Acknowledging the needs of computer-assisted translation tools users: the human perspective in human-machine translation

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ABSTRACT

The lack of translation specialists poses a problem for the growing translation markets around the world. One of the solutions proposed for the lack of human resources is automated translation tools. In the last few decades, organisations have had the opportunity to increase their use of technological resources. However, there is no consensus on the way that technological resources should be integrated into translation service providers (TSP). The approach taken by this article is to set aside both 100% human translation and 100% machine translation (without human intervention), to examine a third, more realistic solution: interactive translation where humans and machines co-operate. What is the human role? Based on the conceptual framework of information systems and organisational sciences, we recommend giving users, who are mainly translators for whom interactive translation tools are designed, a fundamental role in the thinking surrounding the implementation of a technological tool.

KEYWORDS

Interactive translation, information system, implementation, business process reengineering, organisational science.

1. Introduction

Globalisation and the acceleration of world trade operations have led to an impressive growth of the global translation services market. According to EUATC (European Union of Associations of Translation Companies), translation industry is set to grow around five percent annually in the foreseeable future (Hager, 2008). With its two official languages, Canada is a good example of an important translation market, where highly skilled professional translators serve not only the domestic market, but international clients as well. Specialised human resources in Canada are too scarce to face this huge increase in the global translation needs. The Canadian Translation Industry Sectoral Committee had announced already in 1999 that the industry would need an average of 1,000 new professionals every year to sustain the growth in demand (Canadian Translation Industry Sectoral Committee, 1999); however, Canadian universities still produce only around 300 graduates per year (AUFC, 2005).

Apparently, this shortage in skilled resources is not only a problem in Canada. After its International Annual Meeting on Language Arrangements, Documentation and Publications, held in Paris in June 2010, the United Nations (2010: 1) released a declaration which reads as follows: "Without a new generation of trained linguists and professionals

with language skills, international organisations will be unable to perform their vital tasks."

Because of the use of new technologies, processes have accelerated in all fields of human activity. Translation is no exception. For more than half a century, busy translators have been relying on information technologies to make tight deadlines and deliver high-volume translation services. However, when Beesley (1986: 251) writes: "Proponents maintain that computers are not only valuable in translation, but that they are becoming absolutely necessary to help handle the world information explosion," he refers primarily to common hardware and basic word processing software. In our 21st century, translation providers can take advantage of automated translation (AT) or computer-assisted translation (CAT) tools, in order to increase their productivity.

In a nutshell, organisations have increased their needs for translation services, in order to be present in worldwide markets, but they lack the trained human resources to support those needs. Tools exist that partially automate the translation process, but the effects of those tools on individual translators' productivity are still unclear. Also, the influence of those tools on the overall performance of organisations for which translation is a core business - translation services providers or TSP - has yet to be explored.

2. From individual workstations to an integrated Language Information System (LIS)

The process of translation automation leads to human-machine interaction that can be characterised by a varying degree of human implication, from entirely human translation – what we may call translation craftwork – to entirely automated translation – with no human effort at all. While the latter is already in use, translation produced entirely by machines is still not good enough for widespread use among the public and is usually designed for internal purposes. The quality of current entirely automated translation is not acceptable for a TSP. What TSPs need is an adequate range of tools – including automated translation tools, computer-assisted translation tools and linguistic reference tools – that their human translators can use to produce fast-delivered, high-quality translations. To achieve that, organisations need more than a mere computerised individual translator's workstation. They need a system that helps them share and disseminate information, in a way that usefully informs translation production processes. They need what we propose to call a Language Information System.

3. What is an Information System (IS)?

According to Ein-Dor and Segev's (1993: 167) strict definition, "any computerised system with a user or operator interface is an information system, provided the computer is not physically embedded." For example, translators working on individual workstations now have routine access to digitalised bilingual glossaries that are placed on the intranet of their organisation. In such a case, the organisation relies on an existing IS – the intranet – to share information through what Taravella (2011) calls passive language technology. Another application of an information system would be assignment of translation work by a centralised workflow system that displays for each individual translator the tasks he or she has to perform.

What makes research in information systems distinct from other computing disciplines, namely, computer science and software engineering, is its focus on human issues. According to Glass, Ramesh and Vessey (2004), information systems research "examines topics related largely to organisational concepts, especially usage/operation and technology transfer, although it also explores systems/software topics, all primarily at a behaviour level of analysis." This makes information systems a right field for our research about impacts of the use of language information systems on human translators and TSPs.

Indeed, correctly taking into account the dimension of the individual user (perception, resistance to change, inertia, and needs analysis) is one of the main challenges when promoting organisational change through the use of information technology. Information technology facilitates internal coordination between individuals (Gurbaxani et Whang, 1991), which is precisely what language professionals need when collaborating toward producing a translation. As Beesley (1986: 257) puts it:

> The most neglected aspect of MAT [machine-assisted translation] is perhaps the most important: the needs, attitudes and sensitivities of human translators. MAT researchers often ignore the fact that human beings have to use their systems [...] The cooperation of human translators is [...] essential to making any MAT installation work. If translators are saddled with intimidating and inappropriate technology or if the machines become their masters rather than their slaves, then the technology will fail – the translators will see to it.

Workflow Management Systems (WMS) are another kind of information systems that are useful to language professionals. Those systems are designed to structure the work to be done, split it into different tasks, organise those tasks logically and follow up on their execution. Users of a WMS know which tasks have been executed and receive alerts on those still to be completed. WMS offer a formal structure to language professionals faced with an increasing workload. However, it may be the case that not all translators are ready for that kind of structure. Since a WMS makes it less flexible for users to choose the tasks they want to

execute and the moment they can do it, translators that are not comfortable with the technology may feel their autonomy and, consequently, their sense of ownership have been reduced.

Interactive translation tools must indeed be designed to make the work of language professionals easier. To achieve this, when selecting the tools, an organisation must take into account the human factor and seek to integrate all functions, adopting an information systems approach. The focus is no more on selecting one tool, or assembling existing ones, but on designing and building a Language Information System (LIS).

4. Machine translation is no longer an either-or choice

In practical terms, adopting the IS approach frees translation companies from having to decide whether they need to opt for machine translation. With a one-tool approach, TSPs face the question of which tool they need to buy, and whether machine translation is a good solution. But the vast range of tools offered on the market, the endless possibilities of combining machine and human translation, and the fact that the difference between machine translation, computer-aided translation and language technology is not clear (*see infra*) make it impossible to select the 'perfect' tool. With a process approach, namely an information systems approach, the focus is on a different, practical priority: to deliver requested translation projects on time while meeting all quality requirements. With that priority in mind, an organisation can select and integrate a number of different tools, in order to build the 'perfect' information system for its needs.

5. Machine translation vs. interactive translation

When exploring literature about translation tools, the difference between machine translation, computer-aided translation and other forms of interactive translation (which combines machine work and human work) is not clearly apparent in terminological use. For instance, according to Bouillon (1993) and Quah (2006), human-aided machine translation (HAMT) is a kind of automatic translation (AT) that cannot take place without human intervention. In French, its equivalent, *traduction automatique assistée par l'homme* (TAAH), is also called *traduction assistée par ordinateur* (TAO), 'computer-aided translation' or *traduction automatique assistée* (TAA) 'assisted machine translation'. Quah (2006: 6) points out that

> computer-aided translation (CAT) is often the term used in Translation Studies (TS) and the localization industry [...], while the software community which develops this type of tools prefers to call it 'machine-aided translation (MAT)'.

It is especially difficult to distinguish between automatic translation systems that are human-aided (HAMT) and human translation systems that are computer-assisted (machine-aided human translation, or MAHT).

For this reason, both systems are often referred to as computer-assisted translation (CAT) tools (Hutchinson and Somers 1992; Quah 2006). Finally, as Bowker (2002: 4) reminds us, HAMT "is often shortened simply to machine translation (MT)." Boundaries seem blurred between different types of systems due to the long history of the terms and the evolution of the systems they refer to:

> [S]cholars and researchers still disagree on the definition of machine translation with respect to the involvement of humans. However, since no other term has been forthcoming, it continues to be used to refer to systems that are fully automated as well as those with human involvement (Quah 2006: 9).

Navigating the acronym jungle is far from easy, and authors sometimes deal with slightly different constructs. To avoid misusing terms, we will stick to *automated interactive translation*. This term refers to *translation executed with some use of machine translation, but considered as the result of collaboration between machine and human translators*. Whether the translation is computer-aided or human-aided is not the focus here. LIS users will routinely integrate machine translation tools, computer-aided translation tools, and passive language technology (e.g. online databases and shared glossaries), with their own human knowledge, in order to produce a translation. The focus is on the processes that make it possible for LIS users to interact with automated tools, and on the consequences of automation and interaction on human aspects of using a LIS.

6. Importance of human aspects

The first question about automation is whether, and in what ways, human work is still important. In other words, how much is *automated interactive translation* automated, and how much is it interactive?

> The major distinction between MT and CAT lies with who is primary responsible for the actual task of translation. In MT, the computer translates the text, though the machine output may later be edited by a human translator. In CAT, human translators are responsible for doing the translation, but they may make use of a variety of computerized tools to help them complete this task and increase their productivity. Therefore, whereas MT systems try to replace translators, CAT tools support translators by helping them to work more efficiently. (Bowker 2002: 4)

Faced with theoretically infinite possibilities of organising task execution by combining human endeavour and machine work, organisations must decide which combination will indeed sustain performance and serve language professionals, and which is bound to be frustrating. In other words, they must find a balance between people, work environments and processes (Beesley 1986; Williams 1989).

The decision about how to allocate work must be based on a description of translation production processes within the organisation, along with the

implementation of full-size language information systems (LIS). Those systems can be viewed as a new form of specialised information systems. As such, they would share attributes with all other information systems. They would also have features that address the specificity of translation work and processes and make the LIS different from other specialised information systems, management information systems (MIS) or knowledge management systems (KMS), for instance. Below are some contributions from research about information systems that we believe can inform our research on LIS.

First, the very use of information technology offers the potential for improving the performance of an organisation (Davis 1989). According to Daft and Lengel (1986: 556), information technology helps organisations process information, thus reducing both uncertainty and equivocality: "[U]ncertainty has come to mean the absence of information. [...] Equivocality means ambiguity, the existence of multiple and conflicting interpretations about an organisational situation." When a translator lacks information to answer a specific question, for instance, how a particular segment or term was translated in a previous project for the same client, there is uncertainty. Translation memories and terminological databases can reduce this uncertainty by retrieving some precise answers to the question. When a translator does not even know how to phrase the question so as to retrieve useful information, there is equivocality. Let us say a sentence that needs to be translated is very unclear to the translator, semantically, but also syntactically and terminologically speaking. It could take a while before the translator is able to figure out where to start seeking information. A language information system, provided that its research interface is flexible enough, could gather all relevant information sources and help the translator find his or her way through a mass of knowledge. In practice, for instance, pasting the sentence to be translated in the research interface would prompt the information system to display on the same screen the results of several knowledge bases: one for terminological equivalents, another one for contextualised same-structured sentences, and yet another one, maybe an electronic version of some traditional dictionary.

Second, a language information system can be viewed as an expert system. According to the definition given by Hunt and quoted in Ein-Dor and Segev (1993: 190), an expert system "generally consists of a knowledge base and an inference engine." Parallel texts, where a text and its translation are placed alongside in a two-column display, are knowledge bases. CAT tools, namely translation memories, use an inference engine to retrieve and suggest translations based on decision criteria that are built in the system or decided on by the user. Consequently, LIS correspond to the general definition of expert systems. This opens a path of research for applying existing knowledge about expert systems to language information systems.

Third, research on information systems has showed, very early on, that "an understanding of managerial activity is a prerequisite for effective systems design and implementation" (Gorry and Scott-Morton 1971). This makes it necessary to systematically explore the processes that underlie translation production. Gorry and Scott-Morton (1971) also insist upon the importance of taking into account the perception of users faced with a new technology. For Davis (1989), who created the TAM (technology acceptance model), the two most important success factors when adopting information technologies are perceived usefulness and perceived ease of use. However useful and easy to use a system may be objectively, it is the usefulness and ease of use that users perceive subjectively that shape those users' attitude and eventually lead to the adoption or rejection of an information system: "Thus, even if an application would objectively improve performance, if users don't perceive it as useful, they're unlikely to use it. Conversely, people may overrate the performance gains a system has to offer and adopt systems that are dysfunctional" (Davis, 1989: 335).

Key success factors in implementing an information system have been explored by many researchers. Armstrong and Sambamurthy (1999) point to the importance of the role of senior leadership and IT infrastructure, while Jean-Jules and Villeneuve (2011) insist that users take ownership of the new technology, to the extent that using it becomes "routinised."

Finally, because information systems research takes into account the human factors that allow for an efficient use of information technology, the information systems approach is perfectly adapted to exploring the way translators take ownership of automated interactive translation tools. As Banker and Kauffman (2004) remind us, the value of technology for an organisation is strongly related to how precisely business processes and organisational structures are defined, as well as to the cognitive abilities and capacity to process information demonstrated by technology users. The following statement by those authors further encourages us to explore the subject of automated interactive translation through the lens of information systems research: "[There is] an increasing openness of academic research to interdisciplinary theorising related to human-computer interaction, and [a] real need for richer explanations to make IT work well in complex applied settings" (Banker and Kauffman, 2004: 286).

7. Key concepts from other fields

Outside of the information systems field, some concepts can prove useful in exploring the human factor within interactive translation. We retain *intrinsic motivation* first. According to the definition given by Amabile (1997: 39), intrinsic motivation is "the motivation to work on something

because it is interesting, involving, exciting, satisfying, or personally challenging." Intrinsic motivation refers to personal fulfilment instead of material reward. In a more general perspective, motivation is a key factor of job satisfaction (Fernet, 2010). The case can be made that intrinsic motivation among translators is positively correlated with talent retention within translation industry. In other words, translators whose intrinsic motivation is low are more likely to leave the industry than those whose intrinsic motivation is kept at a high level. This hypothesis would be worth testing through causal research, especially in a time when translation industry in Canada is faced with a shortage of qualified professionals and the problem is made even worse by what could be called a "translating brain drain" that benefits other industries. It is worth noting that the link between intrinsic motivation and information systems is suggested by Davis (1989: 334) himself: "Future research is needed to address how other variables relate to usefulness, ease of use, and acceptance. Intrinsic motivation, for example, has received inadequate attention in [Management Information System] theories."

Another field to explore would be knowledge management, for we want to understand how knowledge is shared among translators and other language professionals involved in a translation production process. Even though an exhaustive literature review would obviously be necessary on that matter, a recent approach, suggested by Mutte (2010) drew our attention. Mutte argues that any business reengineering process implies both knowledge creation and knowledge destruction. For instance, when GPS technology was adopted for navigation, the knowledge of how to use a marine sextant was lost, while the knowledge of how to use the new technology was created and acquired. Along the same lines, a consequence of adopting a CAT tool, for example a translation memory tool, is that translators 'gain' the knowledge of how to use the new language technology, but may also 'lose' access to expertise enclosed with the brain of seasoned translators and terminologists, if that expertise is not transferred to the tool. Of course, part of the translators' knowledge is shared, through bilingual corpora, terminological databases, and e-mails that can be indexed. However, seasoned translators keep in their own memory a huge amount of tacit knowledge (Nonaka, 1994) about phraseology, historical evolution of meanings, and professional methods, for instance, that could help a translator find a solution where no obvious solution can be found or no translation is immediately provided by the range of translation tools. In other words, seasoned translators know how to use a 'translation sextant.' This knowledge cannot be lost, especially since the technological jump, combined with the announced massive retirement of language professionals that were involved in the francization process in Quebec in the 1970s, may create a gap in knowledge transfer that could deprive the Canadian translation industry of a huge amount of expertise. The question of how such loss could be avoided (e.g. by keeping open channels of informal communication) or how translation

expertise can be built up into a language information system has yet to be explored.

Research about change management (Meier 2007) will also certainly be useful. The introduction of a new information system is a major change event within an organisation management system. Bareil (2010) worked on the preoccupations of recipients of change. She points to the importance of listening to the concerns expressed by those recipients, who will have to deal with the consequences of change in their everyday work. Concerns must not be considered as signs of a resistance to change. They must be understood as a legitimate attempt to take part to the change in order to take ownership of it. In that perspective, we feel a research on any information system must include interviewing the IS users to learn about the concerns and expectations they may have with regard to the introduction of a new and integrated technology. This is even truer for research about translation industry. Since this industry has not drawn a lot of attention from organisational researchers so far, translation processes and translators concerns are not yet well documented.

Moreover, we do not yet understand fully what factors facilitate the adoption of technology and integration within work routines, and what factors hinder effective technology integration and use. Translating is an act of creation, and it is essential that translators feel that their creativity is nurtured. The introduction of a complete language information system can be perceived as a move designed to increase process automation and decrease creativity and autonomy. This could have a very negative impact on translators' intention to adopt a LIS and integrate its features in their daily work.

Classical predictive models about the intent to adopt a technology (among others, Davis' model) (Davis, 1989) assume that the main factors are *perceived usefulness* and *perceived ease of use*. Although those models were derived from more general models, such as the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB) proposed by Fishbein and Ajzen, a number of factors that were described in the TRA model were eliminated from the final model used in information systems literature.

Perceived usefulness is a construct based essentially on the respondent's appreciation of system contribution to task execution, and on his or her individual efficiency when performing those tasks, while perceived ease of use refers to the respondent's appreciation of how easily he or she will be able to use the system. As noted previously, translating is an act of creation. We are convinced that translators may ignore the creativity factor when initially asked to evaluate a LIS in terms of perceived usefulness or perceived ease of use. However, that perception can change over time, as the constraints imposed by the system are more and more

perceived as limitations of the translator's freedom of action or creativity. This change toward a more negative perception can lead the translator (or another language professional using the LIS) to reject the system in part or as a whole in the short to medium term. Translators can come to perceive the use of technology as hindering their well-being. In such cases, rejecting the LIS could be considered a healthy, self-protecting, legitimate reaction. The reaction can even be more violent, as some translators may choose to leave the industry to pursue another career.

Literature about well-being is rich, and there is a general consensus about the negative influence of stress on one's sense of well-being. Anger, anxiety, psychological discomfort and the general perception of being threatened are known to increase stress. These stress factors can lead one to acts of rebellion, rejection of the source of one's stress or burnout, among many possible consequences. We state that any plan toward the adoption, implementation, routinisation and continued use of a LIS within an organisation, should integrate a variety of approaches aimed at making language professionals at ease with the system, thus reducing the risk of hindering one's well-being, while allowing for enough freedom of action in task execution to value professional work. What must be avoided is considering language professionals as mere semi-skilled workers that are only expected to press a button. In our view, part of the answer will come from the implementation of knowledge management processes. Translators would then be able to act as knowledge users, as well as knowledge creators, depending on which process is involved.

8. Conclusion

The profession of translator is undergoing major changes, one of them being the introduction and widespread use of computerised translation aids. However, the usefulness of these tools is often negatively perceived by translators themselves; at the same time organisations often fail to develop a detailed plan for implementing the tools. Consequently, the following research question seems worth asking: How must language information systems be implemented in Canadian translation service providing organisations, in order to both support translation production processes and maintain the professional well-being and the motivation of language professionals that are to use those language information systems?

Faced with a growing global translation market, combined with a shrinking pool of qualified professionals in Canada, Canadian TSPs must innovate in the way they manage technology and human resources. A well-designed language information system can be one of the answers.

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