

Anglicisms in the Field of Information Technology: Analysis of Linguistic Features

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Abstract

The role that English currently plays is undeniable. It has become the most common means of communication among native speakers of several languages around the world. English penetrates into all areas of people's daily lives. In the field of Information Technology (IT), English has taken a dominant position, as many of the terms used on a daily basis are written in English. The purpose of the article is to analyze the linguistic features of Anglicisms in the field of Information Technology. Methods. The research is based on systematic and comparative analysis, dialectical method, as well as methods of classification and generalization. Results. This study presents the results of compiling a multilingual glossary with Anglicisms used in the GitHub and 3D Slicer fields. Despite the limited number of terms included in the glossary, the article provides a lot of evidence for the influence of the English language in the areas of Information Technology, GitHub and 3D Slicer under consideration. The types of Anglicisms used in the 3D Slicer area seem to be more diverse than in the GitHub area. This study found that five European languages use language strategies to solve any communication problem. The multilingual glossary showed that in some cases there is a coexistence between Anglicism and the native term. In other cases, the English term is the only one used in different languages. There are cases when only the native language is used. Conclusions. This study is a useful tool that helps to improve the efficiency of communication between engineers and technicians who speak different native languages. The ultimate goal of this research will be to create a multilingual glossary that is still under development and is likely to cover other IT areas such as Python and VTK.

Keywords:

Anglicisms, information technology, linguistics, GitHub, 3D Slicer

Introduction

The role that English plays today is undeniable. It has become the most common means of communication among speakers of several languages around the world. English permeates all areas of people's daily lives. For example, in Spanish, some studies have proved the

prominence of lexical Anglicisms in various fields. Sport is an area where many Anglicisms are used [1. 2. 3]. Fashion and beauty are also replete with English terms as reported by various scholars [4. 5. 6. 7]. Marketing, economics, and finance are influenced by this trend [8], the field of tourism [9], and specialty languages [10], to mention just a few of the many domains in Spanish where English plays a beneficial role.

In the field of information technology (IT), English has taken a dominant position because many of the terms used daily are written in English. Various studies conducted in many countries have confirmed this fact. In Italy and Albany, Isida Shehu reported the use of a large number of Anglicisms in specific areas of telecommunications and informatics, and this author cited two reasons: first, the development of technology in English-speaking countries; and second, the lack of native equivalent words for these concepts [11]. In Portugal, Rita Amorim, Raquel Baltazar, and Isabel Soares also stressed the use of Anglicisms in financial media. These authors stated: "in Portugal it is the second language of most public and private areas, influencing its culture and discourses" [12]. In Germany, Robert Corr has done some research on the extensive use of Anglicisms in the field of German computer terminology [13]. Onisko's Anglicisms in German showed the important role of English in various linguistic and cultural areas in Germany. This author even investigated Germans' perception of this globalizing role of English ("discourse learning") [14, 15]. In France, Lazarev A. V. examined the history and reasons for the wide use of Anglicisms in French. This scholar gave several examples of English lexical units in the field of information technology, such as poster, captcha, gif, spam, troll, Network Optimization, and concludes that "the number of English loanwords will inevitably grow, and that this vocabulary is necessary for in modern French" [16]. Karfis has studied in detail the lexical renewal resulting from the contact situation between French and English [17]. In Spain, various studies [7, 9] have presented countless uses

of Anglicisms in IT. The use of English loanwords in the field of Spanish-speaking social media has also been the object of analysis [18, 19]. Nunez Nogueras, Eugenia Esperanza also presented an updated review of the literature on Anglicisms in Spanish [20].

In other European languages not included in this study, the situation is quite similar. In Croatia, Liermann-Zeljak Yvonne sheds some light on the massive use of Anglicisms in electrical engineering terminology [21]. In Romania, Todea, Luminita, and Demarcsek R. reported the presence of English loanwords in Romanian business and technology [22]. In Finland, Petri Mihaljov found that the presence of English is widespread in Finnish information technology [23]. In the Czech Republic, Monika Chladová also provided a glossary and alternative local terms to determine the number of Anglicisms used in information technology in that country [24]. Thus, English is probably widespread in many European languages in the field of information technology.

Given the nature of this study, which corresponds to a type of specialized language or terminology, it seems reasonable to define what terminology is in its two senses. According to Silvia Pavel, and Diane Nolet, the first meaning of “terminology” is “a set of special words belonging to a science, an art, an author, or a social subject,” such as the terminology of medicine or the terminology of computer professionals. The same term, in a more restrictive sense, means “the linguistic discipline devoted to the scientific study of concepts and terms used in specialized languages” [25]. General language is a term used in everyday life, while specialized language is used to facilitate unambiguous communication in a particular field of knowledge, based on the vocabulary and use of language-specific to that field [25]. An author such as [26] Valérie Saugera, among others, defines and developed the concept of terminology and specialized languages. In a second sense of the word terminology, we can refer to Valérie Saugera's definition: “the study and domain of activities connected to the collection, description, processing, and presentation of terms, that is, lexical units belonging to specialized domains of one or more languages” [26]. Maria Dahm states that, unlike lexicology, “terminology deals only with terms or words of a specialized field (such as physics, chemistry, anthropology, art, etc.) or professional field (commerce, industry, sports, etc.)” [27].

This type of language uses a large amount of technical vocabulary because its vocabulary is constantly increasing as new scientific and technical inventions emerge and a new term is needed to denote a new concept [28]. This terminology or specialized speech usually has a limited meaning, designed to avoid ambiguity or misunderstanding. According to Carmen Luján-García, one of the main features of scientific vocabulary is its precision, neutrality, and economy [19]. This refers to the

creation of international terminologies, the main purpose of which is to facilitate communication between experienced users from different parts of the world who also speak different languages. These terminologies are intended to comply with two basic principles of specialized languages: accuracy and avoidance of ambiguity. A delete request, for example, is a delete request in any language, and technicians and engineers working in the GitHub domain understand and use this unambiguous term, which is also neutral because it has neither positive nor negative connotations. This expression also helps to save the language, since it does not require a longer sentence or paraphrase to express what an exemption request is.

Pérez Pascual also notes the universality of this kind of language, since scientific and technical knowledge is universal, and a set of universal terms is needed that can be understood by any specialist in a particular field, working in any country [28]. This applies to a great deal of vocabulary relating to computing and information technology in general.

In the field of terminology, the ideal of unambiguity has been heralded as the best solution to avoid ambiguities or misunderstandings in specialized languages. However, authors such as Dam argue that the field of terminology is dynamic and has moved away from the notion of unambiguity. In a globalizing world, where monolingual and multilingual professionals use terminology in the natural context of use, this notion of unambiguity is unrealistic. Languages, including professional languages, are subject to dynamic changes in meaning from specialized to more general meaning [27].

This study, which has an interdisciplinary and multilingual focus, aims to demonstrate, on real evidence, how Anglicisms influence most modern languages - Italian, French, German, Portuguese, and Spanish - and, more specifically, international information technology, experts. It also analyzes the different strategies used in the languages under study to make communication effective. Thus, the initial hypothesis for this study will be supported by the following statement: the different European languages use anglicized terminology in the field of information technology, more precisely in the areas of GitHub and 3D Slicer.

The justification for this study is based on two facts: firstly, the lack of prior analysis covering so many different modern languages. Several studies have proved the presence of English in the field of information technology, affecting only one language separately, but so far one of the novelties of this work is that no study has covered this phenomenon comparing several languages (French, German, Italian, Portuguese and Spanish). Second, there are no studies on the impact of Anglicisms on specific IT areas of GitHub and 3D Slicer. To confirm or refute the initial hypothesis, some research questions

were asked:

1) To what extent does Anglicism influence the different European languages in the field of information technology, in particular the GitHub and 3D Slicer domains?

2) What kind of anglicism is most commonly used in these languages: unadopted, adapted, or hybrid combinations as linguistic strategies used in the different languages studied?

The article aims to analyze the linguistic features of information technology anglicism.

METHOD

The study is based on systematic and comparative analysis, the dialectical method, as well as methods of classification and generalization.

This part of the work is aimed at creating a multilingual glossary. The previous glossary included IT terms, mostly words dedicated to two areas in the vast field of IT, in particular, GitHub and 3D Slicer. The reasons for choosing these two areas are justified since both areas are relatively new; at this stage in the development of the European MACBioIDi project, these two areas are essential tools for technicians and engineers working on this project. Thus, such a glossary is a useful resource to facilitate communication between project participants.

The sources used to create the previous glossary were documents (PPT presentations) posted on the wiki as part of the European MACBioIDi project, which aims to educate project participants (computer science engineers and technicians) in the different areas of the project. This initial or previous list of terms contained technical and semi-technical vocabulary used in the specified areas of GitHub and 3D Slicer.

In the second phase, the French, German, Italian, Spanish and Portuguese engineers and technicians collaborating in the European MACBioIDi project were offered an initial list of terms to give their opinion based on their experience. In other words, it was expanded and in some cases modified after the interviews. The purpose of the interviews was for engineers and technicians to confirm whether they were familiar with the proposed terms; whether they had used them in their professional lives; whether these Anglicisms coexisted with other local terms to denote the same concept; the spelling and pronunciation of these terms in their languages; whether there was any adaptation or whether the terms were used exclusively as they came from English. This process of listing initial vocabulary and interviewing engineers and technicians of different nationalities took place in June and July 2018.

In the third phase, the use of these anglicisms in specific areas of this study was documented by accessing various Internet forums addressed to experts working in

the fields under study (GitHub and 3D Slicer). A combination of different external sources during the three phases of the study confirmed the use of these technical terms in written language (analysis of written published documents: PPT presentations) published in the wiki of the MACBioIDi project. In contrast, oral usage was documented through oral conversations with engineers and technicians. In addition, some Web sites and Internet forums have reported the use of these terms, which appear to be halfway between written and oral language. The language used on Web sites and Internet forums often lacks the degree of formality of written language, and it tends to be more informal as oral language, even though it is not oral in the strict sense of the word. This multi-stage analysis provided a broader understanding not only of the meaning of specialized language in these areas of information technology but also of actual usage in the context of the lexical units under study.

Finally, in the fourth stage, aimed at answering the second Research Question of this article, the Classification of Anglicisms used in this analysis was the most recent one developed by Virginia Pulcini and Rodríguez González [1, 29]. These authors define unadapted anglicisms as “a word or multi-word unit borrowed from English with little or no formal or semantic integration so that it remains recognizably English in RL”. In contrast, adapted Anglicisms are “a word or multi-word unit borrowed from English with orthographic, phonological, and/or morphological integration into RL structures.” Ultimately, hybrid Anglicisms are “multi-word units loosely combining an English element with an RL element” [1, 29]. Obviously, the Virginia Pulcini and Rodríguez González classification is more complex but has been adapted to this study.

Results

This section will cover technical terms related to the GitHub and 3D Slicer domains collected in our multilingual glossary. Thus, the breakdown of the study objects of the two domains will be described in the following subsections.

GitHub multilingual glossary

GitHub is, as its own website declares, “a community where more than 28 million people learn, share, and work together to build software”. The company, founded in 2016 in San Francisco, espouses the following philosophy: “GitHub was created by developers for developers. To create a better platform for you, we need to create a company that reflects the world we live in today.” So, it's based on the accumulation of knowledge through the collaboration of professionals from different countries around the world. This is to a certain extent the philosophy that also underlies the European project MACBioIDi, within which this article is included: the collaborative work of professionals in different fields and specialties.

The following table shows the terminology collected from the GitHub domain, with a list of anglicisms used on the platform and their usage in different languages. Definitions of GitHub terms are taken from the official GitHub glossary.

Table 1. A multilingual glossary of GitHub terminology

English	Italian	German	French (Maghrib)	Portuguese	Spanish
branch (n)	branch /	Branch	branche	branch /	rama
clone (v)	clone	clone, klon	cloner	clone / duplicar /	hacer un clon / clonar
commit (n)	commit	Commit	More valid	commit / validar /	hacer un commit
diff (n)	differenz	Diff	différence	diferença	hacer un diff
fetch (v)	fare un fetch	fetchen	ammener	fetch / obter	fetch, hacer un fetch
fork (n)	fork	Fork	forchette	fork	fork, hacer un
git (n)	git	Git	-	-	-
markdown (n)	-	Markdown	langage de balisage	ficheiro md	fichero md
merge (v)	integrare / fare il merge	mergen	merge < en. merge	mesclar / fazer un merge	hacer un merge
pull (v)	fare il pull	pullen	tirer	pull, fazer un pull	hacer un pull
pull / request (n)	fare il pull	Pull / Request	requête	fazer un pull / request	hacer un pull /
push (v)	fare il push	pushen	push	push	hacer un
SSH key	chiave SSH	SSH Key	clé SSH	chave SSH	SSH

Source: Created by the author.

The first term considered is the branch, which is also present in the other languages considered. Table 1 shows terms such as branch, which has been adapted in French with the addition of the final -e. In other languages, there is a coexistence of branches with native versions of the term, ramo (Italian), ramo (Portuguese) and rama in Spanish. The branch is a parallel version of the repository.

The term “clone,” which is a verb, is also present in the various languages analyzed. In some of them, clone coexists with other terms, such as the German adaptation of klon or the French adaptation by adding the final -r to make the word a verb, and in Portuguese, clonar. Spanish uses the expressions clon and clonar. Clone is a copy of a repository that resides on your computer, not somewhere on a website server or the act of creating that copy.

Commit is a noun that is present in all languages studied except French, where they say valider. However, in Italian and German, technicians use the English term without adaptation. In Portuguese, the word is used without adaptation and is even used as a verb, adding the verb “to commit,” as in fazer un commit. Spanish uses fer un commit, which means To make changes or modifications to the GitHub repository. Therefore, the English term is used not only as a noun (as in English) but also as a verb. Commit is a revision or individual change

to a file or set of files.

In the case of the English noun diff, which is an abbreviation for “difference,” German uses the term without adaptation, and Spanish turns the term into a verb by adding produce un diff. The other languages studied use their native equivalents. Diff is the difference in change between two fixations or retained changes. Diff will visually describe what has been added or removed from a file since its last commit.

The English verb fetch is also used in all languages studied except French, which uses amener. In Italian, they add the verb “fare,” giving the resulting expression fare un fetch. In German, they add the ending-en, fetchen. In Spanish, they add un fetch, which coexists with the unadapted anglicism fetch. In Portuguese, they also use sampling along with the Portuguese version of “obter”. This expression is used to denote the action of getting the latest GitHub online repository changes without mixing them up.

The fork is the next English noun shown in Table 1. It is used as an unadapted Anglicism in all languages except French, where fourchette is used. In Spanish, it is also used as a verb with the expression fer un fork and is commonly used among GitHub repository users to mean a personal copy of another user's repository that is in your account.

Git is a noun that is only used as an anglicism in Italian and German. In French, Portuguese, and Spanish, it does not seem to be used yet. Git is an open-source application for tracking changes to a text file and is the core technology on which GitHub's social and user interface is built.

Markdown is an English noun that appears to be used in German. Other languages use equivalent words or native language expressions (langage de balisage léger in French, ficheiro md in Portuguese and md in Spanish). Markdown can be defined as a simple semantic file format, not too different from .doc, .rtf and txt.

The English verb merge is also widely used in various languages. In Italian, fare il merge coexists with integrare. In German, the addition of the finite, en, mergen, turns the noun into a verb. French uses merge, and in Portuguese, the native word mesclar coexists with fazer un merge. In Spanish, interviewees use the expression fer un merge. The action of merge is to take changes from one branch in the same repository or from a fork and apply them to another.

The English verb pull is present in all the languages studied except French, where the word tirer is used. In other languages this Anglicism is used as an expression: fare ilpull (Italian), pullen (German), fazer un pull or just pull (in Portuguese) and fer un pull (Spanish). This last expression refers to the action of extracting changes and merging them. For example, if someone has edited a deleted file you are working on, you will want to make

those changes in your local copy so that it is up to date.

The situation is similar with the following English noun, pull request, which is used as a verb in Italian (*fare il pull request*), in Portuguese (*fazer un pull request*) and in Spanish (*hacer un pull request*). In German, the word retains its original English form and grammatical category, while in French the equivalent *requête* is used. Pull requests are proposed changes to the repository, sent by the eorist, and accepted or rejected by the repository staff. These nouns with a verb equivalent in other languages - clone, fix, branch, pull out, merge, extract - are terminological inconsistencies, as the grammatical category of terms is modified / adapted in RL.

The next English verb is a push, used as the original form, without adaptation, in French and Portuguese. In Italian and Spanish, the verb to make, *fare il push* is added, and in Spanish, *fer un push*. In German, the addition of ending-en again turns this Anglicism into the verb *pushen*. Push is the action of sending your committed changes to a remote repository, such as a repository hosted on GitHub.

The SSH Key expression is another example of an expression that is used in all languages learned. The term "key" is retained in German, while other languages use local equivalents: *chiave* (Italian), *clé* (French), and *chave* (Portuguese). In Spanish, *llave* is not used, but simply the original acronym: SSH. It refers to a way of identifying oneself on an online server using an encrypted message.

In quantitative terms, of the total 13 terms considered in the GitHub domain, four of them (30.7%) - merge, pull, push and request- are used in the five languages analyzed in their unadopted form with the addition of the verb to make or suffix. *ru* in the case of German. In all of these cases, they are used as verbs. Another four terms (30.7%) - commit, fetch, fork, and pull request - are used in four of the languages studied. Two terms (15.3%) - branch and clone - are used in their unadopted form in three languages. Two terms (15.3%) - diff and Git - are used in two languages, and finally one term (7.6%) - markdown - is used as an anglicism in only one language.

These terms stem from the English language, as one would expect since this platform for sharing knowledge and talent in technology was created in the United States. What seems interesting, however, is how each language learned develops different strategies in terms of choice, using technicians and engineers to use these terms in English without adopting or adapting them to RL, or simply by creating hybrid combinations such as pull (Spanish). The use of unadopted adapted Anglicisms and hybrid combinations shows the degree of English proficiency of professionals working in any field of information technology. Moreover, this analysis shows the "invasion" of Anglicisms to which different European languages are subjected.

3D Slicer

The second area of information technology analyzed is

3D Slicer, which is an open-source software platform for medical image informatics, image processing, and three-dimensional visualization, as explained on its own official website.

Consider the anglicism used by physicians, engineers, and technicians working on the topic of building a 3D Slicer in the MACBioDi project.

The build is an anglicism used in most languages studied. Interestingly, the building is used as a noun in Italian and German, while in Portuguese and Spanish they use the expressions *fazer un build* and *fer un build*, making the word build function as a verb.

The expression Cmake is also used in its pure (unadopted) form in Italian, German and Portuguese. In French and Spanish, this English expression is preceded by *compilateur* and *compilador para lengua C* (Cmake).

The medium of Anglicism appears to be used with the English spelling along with the German term *Umgebung*. In the other languages studied, the interviewed technicians use their native equivalents for this term: *ambiente*, *environnement*, *entorno*.

The framework is used without adaptation in all five languages studied. In Spanish, it is used along with the Spanish expression *entorno de trabajo*. Below is the acronym IDE, which stands for Integrated Development Environment, and it is also used in the various European languages studied, in some cases with variations in pronunciation, as in Italian, Portuguese and Spanish, but with English in German. Framework, or software framework, is a platform for developing software applications. It provides a framework on which software developers can create applications for a particular platform.

Libraries are another lexical unit that refers to sets of additional software used to perform specific tasks. In German, the term coexists with the German word *bibliothek*. In Spanish, technicians and engineers do not use the Spanish equivalent of the term *bibliotecas*, but instead, *librerías*, which in that language means bookstore. In information technology loop is used in German as an Anglicism, and in Portuguese, the term coexists with other native words. Other languages studied use vernacular terms to refer to it. Loop is used in software to refer to something repeated several times.

However, the case of the Anglicism plugin is quite different, as it is in all the languages studied. The unadapted English version is used in different languages with two different spellings: *plugins* or *plug-ins*. This refers to a small computer program that makes a larger application run faster and have more features.

As shown in Table 2, unadopted borrowed open source is used exclusively in some languages, such as Italian and German, where there seems to be no equivalent. In Portuguese and Spanish, there are translations of *codigo aberto* and *codi obert*, respectively, which are also considered as translations from English, which is another

type of borrowing. The expression “open source” means that the document is available on the Internet for all and that it is free. It is a method of publishing that is becoming more and more popular.

The term setup is used in all the languages in question with exactly the same spelling and pronunciation as in English. In Spanish, the term coexists with configuration. The verb set up means to install a computer program or environment.

The same is true of the noun password, which is used in most languages along with other vernacular terms. In Portuguese and Spanish, the English word is used along with the local equivalents *paraula passe* and *contrasena*, respectively. French is the only language that still uses its native equivalent of *mot de passe*. Password refers to a secret word or combination of letters or numbers used to communicate with another person or computer to prove who you are.

The following term user is used in German and Portuguese, along with their native equivalents: *benutzer* and *utilizador*, respectively. This refers to a person using a machine, service, or product.

The considered anglicisms used in the five different languages of this project are: plug-in, set-up/setup, framework, IDE, software, tool-kit, checkout, click and script. This makes a total of nine (22.5%) of the 40 anglicisms studied. There are also four terms used in four of the languages examined: build, Cmake, password, and hardware. In most cases, French is the only language in which the original English terms are not used. Some Anglicisms are used in three of the languages considered: libraries, package, interface, and login. The remaining English loanwords are used in one or two of the languages studied. It should be noted that most of these terms are used with the same English spelling, without adaptation to RL. In some cases, the English loanword coexists with another native term, but in many cases, Anglicism is the only term used for a particular concept.

Regarding both areas under consideration in general terms, the prominent presence of English loanwords in all the European languages studied at the lexical level is noticeable. But what is even more noticeable is the influence on the grammatical functions of these terms, some of which often change the word class from nouns to verbs, as in the case of commit, which changes to *fazer un commit* (Portuguese) or *fer un commit* (Spanish). In such a subject field, grammatical categories seem to be easily changed by users as a linguistic strategy to make communication effective. Terminologies and specialized languages, far from the ideal of unambiguity to avoid ambiguity, are dynamic fields, prone to change and adaptation to the real needs of native speakers to communicate, and this study demonstrates this fact. Despite the English origin of most of these terms, which is discussed in the next chapter, they are later adapted to each

language for ease of communication.

Furthermore, it is also noticeable to switch many of these originally specialized terms to a more general type of language, as in the case of terms such as software, click, password, and login present in this study; their meanings are not limited to IT experts, but can also be understood and even used by any average speaker.

Overall, this chapter attempts to answer the first research question: to what extent do Anglicisms influence the different European IT languages, in particular, the GitHub and 3D Slicer domains? Undoubtedly, the presence of Anglicisms is higher in the 3D Slicer domain than in the GitHub domain. In general terms, the six languages to be analyzed were influenced by the use of anglicized lexical units, mostly belonging to a kind of specialized language or terminology. Despite the existence of some equivalent terms in the target languages, most technicians and engineers tend to use unadopted English terms. To a lesser extent, some RL-adapted terms are used, as well as some hybrid forms. In the global era, this is an area that makes it easy to translate specialized terms from English into other languages. So far, most advances in information technology have come from Anglo-American countries, and hence the emergence of new vocabulary to denote these new inventions is in English. The next natural step, which this study may indicate, is to transfer these terms into other languages so that they can be used by international specialists working in this field.

Types of Anglicisms

This chapter addresses the second research question: what type of Anglicisms are most commonly used in these languages: unadopted, adapted, or hybrid combinations as linguistic strategies used in the different languages studied?

The Virginia Pulcini and Rodríguez González classification of anglicisms was used, although adapted to the sample collected in this study. Tables 2 and 3 summarize each type of anglicism in the languages studied. In the case of the GitHub area, with the exception of French, the use of other languages ranges from 10 to 13 anglicisms, with the most frequent use being unadopted, except for Spanish, a higher percentage of which is the use of hybrid anglicisms.

Table 2. Breakdown of types of anglicisms in the GitHub area

	Italian	German	French	Portuguese	Spanish
Non-adopted	5	8	2	7	2
Adapted	-	5	-	-	-
Hybrids	6	-	1	5	8
Total	11	13	3	12	10

Source: Created by the author.

Table 3 shows the frequency of anglicized terms in the

3D Slicer domain, which is higher than GitHub because the sample of terms is also higher. German and Italian, where more Anglicisms are used. In quantitative terms, French is again the language where Anglicisms are used the least.

In all the languages studied, unadopted Anglicisms are the most frequently used, followed by adapted in the case of German.

Table 3. Breakdown of types of anglicisms in the 3D slice area

	Italian	German	French	Portuguese	Spanish
Non-adapted	25	23	8	17	11
Adapted	1	5	-	-	-
Hybrids	-	-	-	1	2
Total	26	28	8	18	13

Source: Created by the author.

Non-adapted anglicisms

The data shows that the most commonly used type is unadapted anglicisms. The following subsections show examples of this type of anglicism found in every language in the GitHub area.

1. The following terms have been used in the GitHub area without adaptation:

Italian: branch, clone, commit, fork, git.

German: branch, clone, commit, diff, fork, git, markdown, pullrequest.

French: merge and push.

Portuguese: branch, clone, commit, fetch, fork, and pull.

Spanish: fetch and fork.

As you can see from the previous lines, terms like fork are used in all languages except French. Similarly, commit and branch are used in most of these languages. These are terms that are also used in professional contexts. The use of these English-language lexical units is expected in these contexts, where the need to be efficient and accurate in communication is important for technicians and engineers.

2. In the 3D Slicer

This section shows the different unadapted anglicisms used in the 3D Slicer field in the various languages studied:

Italian: build, Cmake, checkout, click, database, download, file, framework, hardware, master and multiplatform.

German: assembly, build, command, Cmake, Checkout, environment, file, framework, hardware, IDE (English pronunciation), libraries, login, loop, master, open source, package, plug-in, setup, slave, software, tool, toolbar, toolkit, and user.

French: Cmake, framework, IDE, interface, plugin, script, setup, and tool-kit.

Portuguese: Cmake, checkout, click, framework, hardware, IDE, interface, login, loop, package, password, plugin, script, setup, software, tool-kit, and user.

Spanish: checkout, framework, hardware, IDE, login, password, plugin, script, setup, software, and tool-kit.

In the 3D Slicer domain, the use of anglicisms is higher, but you may notice that not all of them are as specialized terms as in the GitHub domain. Terms such as hardware, file, login, package, software, and password can be used by almost any average computer user.

Adapted Anglicisms

This type of anglicism is used less frequently in both areas, GitHub and 3D Slicer. These are examples that seem to be used. In German, different English nouns become Germanic verbs, adding a spelling adaptation (the ending -en). In the case of SSH Key, the English spelling is retained, but the expression is used with a phonetic adaptation to German.

1. In the GitHub domain

German: fetchen, mergen, pullen, pushen, SSH key (with phonetic adaptation, pronounced in German).

2. In the field of 3D Slicer

Italian: IDE, with phonetic adaptation, pronounced in Italian.

German: click, download, update, upload, and upgrade a - are English verbs, but in German, they are used as nouns.

Hybrid Anglicisms:

1. In the field of GitHub

Italian: fare un fetch, fare il merge, fare il pull, fare il pull request, fare il push, chiave SSH.

French: clé SSH.

Portuguese: fazer un commit, fazer un merge, fazer un pull, fazer un pull request, chave SSH.

Spanish: hacer un commit, hacer un diff, hacer un fetch, hacer un fork, hacer un merge, hacer un pull, hacer un pull request, hacer un push.

2. In the field of 3D Slicer

Portuguese: fazer un build.

Spanish: hacer un build i hacer click.

The use of hybrid forms is a useful strategy to increase the efficiency of communication between speakers of a common language, but the key English term expressing the action is retained. For example, a Spanish engineer might ask another Spanish colleague fer un commit, using this expression that both speakers of the same language understand. They use fer un ..., which is Spanish, but they still retain the English term commit because it is important for communication because there is no other way to express this action in Spanish.

Broadly speaking, and considering the data in Table 3, in the GitHub area, German is the language that uses more anglicized lexical units for these technical concepts, with 13 borrowings (100%) from a corpus of 13 terms. Portuguese is second with 12 borrowings (92.3%) of the corpus, and Italian is third with 11 Anglicisms (84.6%) of the corpus. Spanish is in fourth place with 10 terms (76.9%). French is in last place, with only 3 loanwords

(23%) of the total. French is undoubtedly the most conservative language, as it uses more native words for these technical concepts.

Summarizing the content of Table 3 (3D slice terminology), out of 41 anglicized terms, German is again the language that uses more loanwords. A total of 28 terms (68.2%) are Anglicisms. Italian is in second place with 26 loanwords (63.4%) used in the field. Portuguese is in next place with 18 Anglicisms (43.9%) of the total corpus. Spanish uses 13 Anglicized lexical units (31.7%) of the corpus, and French is again in last place for borrowings from English, with only 8 terms (19.5%) of the corpus.

German is the language that uses the highest percentage of Anglicisms in the areas of GitHub and 3D Slicer, in contrast to French, which tends to use more native terms and therefore shows less English influence than other languages in the areas studied.

To summarize, and in connection with the second research question, there is a tendency to use unadopted Anglicisms rather than adapted or hybrid ones. The reason may be because this is a type of specialized language where avoiding ambiguity is essential for effective technical communication. It is more efficient to use the original anglicized term, which will be understood by any technician or engineer than to use an adapted or hybrid term, which will probably not be understood by other foreign users.

CONCLUSIONS

Regarding the first research question, it has been demonstrated that Anglicisms influence European languages in the field of information technology. This study presents the results of a multilingual glossary with Anglicisms used in the fields of GitHub and 3D Slicer. Despite the limited number of terms included in the glossary, the article provides a wealth of evidence for the influence of English in the information technology fields under consideration, GitHub and 3D Slicer. The types of Anglicisms used in the 3D Slicer field seem to be more diverse than in GitHub. By different, it is assumed that they combine highly specialized terminology (such as build) as well as other English lexical units that can be used by any normal computer user (such as password, login, sign in, upload, and others).

This study showed that these five European languages use linguistic strategies to solve any communicative problem. A multilingual glossary showed that in some cases there is coexistence between anglicism and the native term (e.g., branch and ramo coexist in Italian and Portuguese). Second, in other cases the English term is the only one used in different languages, e.g., in the case of a branch, push, click, plugin, checkout, to list some of them. Third, there are cases where only the native language is used, for example, more valid is the only term used in French.

When it comes to the second research question, the most frequent type of Anglicism is unadopted. To illustrate this, in Italian or German, many borrowings from English are used without adaptation, for example in the branch, clone, commit, fork, git, to name just a few examples.

There may also be some cases of adaptation: for example, plugin without the hyphen in all the languages studied, or the German ending -en, as in mergen, pushen, pullen, turning some English nouns into verbs. These examples show the adaptation of Anglicisms to RL.

Hybrid combinations are common in Romance languages, i.e., Italian, Portuguese, and Spanish. Cases in which a verb - fare, fazer o fer + pull, pull request, push, fetch - is combined to turn a noun into a verb in the RL are some examples of hybrid combinations. These three languages use the same strategy to bridge this linguistic gap. In all cases, they retain the keyword in English expressing the action to be performed.

To summarize, engineers, technicians, and doctors have many reasons to use these Anglicisms, such as lack of an equivalent in their native language, superior knowledge and familiarity with English documents and Web sites, the need to use terms understood internationally by any professional working in these fields around the world, the desire to look modern and cool using these English words, the economy of language and the North American origin of all these terms. This is a field that is constantly undergoing changes, improvements, and innovations, and most of these terms come from countries such as the United States and the United Kingdom. Although equivalents exist for many of these terms, sometimes experts still prefer to use the English borrowed word, because the native word does not seem to reflect the full meaning of the concept. In other words, there is not only one single reason that could justify the use of

Terminology and specialized languages are far from the ideal of unambiguity that avoids ambiguity. English underlies most of the terms in question, but we have also seen a number of adaptations and hybrid formations, combining an English word or root with another native term to make communication effective. Specialized languages are dynamic domains, subject to change and adaptation.

This research is a useful tool to help improve the effectiveness of communication between engineers and technicians who speak different native languages. The ultimate goal of this research will be to create a multilingual glossary, which is still under development and will probably cover other IT areas such as Python and VTK.

References

- [1] González, F. R.: *Anglicismos en el mundo del deporte: variation lingmstica y sociolingmstica*. In: Boletín de la Real

- Academia Espanola, vol. 90, no. 306, pp. 285-309 (2012)
- [2] Rodríguez-Medina, M. J.: *An Approach to the Study of the Use of English in the Activities of Spanish Gyms*. Spanish in Context, vol. 13, no. 1, pp. 128-48 (2016) <https://doi.org/10.1075/sic.13.1.06rod>
- [3] Campos-Pardillos, M. Á.: All is not English that Glitters: False Anglicisms in the Spanish Language of Sports. *Atlantis*, vol. 37, no. 2, 2015, pp. 155-74 (2015).
- [4] Balteiro, I., & Campos, M. Á.: *False Anglicisms in the Spanish Language of Fashion and Beauty*. In: Ibérica, vol. 24, pp. 233-60. (2012)
- [5] Luján García, C.: *Analysis of the Presence of Anglicisms in a Spanish Internet Forum: Some Terms from the Fields of Fashion, Beauty, and Leisure*. In: Revista Alicantina de Estudios Ingleses, vol. 30, no. 7, 2017, pp. 277-300 (2017)
- [6] Luján García, C.: *Anglicisms and their Use in an Internet Forum Addressed to Spanish-speaking Teenagers*. In: Spanish in Context, vol. 14, no. 3, pp. 440-63 (2017)
- [7] Tejedor Martínez, C.: *The Influence of the English Language on the Description of Cosmetic Products*. In: Revista Alicantina de Estudios Ingleses, vol. 30, no. 7, pp. 303-29 (2017)
- [8] Zurita, P. L.: *El uso de anglicismos en el contexto del vocabulario académico de Marketing*. In: Onomazein, vol. 39, pp. 114-39 (2018).
- [9] De la Cruz Cabanillas, I., & Martínez, C. T. Email or correo electrónico? Anglicisms in Spanish. *Revista Española de Lingüística Aplicada*, vol. extra 1, pp. 95-118, (2012)
- [10] Todea, L., & Demarcsek, R. *Anglicisms in the Romanian business and technology vocabulary*. In: IOP Conference Series: Materials Science and Engineering, vol. 144, no. 1, pp. 012013. IOP Publishing. doi: 10.1088/1757-899X/144/1/012013 (2016, August).
- [11] Shehu, I. *Anglicisms in Italian and Albanian Language in the Field of Telecommunication and Informatics*. In : Mediterranean Journal of Social Sciences, vol. 4, no. 10, 2013, pp. 689-92 (2013). <https://doi.org/10.5901/mjss.2013.v4n10p689>
- [12] Amorim, R., Baltazar, R., & Soares, I.: The Presence and Influence of English in Portuguese Financial Media. *International Journal of Society, Culture and Language*, vol. 5, no. 2, 2017, pp. 49-59. (2017)
- [13] Corr, R.: *Anglicisms in German Computing Terminology*. Final Degree Thesis (2003)
- [14] Onysko, A.: *Anglicisms in German: Borrowing, Lexical Productivity, and Written Codeswitching*. Mouton de Gruyter, 2007.
- [15] Onysko, A.: *Exploring Discourse on Globalizing English: A Case Study of Discourse on Anglicisms in German*. In: English Today, vol. 25, no. 1, pp. 25-36. (2009)
- [16] Lazarev, A. V.: *Anglicisms in French Vocabulary in the Early 21st Century*. In: Journal of History Culture and Art Research, vol. 6, no. 6, pp. 187-93. (2017) doi: 10.7596/taksad.v6i6.1340/
- [17] Karfis, O.: *French Computer Terms*. French Today. www.frenchtoday.com/blog/french-vocabulary/learn-some-frenchcomputer-terms/. (27 May 2013)
- [18] Luján García, C.: *Analysis of the Presence of Anglicisms in a Spanish Internet Forum: Some Terms from the Fields of Fashion, Beauty and Leisure*. In: Revista Alicantina de Estudios Ingleses, vol. 30, no. 7, pp. 277-300 (2017).
- [19] García, C. L.: *Anglicisms and their Use in an Internet Forum Addressed to Spanish-speaking Teenagers*. Spanish in Context, vol. 14, no. 3, pp. 440-63 (2017)
- [20] Nogueras, N. & Esperanza, E.: *An Up-to-date Review of the Literature on Anglicisms in Spanish*. In: Diálogo de la lengua, vol. 9, pp. 1-54 (2017)
- [21] Liermann-Zeljak, Y. *Anglicisms in Electrical Engineering Terminology*. In: International Journal of Electrical and Computer Engineering Systems, vol. 4, no. 2, pp.43-53 (2013)
- [22] Todea, L., & Demarcsek, R.: Anglicisms in the Romanian Business and Technology Vocabulary. *IOP Conference Series: Materials Science and Engineering*, vol. 144, pp. 12-13 (2016) doi: 10.1088/1757-899X/144/1/012013
- [23] Mihaljov, P.: *Influence of English on the Finnish of Information Technology: A Study of Contemporary Terminology*. Pro-Gradu Thesis, University of Tampere, (2011) trepo.tuni.fi/bitstream/handle/10024/82677/gradu05181.pdf?isAllowed=y&sequence=1/.
- [24] Chladová, M. *Translation from the Field of Information Technology and Anglicisms Related to this Field*. Pro-Gradu Thesis. Západočeská univerzita v Plzni, (2014)
- [25] Silvia, P., & Nolet, D.: *Handbook of Terminology*. Terminology and Standardization Directorate: English translation by Ch. Leonhardt. Ottawa-Hull: Translation Bureau (2001).
- [26] Picone, M. D.: *Remade in France: Anglicisms in the lexicon and morphology of french by valérie saugera*. The French Review, vol. 92(2), pp. 205-206 (2018) <https://doi.org/10.1353/tfr.2018.0086>
- [27] Dahm, M. R.: *A socio-cognitive investigation of English medical terminology: dynamic varieties of meaning*. In: Lexicography, vol. 4, no. 1, pp.81-103 (2018) <https://doi.org/10.1007/s40607-018-0039-9>(2018).
- [28] Pérez Pascual, J. I.: *El léxico de especialidad*. Léxico español actual III, edited by Luis Luque Toro, José F. Medina Montero and Rocio Luque, Università Ca' Foscari Venezia, 2012, pp. 189-220 (2012)
- [29] Pulcini, V., Furiassi, C., & Rodríguez González, F.: *The Lexical Influence of English on European Languages*. The Anglicization of European Lexis, edited by Cristiano Furiassi, Virginia Pulcini and Félix Rodríguez González, John Benjamins, pp.1-26 (2012)

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