen: Max Niemeyer Verlag.

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