

Ralph Krüger

Contextualising Computer-Assisted Translation Tools and Modelling Their Usability

Abstract

In this paper, I attempt to contextualise computer-assisted translation (CAT) tools from a theoretical and a professional perspective and to model the usability of these tools. The theoretical contextualisation of CAT tools is based on Risku's (2004) cognitive translational theory of Situated Translation, which claims that cognition is not isolated in the translator's head but emerges in dynamic processes of interaction between the translator and his or her working environment. The potential influence exercised by CAT tools on the translator's cognitive performance is illustrated by means of the Cologne Model of the Situated LSP Translator, which is based on the theory of Situated Translation and which conceptualises CAT tools as important environmental artefacts in the translational ecosystem. The professional contextualisation takes the form of a survey of the role of CAT tools in the different phases of the computer-assisted translation process. In this context, I discuss how the various sub-tasks of these process phases can be supported by different CAT tools. Following this theoretical and professional contextualisation, I propose a general model of CAT tool usability as well as a more specific model of translation memory system (TMS) usability. These models are derived from ISO standard 9241 "Ergonomics of Human-System Interaction" and attempt to capture all relevant dimensions of CAT tool usability from a user-oriented perspective.

1 Introduction

In the last 15 to 20 years, translation technology has become an integral part of the translation process and has changed the nature of this process in quite fundamental ways (Christensen/Schjoldager 2010: 1; O'Brien 2012: 1). What has become very clear over time is that translation technology has come to stay and that the good old days of pen-and-paper translation are inevitably coming to an end. This is evidenced, for example, by Gouadec (2007/2010: 156), who analysed 650 job advertisements for translators and found that all of these advertisements require translators to have knowledge of translation memory (TM) systems. Also, younger generations of translators entering the translation market today will often have been educated in universities featuring state-of-the-art computer infrastructure and translation technology and will

probably feel that computer-assisted translation (CAT) is the natural way to translate.¹ Generally, the adoption of CAT tools is considered to have both advantages and disadvantages. For example, the use of TM systems may entail, on the positive side, a higher process standardisation, productivity and cross-document consistency and lower translation costs and, on the negative side, a possibly higher focus on individual translation segments (to the detriment of the textual perspective) or the uncritical adoption of low-quality translation units from contaminated TMs (cf. Christensen/Schjoldager 2011: 128; Ehrensberger-Dow/Massey 2014a: 200). In this article, I will not attempt to answer the question of whether the advantages of CAT tools outweigh their disadvantages or vice versa, particularly since – as discussed above – the alternative to revert back to pen-and-paper translation is no longer a feasible option.² What needs to be emphasised, however, is that translation technology does not only have a profound impact on the nature of the translation process but also on the translator's cognition. This is highlighted in the following quote by Pym:

[...] new translation technologies such as translation memories, data-based machine translation, and collaborative translation management systems, far from being merely added tools, are altering the very nature of the translator's cognitive activity [...].

(Pym 2011: 1)

While this impact of CAT tools on the translator's cognition has been recognised in translation studies, there is still a scarcity of translation technology research which does proper justice to this impact and which scrutinizes more closely the *usability* dimension of translation technology, usability here being understood broadly as the extent to which a user can achieve a certain goal with a given software tool (for a detailed definition and discussion of usability, see section 4 below). The link should be quite obvious: While CAT tools exhibiting a high usability should enhance the translator's cognitive performance, tools exhibiting a low usability will probably tend to decrease it (a trivial observation with which most practicing translators will certainly agree).^{3,4} However, as Dillon and Fraser (2006: 68) and Christensen and Schjoldager (2010: 1) point out, the major share of the literature on translation technology focuses on issues such as product reviews, product comparisons or aspects of workflow management. And while the usability dimension of translation technology is often

¹ In Dillon and Fraser's (2006) investigation of translators' perception of translation memory adoption, the authors found, perhaps not surprisingly, that younger translators tend to adopt a more positive stance towards the use of CAT tools than older translators, who were educated and socialised prior to the 'technological turn' in the translation industry.

² O'Brien (2012) even conceptualises translation as a form of "human-computer interaction", which stresses the high relevance of translation technology in the modern translation profession.

³ See also Abran, Khelifi and Suryn (2003: 325): "For the end-user, software usability is essential because it is a determinant of performance: an application which features good usability will allow the user to perform the expected task faster and more efficiently."

⁴ In the words of Ehrensberger-Dow and O'Brien (2015: 102), low-usability CAT tools may lead to "cognitive friction", which can be understood as "the resistance encountered by a human intellect when it engages with a complex system of rules that change as the problem changes" (Cooper 2004: 19).

implicitly reflected in these publications, it is rarely addressed in an explicit and/or structured way.⁵ For example, in a very interesting and useful article for the German Federal Association of Interpreters and Translators (BDÜ), Keller (2011) compares the performance of nine TM systems in various phases of the translation process and discusses in detail some relevant features of these systems. Although, at various points in the article, the author highlights the benefits or shortcomings of specific performance features of a given TM system, there is no detailed discussion of usability aspects from the perspective or to the benefit of a practicing translator.

The lack of consideration of the actual interaction of translators with translation technology in practical contexts (which will inevitably raise the question of usability) as well as the lack of corresponding empirical research is also highlighted by Christensen and Schjoldager:

Empirically documented knowledge about the nature and applications of TM systems and translators' interactions with them is both scarce and fragmented. In particular, more research is needed on how translators interact with TM technology and on how it influences translators' cognitive processes. (Christensen/Schjoldager 2010: 11)

In the light of the supposedly strong influence of CAT tools on the translator's cognition and the relative lack of research on the translator's interaction with CAT tools, it seems desirable, within translation technology research, to place more emphasis on CAT tool usability and to take into account the perspective of practicing translators in real-world translation settings. The need to shift the focus from isolated investigations of translation technology to joint considerations of this technology and its intended users is underlined by Lagoudaki, who points out, quite rightly in my opinion, that "many of the existing commercial TM systems are *technology-driven applications* (e.g. with an abundance of useless features and a complex, impractical and difficult to learn user interface) rather than *user-driven applications*." (Lagoudaki 2006: 2, *italics added*). This view is mirrored by O'Brien, who claims that "there is little evidence to suggest that tools that are proposed as aids to the translation process have been designed from the point of view of the humans who have to use them." (O'Brien 2012: 115).

The aim of this article is twofold. Firstly, it aims to contextualise CAT tools from a theoretical and a professional perspective. To do so, the conceptualisation of CAT tools in the cognitive translational theory of Situated Translation and the practical role of these tools in the computer-assisted translation process are discussed. This is intended to underline the theoretical justification and the practical relevance of more exhaustive and intensive CAT tool usability research and to lay the groundwork for the discussion of CAT tool usability as the second focal point of this article. In this context, I propose a general model of CAT tool usability as well as a more specific model of

⁵ Campbell et al. assume that it is due to the highly specialised nature of translation technology and the fact that the widespread adoption of this technology is still in progress that "the usability of translation technology has not been thoroughly evaluated" (Campbell et al. 2013: 2042). However, as discussed briefly at the beginning of this article, the widespread adoption of translation technology has become a fact by now, which makes the need for larger-scale CAT tool usability research all the more pressing.

translation memory system (TMS) usability and I discuss the various usability dimensions of these models in detail. The models can be used as foundations for structured approaches to CAT tool usability testing.

2 Theoretical Contextualisation: CAT Tools in the Framework of Situated Translation

In this section, I attempt a theoretical contextualisation of CAT tools. To do so, I will sketch, very briefly, the development of cognitive translation studies and demonstrate that modern cognitive translational approaches such as Situated Translation offer adequate concepts and models which allow us to capture the importance of CAT tools for the translator's cognitive performance in sound theoretical terms.

Since its inception in the middle of the 20th century, modern translation studies has undergone a development which led from a contrastive perspective on linguistic systems via a contrastive perspective on texts to a holistic perspective on translational action and the person of the translator (Stolze 1994/2011). This shift of epistemic focus from the product to the process and the agent of translation eventually led to the 'cognitive turn' in translation studies (cf. Siever 2010: 341) and to the central question of 'what happens in the minds of translators' (cf. Krings 1986). Within cognitive translation studies, a similar development can be observed. Starting from an 'ideal translator' (cf. Kade 1968: 62), whose mind served as some kind of storage box for various linguistically-oriented 'translation algorithms', the epistemic interest has widened gradually to include the individual knowledge requirements of the translator and hence the translator as a real person.⁶ At first, this real translator was investigated in relative isolation from the various influences in his/her professional environment, but gradually these factors became more important in constructing cognitively-oriented theories of translation. Within cognitive translation studies, this development has culminated in the above-mentioned theory of Situated Translation (Risku 2004), which assigns central importance to the individual situational factors of the translator and his/her working environment. Situated Translation is based on the cognitive-scientific paradigm of *situated cognition*, which claims that humans and their environment form a cognitive system, more precisely, a cognitive ecosystem (Strohner 1995: 56). This means that human cognition is not isolated in the human brain but emerges from the specific relationship between humans and their environment (Strohner 1995: 54). From a translational perspective, the concept of a cognitive ecosystem allows describing the translator's cognition by taking into account all the situational factors that were largely ignored in the early stages of cognitive translation studies. The need for such a macro-

⁶ These two early stages of cognitive translation studies correspond to the two cognitive scientific paradigms of *symbol manipulation* and *connectionism*. For a more detailed discussion of the different paradigms in cognitive science and cognitive translation studies, see, for example, Risku (2004, 2005) and Krüger (2015).

scopic and holistic perspective on the translator's mind and his/her environment is stressed by Risku:

The mind is only one part of the story. We need to find out not only what happens in a translator's mind, but also what happens elsewhere, e.g. in their hands, in their computers, on their desks, in their languages or in their dialogues. Translation is not done solely by the mind, but by complex systems. These systems include people, their specific social and physical environments and all their cultural artefacts. (Risku 2010: 103)

The notion of *artefacts* is particularly important in the context of the present article. Artefacts are understood, quite generally, as objects made or used by humans for a particular purpose and range from calendars and spectacles to languages and objects of art to the products of modern information technology (Risku 2004: 20). Artefacts with high relevance to translation practice and to the present article are, obviously, "the many tools that are part of modern translation work (text processors, online research tools, translation memories)" (Risku 2013: 36). From the perspective of Situated Translation, it becomes clear why CAT tools, in the words of Pym (2011: 1, see quote above), alter "the very nature of the translator's cognitive activity" – these tools form an integral part of the translational ecosystem. And since situated cognition claims that cognition emerges from the interaction between humans and the various artefacts in their ecosystems, CAT tools can also be conceptualised as an integral part of the translator's cognition.⁷ While such an extended view of the human mind and human cognition is still not unanimously accepted in cognitive science (cf. Adams/Aizawa 2010), it provides a plausible basis for understanding and analysing human-machine interaction (cf. Ehrensberger-Dow/Massey 2014b: 63).

2.1 From Theoretical to Professional Contextualisation: CAT Tools in the Cologne Model of the Situated LSP Translator

Based on Risku's theory of Situated Translation and Serrano Piqueras' (2011) models of the tectonics and the dynamics of the translation process, I have developed the Cologne Model of the Situated LSP Translator,⁸ which aims at a holistic description of the LSP translator and the relevant factors influencing his/her cognition in real-world translation environments.⁹ In this section, I will briefly discuss the role of CAT tools in the Cologne model since this model provides a link between the theoretical and the professional contextualisation of these tools. The model is depicted in figure 1 on the following page:

⁷ On the conceptualisation of CAT tools – in this case translation memories – as artefacts in the sense of Situated Translation, see also Christensen: "A TM is to be considered a material artifact involved in the human translator's process of organizing the functional skill of memorizing translation decisions made during earlier translations into cognitive functional skills." (Christensen 2011: 140).

⁸ LSP = Language for Special Purposes.

⁹ In addition to the works of Risku (2004) and Serrano Piqueras (2011), the Cologne model is explicitly informed by Holz-Mänttäri's (1984) theory of translational action, Reinke's (2004) model of the work phases of the translation process and Schubert's (2007) integrated model of mono- and multilingual specialised communication.

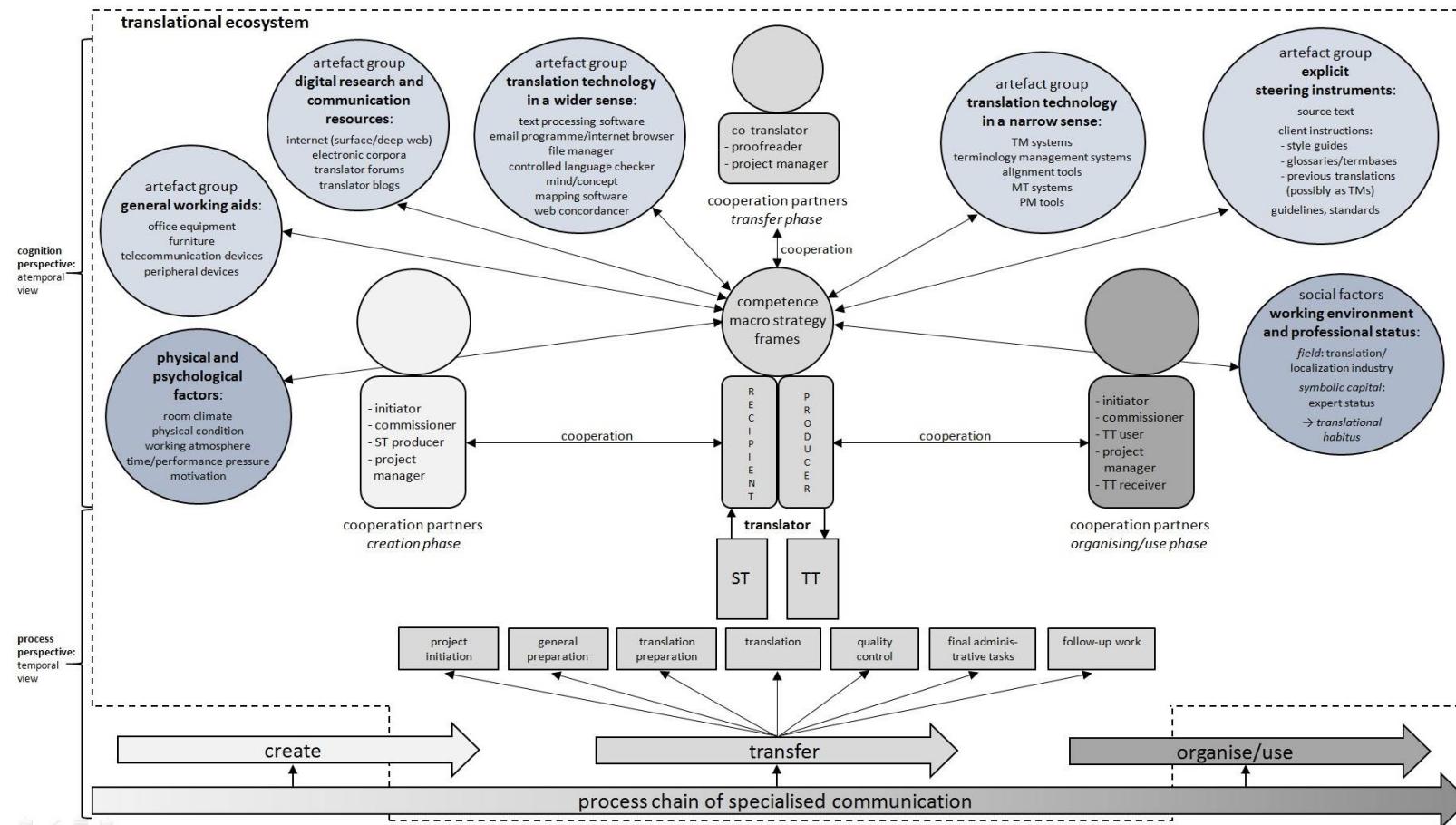


Fig. 1: The Cologne Model of the Situated LSP Translator

Since the model aims at an exhaustive description of the situated translator's professional working environment, it is too complex to be illustrated here in full (for a detailed discussion, see Krüger 2015 and Krüger forthcoming). In this article, I will merely give a brief overview of and elaborate on the components which are relevant in the present context. The model is divided into two levels. The lower level depicts the translation process as a sub-process of the 'process chain of specialised communication' (cf. Schubert 2007: 132). This process chain forms the superordinate structure in which the translational ecosystem is embedded. The translation process, which corresponds to the *transfer* phase of Schubert's process chain, is divided into several work phases as identified by Reinke (2004: 102) and Serrano Piqueras (2011: 44).¹⁰ In the model, I have depicted the maximum number of work phases of the translator. Which of these phases actually apply and how prominent these phases are in the translation process depends on the respective translation setting.^{11,12} These work phases will serve to structure the professional contextualisation of CAT tools in section 3 below.

The upper level of the model depicts the actual constituents of the translational ecosystem, i.e. the situated translator and his/her working environment. The relevant components of this working environment are the translator's cooperation partners, various social, physical and psychological factors as well as different artefacts, which I assigned to specific artefact groups. The group with specific relevance to the present article is the artefact group concerned with *translation technology in a narrow sense*, which could also be called *CAT tools*. The artefacts listed in this group – translation memory systems, terminology management systems, alignment tools, machine translation (MT) systems¹³ and project management (PM) components – merely serve for

¹⁰ The work phases illustrated in the model also show a high degree of similarity to the translation workflow depicted in ISO standard "Translation Services – Requirements for Translation Services" (ISO 17100 2015).

¹¹ For example, the phase of *project initiation*, which involves the acquisition of customers and translation jobs, is a very important phase for freelance translators, whereas in-house translators in translation agencies or language services will not usually be required to acquire new customers/jobs or to negotiate fees for translation assignments.

¹² Reinke (2004: 101-103) identifies three primary translation settings: (1) *internal translation* in the language service of a company or a public authority; (2) *external translation* (a) by a translation agency (in-house or by means of outsourcing), (b) by freelance translators (directly for a company/public authority or via a translation agency), or (c) by project-specific teams of freelance translators (directly for a company/public authority or via a translation agency), and (3) a *combination of internal and external translation* or a *combination of various forms of external translation*.

¹³ It is debatable whether MT systems can be classified as a subset of computer-assisted translation tools since these systems usually do not assist the process of human translation but perform the translation automatically, with the translator's role being reduced to the tasks of pre- and post-editing (cf. Schubert 2007: 171; Reinke 2013a: 34). However, Reinke points out that it is possible to integrate TM and MT technology in a batch processing or an interactive processing scenario. In a batch processing scenario, "all segments of the source text that do not produce an exact or high percentage 'fuzzy match' when being compared with the TM database may be exported for processing by MT". In an interactive processing scenario, "translators can invoke the MT system each time there is no match with the TM database" (both quotations Reinke 2013a: 35). Particularly the scenario of interactive processing illustrates that MT systems can indeed be used to assist (instead of replace)

illustration purposes, i.e. I did not attempt to include an exhaustive list of CAT tools in the model. However, the artefact group *translation technology in a narrow sense* – or *CAT tools* – includes only those tools that are (relatively) specific to the translation process. The artefact group *translation technology in a wider sense* – in Risku's (2013: 36) words above, “the many tools that are part of modern translation work” –, would also include more general tools such as text processing software, web concordancers (cf. Krüger 2012) or concept mapping software (cf. Austermühl 2012), which are also applicable and relevant in other professional fields beyond translation. While these tools also play an important role in assisting the human translation process, they are excluded from consideration in the present article.

As mentioned above, Situated Translation claims that translation technology as well as other environmental artefacts form an integral part of the translator's cognition. Hence, the Cologne model of the Situated LSP Translator incorporates translation tools as important constituents of the translational ecosystem. By acknowledging the potentially high cognitive relevance of translation technology, Situated Translation provides a sound justification for integrating CAT tools in translation theory building and for assigning the usability of these tools a more central place in translation technology research.

3 Professional Contextualisation: CAT Tools in the Translation Process

In this section, I will attempt a professional contextualisation of CAT tools by surveying the role of these tools in the computer-assisted translation process. In this context, I will zoom in on the translation process depicted in the Cologne Model of the Situated LSP Translator and attempt to establish a link between the various sub-tasks of the individual work phases of this process and different CAT tools (both autonomous software and integrated components of TM systems) which can be used to support these sub-tasks (this is informed by Reinke 2004: 109). The survey of CAT tool support in the translation process is not yet specifically concerned with the usability of these tools. Rather, it is intended to lay the foundation for the structured discussion of CAT tool usability in section 4, which will, at various points, make reference to the present survey. The computer-assisted translation process is depicted in figure 2 on the next page:¹⁴

¹⁴ the process of human translation. Bundgaard, Christensen and Schjoldager (2016: 108) call this scenario “MT-assisted TM translation”.

Most examples discussed in the context of the computer-assisted translation process in the present section and in the context of the usability of CAT tools in section 4 are based on SDL Trados Studio in its current version (2015). This is due to the fact that Trados Studio is one of the most widely used CAT tools in the translation industry and offers a plethora of functions and characteristics which are relevant to the present article. However, the prominence of examples from Trados Studio should not be understood as an endorsement of this TM system at the expense of other systems.

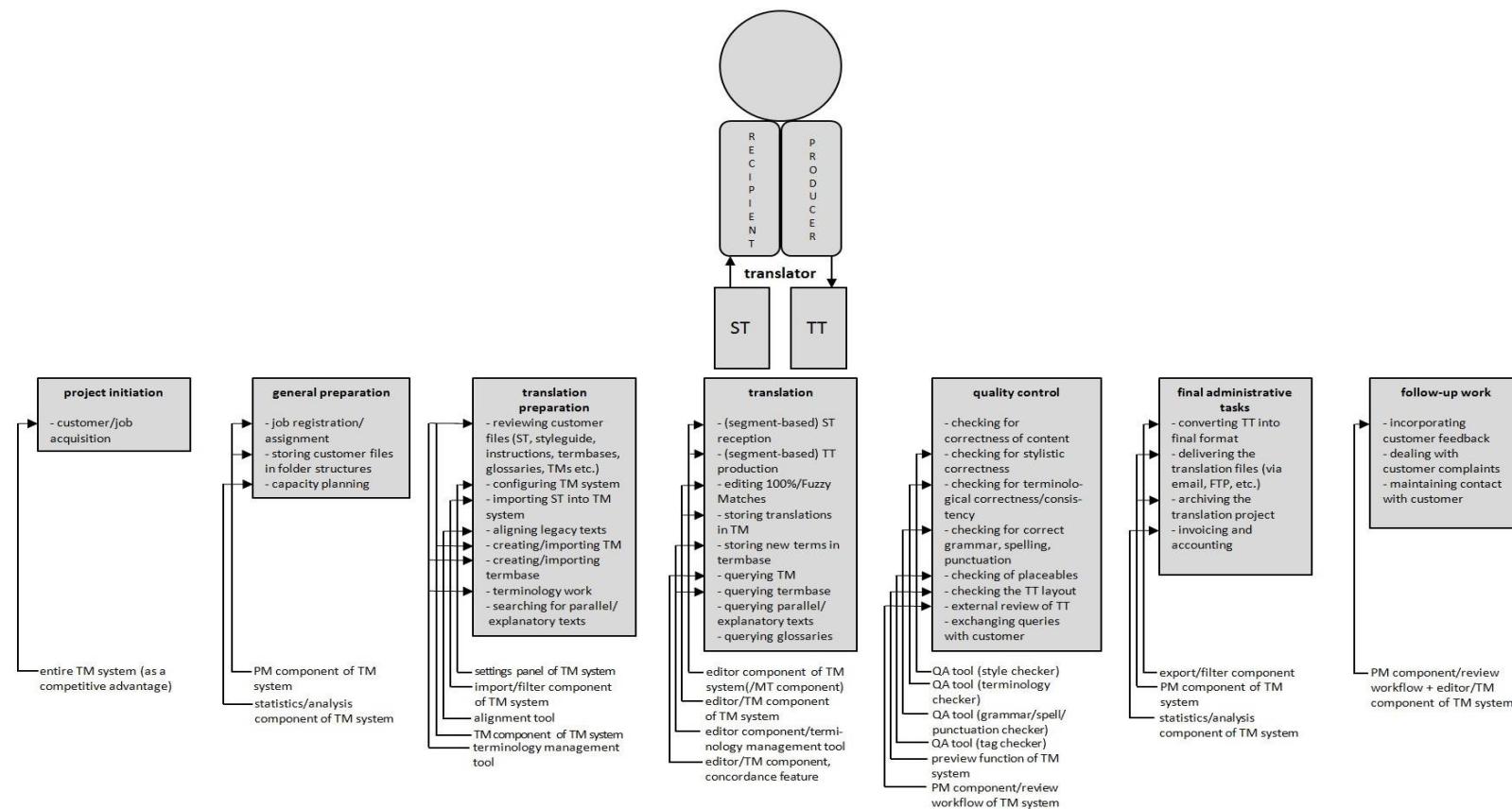


Fig. 2: The computer-assisted translation process

The translation process starts with the *project initiation* phase, which involves the acquisition of new customers and translation jobs.¹⁵ Due to the nature of this phase, it is not directly supported by any specific CAT tools. However, the workflows of individual customers may require translations in specific file formats and/or translation memory systems – for example because the customer has purchased a specific TM system/developed a proprietary in-house system or because a given TM system is optimally integrated with the customer's content management system. If the translator owns the TM system required by the customer, this may present a competitive advantage and may prompt the customer to assign the translation job to this translator.¹⁶ Also, various TM providers (such as Across) maintain a translator database which contains translation service providers (TSPs) working with the company's TM system. Customers who also work with this TM system or who have a workflow compatible with this system may then search this database for suitable TSPs. From the translator's perspective, then, there seems to exist a potential link between the acquisition of new customers/translation jobs and the ownership of a given TM system.

In the *general preparation* phase, the translation job is registered and (in the case of a freelancer network, a translation agency or a language service) assigned to one or more translators, the customer files are placed in suitable folder structures, and the capacity for handling the translation job is planned. Today, most commercially available TM systems feature a specific project management component which supports management and handling of files (among other things, the PM component can assist the translator in creating specific folder structures¹⁷), management of customer/translator data and workflow management (cf. Reinke 2013a: 30). Also, TM systems generally feature a statistics or analysis component, which establishes the amount of new matches, fuzzy matches, repetitions, 100 % matches and perfect matches in a given translation job and which thereby supports capacity planning.

The *translation preparation* phase involves reviewing the various files provided by the customer, configuring the TM system, importing the source text into the TM system, aligning legacy texts (if available), creating or importing TMs or terminology databases (termbases), conducting preparatory terminology work and searching for parallel/explanatory texts for documenting the translation job. Reviewing the customer files (for completeness, suitability, etc.) can be supported by the TM component of the TM system or by a terminology management tool, in case the customer provides one or

¹⁵ Again, whether this phase and other phases of the translation process are actually relevant for a particular translator depends on his/her specific translation setting (see the discussion in section 2.1).

¹⁶ However, there is the danger that customers base their translator selection process solely on the availability of specific TM systems and on the translator's competent handling of these systems and not on other relevant sub-competencies of the translator's overall translation competence (for example, his or her subject-matter competence).

¹⁷ For example, when working with the *project package* workflow in Trados Studio, the software automatically creates folders for source and target files, translation memories, etc. Also, when performing batch tasks such as *Analyze Files* or *Export for Bilingual Review*, Trados Studio automatically creates corresponding folders and places the relevant files in these folders.

more TMs and/or termbases as reference for the translation job. Configuring the TM system involves general preparatory tasks such as activating or deactivating the *AutoCorrect* function, activating or (in the case of highly contaminated TMs) deactivating the *Auto-propagation* function, configuring keyboard shortcuts, configuring *AutoSuggest* dictionaries, etc. The settings or options panel of current TM systems usually allows a very fine-grained configuration of the system according to specific user needs.¹⁸ How a given source text in a given file format is imported and presented in the TM system can be adjusted in the import/filter component of the system. For example, when importing Microsoft Word files, Trados Studio offers functions for treating special characters as inline placeholder tags or for extracting comments as translatable text or as Studio comments. When importing PowerPoint files, notes can be extracted and presented after each slide or at the end of all slides or can be excluded from the ST import, etc. Most current TM systems convert the translatable file into the XML-based format *XLIFF (XML Localization Interchange File Format)* or into a similar format (such as *SDLXLIFF* or *MQXLIFF*) after the import. XLIFF has become the standard format for exchanging localisable content between different TM systems. Another step in the *translation preparation* phase is the alignment¹⁹ of legacy texts. Before switching to the integrated TM system approach with Trados Studio 2009, SDL offered the autonomous tool WinAlign for aligning source and target texts. The alignment could then be exported into various exchange formats and imported into a TM. In Trados Studio, the alignment function is integrated directly into the TM system, with no additional export and import processes required. TMs can be created and imported via the (nowadays usually integrated) TM component of the TM system. Relevant questions in the context of this sub-task are, for example, whether the TM system supports common interchange formats for TM data (particularly the XML-based format *Translation Memory eXchange, TMX*), whether it supports the selection of multiple TMs, the parallel selection of TMs with different language combinations (for example, SDLs *AnyTM* function), etc. The creation and import of terminology databases and the preparatory terminology work (which involves populating these termbases prior to the actual translation) are usually done in autonomous terminology management systems such as MultiTerm (SDL), crossTerm (Across) or qTerm (Kilgray). With respect to termbase creation, a relevant question would be whether the respective terminology management system supports data structures according to the *meta-model* specified in ISO 16642 (2003) “Computer Applications in Terminology – Terminological Markup Framework” (cf. Arntz/Picht/Schmitz 1989/2014: 242). The seamless import (and export) of termbases depends on whether the respective terminology management system supports

¹⁸ The configurability of TM systems will be taken up again in the usability discussion in section 4.2.2 below.

¹⁹ In the translation process, an alignment creates “TM databases from previously translated documents that are only available as separate source and target text files by comparing a source text and its translation, matching the corresponding segments, and binding them together as units in a TM” (Reinke 2013a: 30).

common interchange formats for terminology data (particularly the XML/SGML-based formats *TermBase eXchange*, *TBX*, *Machine-Readable Terminology Interchange Format*, *MARTIF*, and *Open Lexicon Interchange Format*, *OLIF*; cf. Dreher/Ziegler 2011: 181). The search for parallel or explanatory texts is usually not supported by any CAT tools understood in a narrow sense. In applied corpus-based translation studies, various researchers propose a structured approach to compiling corpora of parallel/explanatory texts from the internet (the so-called *Web for Corpus* or *WfC* approach; see, for example, Krüger 2012: 515-518). It is certainly true that the internet has become the most important research source in professional translation. At the same time, electronic corpora are gaining in importance both in translation research and in translation practice. However, it is debatable whether the internet and electronic corpora can be considered prototypical CAT tools or translation technology in a narrow sense as understood in this article. In the Cologne Model of the Situated LSP Translator, these tools are included in the artefact group *digital research and communication resources* and are therefore excluded from the present discussion of the computer-assisted translation process.²⁰

The actual *translation* phase involves the (segment-based) source text reception and target text production, editing 100 % and fuzzy matches, storing new and/or revised translations in the translation memory, storing new terms in the termbase, querying TM(s) and termbase(s) and querying parallel/explanatory texts and glossaries. The (segment-based) ST reception and TT production are supported by the editor component of the TM system and, in the case of TT production, also by the machine translation component of the TM system (if available, see the discussion of the interactive processing of translation segments by MT systems in footnote 13). Functions related to the ST reception in the editor include the presentation of placeables (for example, the options *No Tag Text*, *Partial Tag Text* and *Full Tag Text* in Trados Studio), the adaptation of font sizes used for displaying the translatable text (see the usability discussion in section 4.2.2 below), etc. The TT production can be supported, among other things, by functions simplifying the writing process (for example, the *AutoCorrect*, *AutoSuggest* and *QuickPlace* functions of Trados Studio), by keyboard shortcuts for commonly used functions such as *Confirm Segment* or *Move to Next Unconfirmed Segment*, etc. 100 % and fuzzy matches can usually be edited directly in the editor or in the TM component of the translation memory system. The same holds for storing new or revised translations in the TM. The termbase can usually

²⁰ At the European Master's in Translation (EMT) Network Meeting in Riga in November 2015, the Working Group "Tools and Technology" discussed a research proposal entitled "Use of Corpora as CAT Tools". The participants were indecisive whether electronic corpora should be treated as prototypical CAT tools or not. However, there was unanimous agreement that these resources offer enormous potential for translation teaching and practice and that they should be assigned a more prominent place in translation technology research. In the light of this, future versions of the Cologne Model of the Situated LSP Translator may well include electronic corpora in the artefact group *translation technology in a narrow sense*, which would make them an integral component of the computer-assisted translation process.

be populated with new terms or queried directly from the editor of the TM system or in the external terminology management tool. Most current TM systems also include functions for automated term lookup, i.e., if the source segment includes a term from the specified termbase, this term, along with available additional information, will be presented automatically in the term recognition window. The translation memory can usually be queried directly from the editor or from the TM component of the translation memory system. The concordance feature can be used to retrieve instances of specific search strings below match level from the TM and to display these strings in their immediate context (cf. Reinke 2013a: 20). Querying parallel/explanatory texts or glossaries (in electronic form) is usually not supported by any CAT tools in the narrow sense. However, in this context, translators can use specific web concordancers such as WebCorp Live (2015) in order to access the internet as a corpus (the so-called *Web as Corpus* or *WaC* approach; see, for example, Krüger 2012: 518-520). Although these web concordancers are very useful tools both in translation teaching and practice, they are assigned to the artefact group *translation technology in a wider sense* in the Cologne model and are hence excluded from the present discussion of the computer-assisted translation process.

The *quality control* phase involves checking the target text for correctness of content, for stylistic correctness, for terminological correctness/consistency and for correct grammar/spelling/punctuation as well as checking the placeable elements in the target text, checking the TT layout, sending the TT for external review and exchanging queries with the customer. Checking the TT for correctness of content is mainly a manual task which is not supported by any specific CAT tools. Some tools offer functions for comparing the length of ST and TT segments (significant differences between ST and TT segment length may be an indicator of inadmissible omissions or additions in the target text), and terminology checkers can be configured to alert the user when a TT segment does not include an equivalent for a particular ST term present in the corresponding ST segment. However, these functions operate merely at the formal level and usually cannot contribute in any significant way to this quality control task.²¹ On the other hand, checking the target text for stylistic correctness can be supported by quality assurance (QA) tools featuring a specific style checker. An example for this would be the authoring support tool Acrolinx (cf. Siegel/Lieske 2015: 62). Checking the TT for terminological correctness/consistency can be supported by specific terminology checkers, which can be part of external QA tools, such as Acrolinx, D.O.G. Error Spy or ApSIC Xbench, or integrated components of TM systems (for example, the integrated Terminology Verifier of Trados Studio). The same holds for checking the grammar, spelling and punctuation of the target text. This task can also

²¹ In fact, these functions often lead to false positives, i.e. alleged errors which, upon closer investigation, turn out to be no errors at all (see, for example, Reinke 2013b: 42-43). Depending on the amount of such false positives, these functions will actually impede (instead of support) the human translation process.

be supported by external QA tools such as the ones listed above or by internal QA components of most TM systems. Also, most external QA tools and TM systems offer functions for checking the placeable elements in the target text (for example, the integrated Tag Verifier of Trados Studio). The layout of the target text can be checked by converting the preliminary TT version into the final format or – and this is usually the more economic approach – by using the integrated preview function of the TM system (if available). The external review of the target text can often be supported by the PM component or the review workflow of the TM system. Trados Studio, for example, includes the batch task *Export for Bilingual Review*. This exports the translated document into a bilingual Microsoft Word file with the option *Track Changes* activated. After review, the translator can reimport this Word file into Studio using the batch task *Update from Bilingual Review* and can accept or reject the reviewer's changes in line with the respective workflow in Microsoft Word.²² The task of exchanging queries with the customer is not normally supported by specific CAT tools or functions. However, with the proliferation of cloud-based translation memory systems (such as GlobalSight or Memsource), it seems feasible to integrate this information exchange process into the overall PM workflow of such systems.²³

The phase of *final administrative tasks* involves converting the target text into the final format (if requested by the client), delivering the translation (for example, via email or FTP server), archiving the translation project, invoicing the project and keeping accounts. The TT conversion into the final format is supported by the export/filter component of the TM system (see the discussion of the import/filter component in the *translation preparation* phase). The delivery of the translation can be supported by the PM component of the TM system. For example, when creating a return package within the translation package workflow of Trados Studio, the programme offers the function *Send Package by Email*, which creates a draft email (in Microsoft Outlook) with the project package attached. The TM system memoQ, on the other hand, features an online project workflow. Here, the translator can deliver the translation directly from memoQ by uploading it to the designated server. The PM component of a TM system may also support archiving the translation project (at least within the TM system). For example, in the *Projects* view of Trados Studio, finished projects can be set to the status *Completed*, and the view offers filter options for displaying or hiding completed projects. Of course, from the translator's perspective, archiving translation projects goes beyond this tool-internal sub-step and includes, for example, grouping projects completed in previous years in corresponding folders, storing completed projects on external hard drives, etc. Invoicing the translation project again is supported by the statistics/analysis component of the TM system. Since, nowadays, most translation

²² This workflow is particularly useful if the reviewer does not work with the same translation memory system as the translator. When the translation is exported into a bilingual Word file, the review process becomes independent of a specific TM system.

²³ For an up-to-date overview of cloud-based translation memory systems, see Mieth (2015).

projects are invoiced based on the number of translated words – broken down into different match categories such as *perfect match*, *100 % match*, *repetition*, *fuzzy match* (usually various subcategories) and *no match* –, the initial analysis of the translatable files will generally serve as basis for calculating the translation fee.

Finally, the phase of *follow-up work* involves tasks such as incorporating customer feedback, dealing with customer complaints and maintaining contact with the customer in order to acquire future translation jobs. The only task of this phase which can be supported by CAT tools is the incorporation of customer feedback. This task can be supported by the PM component/review workflow of the TM system (see the discussion of the task of sending the target text for external review in the *quality control* phase) and by the editor/TM component of the system. Ideally, the TM system should allow the user to assign attributes such as *From Customer Review* or *Approved by Customer* to the revised translation units so that the customer's preferences can be clearly identified when querying the TM in future translation scenarios.

This concludes the overview of the computer-assisted translation process and the contextualisation of CAT tools from a professional perspective. Although I tried to discuss the different phases of the computer-assisted translation process and the respective sub-tasks in some detail, the overview is by no means exhaustive. This is due to the potentially very complex nature and wide scope of this process. In this overview, I have attempted to find a balance between completeness of description and ease of presentation. In any case, what was still missing from the present discussion is the usability dimension of the various external tools or internal components/functions illustrated above. This usability dimension of CAT tools will be the main concern of the following sections.

4 Modelling the Usability of CAT Tools

As mentioned in the introduction of this article, translation studies publications specifically and exhaustively concerned with the usability of CAT tools from a user-oriented perspective still seem to be relatively scarce.²⁴ A cursory search in relevant databases such as Translation Studies Abstracts Online and BITRA as well as a corresponding internet search yielded three PhD theses (Höge 2002; Dragsted 2004; Lagoudaki 2008), one MA thesis (Guillardeau 2009) and several academic articles (e.g. Dillon/ Fraser 2006; Dragsted 2006; Lagoudaki 2006; Colominas 2008; Christensen/ Schjoldager 2011; Campbell et al. 2013). Most of these publications only seem to focus on particular aspects of overall CAT tool usability (for example, Dragsted 2004 and

²⁴ That the usability dimension is indeed underrepresented in translation technology research is also evidenced by the *Routledge Encyclopedia of Translation Technology* (Chan 2015). This publication which, by nature, should aim at a more or less exhaustive overview of the field of translation technology, contains no proper entry on usability (although the term is included in the index and appears several times in the publication).

2006 focus on the cognitive impact of segmentation, and Colominas 2008 is concerned with the precision of sub-sentential segmentation), on specific types of CAT tools (Guillardeau 2009 is concerned with open-source TM systems) or they do not derive their usability definition from the most current or most widely used usability standards (for example, Höge 2002: 92 works with the usability definition of ISO/IEC 9126, whereas most current usability models are based on ISO 9241; see the discussion below). Also, there is a relatively new research strand concerned with the ergonomics of the translation process (O'Brien 2012; Ehrensberger-Dow/Massey 2014a,b; Ehrensberger-Dow/O'Brien 2015). Within this research strand, there are three research foci, i.e. cognitive, physical and organizational ergonomics. Issues pertaining to translation software (and hardware) are investigated in the context of cognitive ergonomics (cf. Ehrensberger-Dow/O'Brien 2015: 106), which is concerned with "mental processes, such as perception, memory, reasoning, and motor response, as they affect interactions among humans and other elements of a system" (International Ergonomics Association n. d.). However, the issue of CAT tool usability is not addressed specifically in cognitive ergonomics research, and the investigation of translation technology remains at a rather coarse-grained level, being mostly concerned with shortcomings of user interfaces and the possibility to customise tool settings according to individual preferences (Ehrensberger-Dow/Massey 2014a: 204; ErgoTrans 2015: 3-4). Therefore, it seems that translational ergonomics may provide a high-level theoretical framework for CAT tool usability research (as does Situated Translation) but – probably due to the very wide scope of this approach – there have not been any detailed theoretical or empirical contributions to CAT tool usability research yet. In the present article, I will present a draft of a general model of CAT tool usability which is based on current usability standards and which attempts to capture all relevant usability aspects of CAT tools from a user-oriented perspective. Based on this general model of CAT tool usability, I propose a draft of a more specific model of translation memory system (TMS) usability. But first, I will discuss in some detail the term *usability*, which was evoked already at several points in this article but not yet properly defined.

In an article for the *Software Quality Journal*, Abran, Khelifi and Suryn (2003: 324) point out that the term *usability* "has not been defined homogeneously, either by the researchers or by the standardization bodies" and that the issue can be approached from different perspectives. In this context, the authors make a distinction between *product-oriented* standards such as ISO/IEC 9126 (2001) "Software Engineering – Product Quality"²⁵ and *process-oriented* standards such as ISO 9241 (2011) "Ergonomics of Human-System Interaction"²⁶ (Abran/Khelifi/Suryn 2003: 324). From a product perspective, usability is defined as "[t]he capability of the software product to

²⁵ In the meantime, the standard has been replaced by the standard ISO/IEC 25010 (2011) "Systems and Software Engineering – Systems and Software Quality Requirements and Evaluation (SQuaRE) – System and Software Quality Models".

²⁶ Previously, ISO 9241 was called "Ergonomics Requirements for Office Work with Visual Display Terminals (VDTs)".

be understood, learned, used and attractive to the user when used under specific conditions" (ISO/IEC 9126-1 2001). In ISO/IEC 9126 (2001), software usability is constituted by the five sub-dimensions of understandability, learnability, operability, attractiveness and usability compliance (cf. Abran/Khelifi/Suryn 2003: 326). From a process perspective, on the other hand, usability is defined as "[t]he extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specific context of use" (ISO 9241-11). According to Abran and Khelifi and Suryn (2006: 330), the process-oriented standard ISO 9241 takes a broader perspective on usability than the product-oriented standard ISO/IEC 9126. If we compare the definitions of usability in the two standards, it becomes obvious that the definition in ISO 9241 places more emphasis on the fact that usability is dependent on specific goals, specific users and specific contexts of use. This is in line with Rudlof's (2006: 15) observation that usability is not an *in vitro* quality but can only be established relative to a particular context of use.²⁷ This *in vivo* quality of the usability concept is probably better reflected by the process-oriented approach than by the product-oriented approach to this topic.²⁸ However, Abran and Khelifi and Suryn (2003: 330) point out that the product-based approach and the process-based approach to usability do not exclude each other but that they are in fact complimentary perspectives on the same topic. Accordingly, different authors (such as Dix et al. 1993/2004; Nielsen 1994; Abran/Khelifi/Suryn 2003) used the usability definition of ISO 9241 (2011) as a starting point for their usability models and complemented these models with elements from ISO/IEC 9126 (2001) and/or other usability standards. The CAT Tool Usability Model which I propose in figure 3 below is also derived primarily from the usability definition of ISO 9241 (2011) but, as the models mentioned above, its scope goes beyond this definition to include other usability dimensions.

²⁷ For the purpose of the present article, the context of use is understood to include the users of a specific software and their specific goals, which are stated separately in the ISO 9241 (2011) definition of usability. A context of use with this broader extension is reminiscent of the functional linguistic notion of *context of situation* (cf. Baker 2006: 324).

²⁸ On the context-dependence of software usability, see also Abran, Khelifi and Suryn: "To verify whether or not the required level of usability is achieved, it is necessary to measure the performance and the satisfaction of users working with the product. The measurement of usability is a complex interaction between users and context of use; this might produce different levels of usability performance for the same product when it is used in different contexts." (Abran/Khelifi/Suryn 2003: 329).

4.1 A General Model of CAT Tool Usability

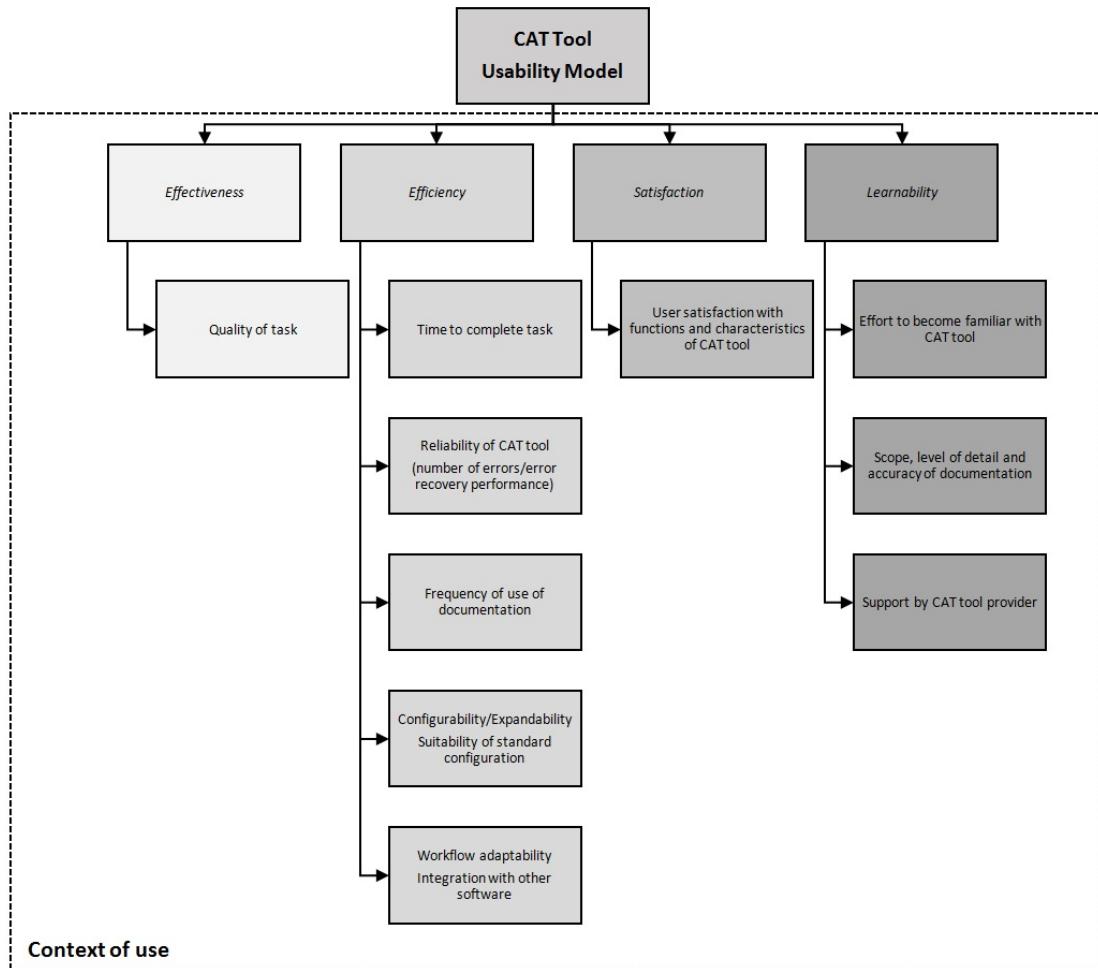


Fig. 3: A general model of CAT tool usability

The three usability dimensions of *effectiveness*, *efficiency* and *satisfaction* discernible in the CAT Tool Usability Model in figure 3 are derived from the ISO 9241 definition of usability (see section 4 above). Effectiveness is primarily a qualitative dimension, which describes how well a given user can achieve specified goals or perform specified tasks using the software. Efficiency, on the other hand, is a quantitative dimension, which is concerned with the effort required to achieve these goals or to perform these tasks. Satisfaction, in turn, is a subjective dimension, which captures the way the users feel about working with the software (cf. Rudlof 2006: 15). In the general model of CAT tool usability above, I complemented these three dimensions with the dimension of *learnability*, which constitutes one of the five sub-dimensions of usability in ISO/IEC 9126 (2001) (see section 4 above) and which various authors, such as Dix et al.

(1993/2004), Nielsen (1994) and Abran, Khelifi and Suryn (2003), integrated into their own usability models. Learnability, as understood in the general model of CAT tool usability, is concerned with how easily new users can familiarise themselves with a given software system and which resources they can draw on in this process.

As can be seen in figure 3, the general model of CAT tool usability is embedded in a specific context of use. This is intended to highlight the *in vivo* nature of usability, i.e. the fact that usability can only be established relative to specific users pursuing specific goals in a specific context (which is in line with the usability definition in ISO 9241). For example, the suitability of the standard configuration of a given CAT tool cannot be determined in isolation but only if we specify which task the configuration is to be suitable for and in which situation the CAT tool is to be used.²⁹ This emphasis on the context of use or the situation in which a given CAT tool is employed is also in line with the basic tenets of Situated Translation, which stresses the strict situation-dependence of the translator's cognitive performance (see section 2 above).³⁰

I will discuss the CAT tool usability model depicted in figure 3 at a rather abstract level since this is a very general model which basically serves as a coarse-grained template for more explicit or finer-grained models of specific CAT tools such as terminology management systems, machine translation systems or translation memory systems. The TMS Usability Model depicted in figure 4 is such a fleshed out or expanded version of the general CAT Tool Usability Model and will therefore be discussed at a more detailed level.

4.1.1 The CAT Tool Usability Dimension of *Effectiveness*

As mentioned above, *effectiveness* is a qualitative dimension, which is concerned with the quality of the task(s) performed with a given CAT tool (for example, the quality of a terminology database, of an alignment, or of a human translation). If we want to make judgements about the effectiveness of a given CAT tool, we must therefore establish various quality parameters against which the task performed with the CAT tool can be checked. I will address this dimension in more detail in the discussion of the TMS Usability Model below.

²⁹ In their evaluation of translation memory software for specific multilingual working environments, Campbell et al. also stress the importance of taking into account the specific context of use of a TM system: "We found that it was crucial to understand the organization's context and workflow prior to attempting to evaluate a specific piece of software. This step may seem obvious, but the *contextual inquiry* provided the necessary context for understanding which of the issues uncovered in this evaluation were specific to the software tool being evaluated and which issues were more intrinsic to the overall workflow." (Campbell et al. 2013: 2045-2046).

³⁰ In this context, see also Ehrensberger-Dow and Massey: "Presumably, [...] translation performance is affected not only by what happens in the translator's mind or on the computer screen, but also by how translators interact with their technological, physical, and organizational environment. That interaction may involve translators adapting environmental factors like tools and technology to suit their working needs, or adjusting their own cognitive processes and physical actions to fit those same factors." (Ehrensberger-Dow and Massey 2014b: 59).

4.1.2 The CAT Tool Usability Dimension of *Efficiency*

The *efficiency* dimension is finer-grained than the dimension of effectiveness. One important aspect of this dimension is the time required to perform a given task using the CAT tool in question. This temporal aspect is covered by most of the major usability models (see, for example, Abran/Khelifi/Suryn 2003: 334) and can be evaluated quite easily by means of time measurements. Another important aspect of the efficiency dimension is the reliability of the CAT tool, i.e. the number of errors occurring during the task and the recovery performance in the event of an error (cf. Guillardeau 2009: 87). Since errors are usually more or less time-consuming, this usability aspect also has a temporal dimension to it. The frequency of use of documentation is also an efficiency aspect which is covered in most of the major usability models (cf. Abran/Khelifi/Suryn 2003: 332, 334). The basic idea is that the more frequently the user has to consult the documentation, the less intuitive and efficient working with the software will be. The configurability/expandability of the CAT tool refers to how well the tool can be customised according to specific work or user requirements and whether the user can add new functions to the tool, and the suitability of the standard configuration is concerned with how well this configuration is suited to perform a given task in a given context of use. I will also discuss these aspects in more detail in the context of the TMS Usability Model below. The aspect of workflow adaptability/integration with other software is the last aspect of the efficiency dimension. This aspect is concerned with how flexibly the CAT tool can be adapted to different workflows and/or how well it is integrated with other software. Examples would be the compatibility between a given terminology management system and a given translation memory system or the number of data exchange formats supported by these systems. With reference to the research strand of translational ergonomics discussed in section 4 above, this workflow adaptability/integration of CAT tools can be considered as an aspect of *organizational ergonomics*, which is concerned with “the optimization of sociotechnical systems, including their organizational structures, policies, and processes” (International Ergonomics Association n. d.).

4.1.3 The CAT Tool Usability Dimension of *Satisfaction*

The dimension of *satisfaction* is solely concerned with the user's satisfaction with the functions and characteristics offered by the CAT tool. At a very general level, this satisfaction can be established using standardised rating scales such as the Software Usability Scale (SUS, Brooke 1996).³¹ When using this scale to measure the satisfaction of users with a given piece of software, the participants are asked to rate the following 10 aspects with answers ranging from *Strongly Agree* to *Strongly Disagree*:

³¹ For an application of this scale in the context of translation technology research, see Campbell et al. (2013). The scale can be accessed online under Usability.gov (2016).

1. I think that I would like to use this system frequently.
2. I found the system unnecessarily complex.
3. I thought the system was easy to use.
4. I think that I would need the support of a technical person to be able to use this system.
5. I found the various functions in this system were well integrated.
6. I thought there was too much inconsistency in this system.
7. I would imagine that most people would learn to use this system very quickly.
8. I found the system very cumbersome to use.
9. I felt very confident using the system.
10. I needed to learn a lot of things before I could get going with this system.

As mentioned above, this is a very general scale which can be used to measure user satisfaction with a wide range of potentially very different systems. If the exact nature of the system to be evaluated is determined, a rating scale which is tailored to the characteristics of this system could be used. The usability dimension of satisfaction will also be discussed in some more detail in the context of the TMS Usability Model below.

4.1.4 The CAT Tool Usability Dimension of *Learnability*

The first aspect of the *learnability* dimension is concerned with the effort the user has to invest in order to become familiar with the CAT tool. From a product-oriented perspective, this aspect would cover the intuitiveness of a given CAT tool. In most of the major software usability models, the learnability dimension is reduced to the “time to learn” which has to be invested before a user can handle a software product with confidence (cf. Abran/Khelifi/Suryn 2003: 332, 334). However, Guillardeau (2009: 84-86) points out, rightly in my opinion, that learnability is also dependent on the availability of product documentation. In the general model of CAT tool usability, I specify further that it is not only the availability of such documentation but also its scope, level of detail and accuracy that will eventually contribute to the learnability of the software product. Also, the support offered by the developer and/or vendor of the CAT tool is an important contributor to learnability. Commercial vendors such as SDL, Across, Kilgray, etc. usually offer a high level of support (which will not always be free of charge), whereas the support level for open-source software such as OmegaT and Anaphraseus may vary (cf. Guillardeau 2009: 85-86).

4.2 A Model of Translation Memory System (TMS) Usability

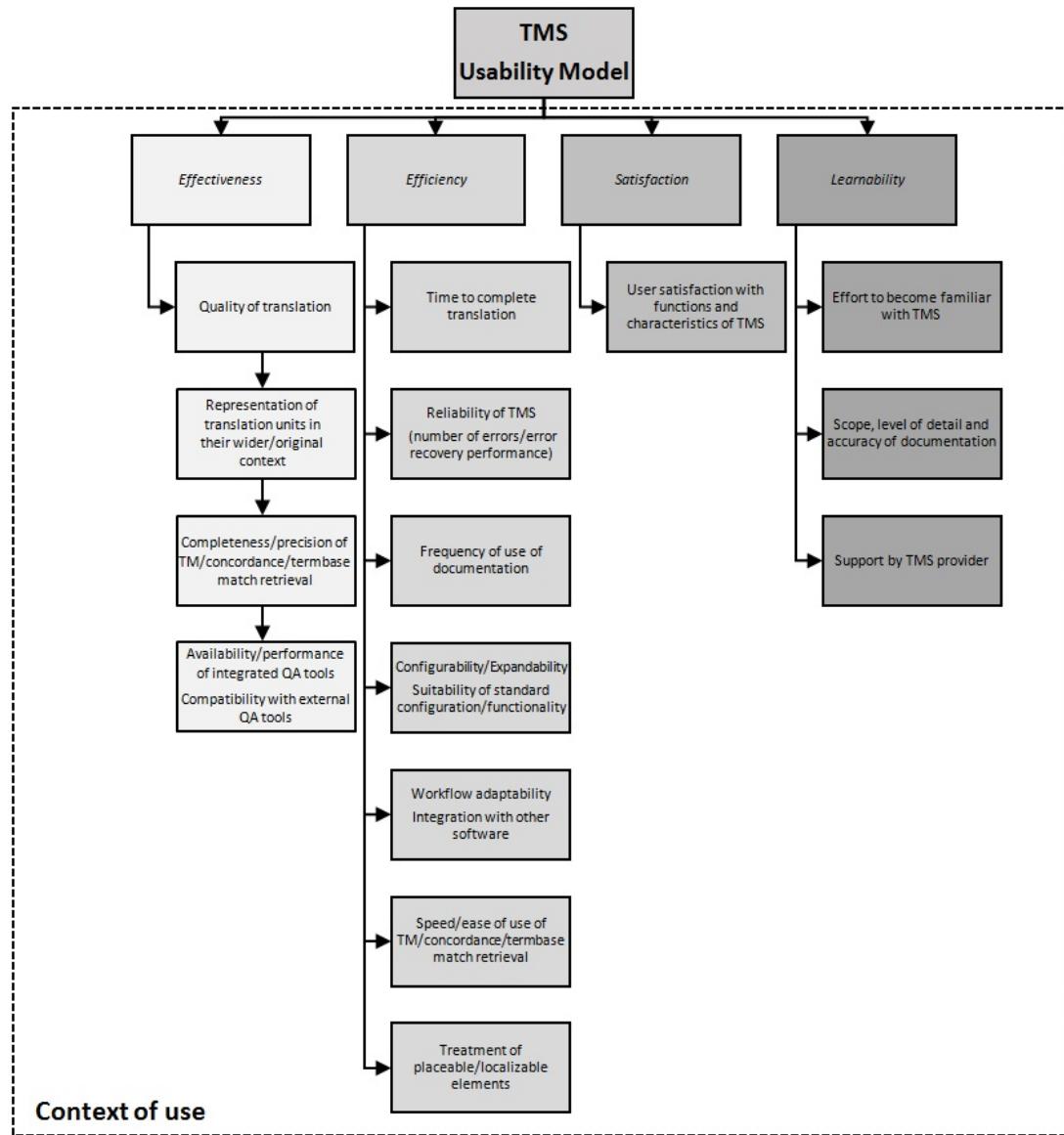


Fig. 4: A model of translation memory system (TMS) usability

In this section, I will be concerned with the more specific model of translation memory system usability – TM systems being the central tools used in the computer-assisted translation process. Compared to the general model of CAT tool usability discussed in section 4.1, the four usability dimensions have been fleshed out in more detail in this model. The TMS Usability Model is also embedded in a specific context of use in order

to do justice to the *in vivo* nature of TMS usability (see the discussion in section 4.1 above).

4.2.1 The TMS Usability Dimension of *Effectiveness*

In the TMS Usability Model, we can address the *effectiveness* dimension in more detail since we know the nature of the product to be produced using the CAT tool, i.e. we are concerned with the quality of a translation product. The topic of translation quality has been addressed in detail both in translation studies (for example, House's 1997 model of translation quality assessment) and in the translation industry (for example, the standard SAE J2450 2005 "Translation Quality Metric"), so there should be enough frameworks available for measuring the quality of the translation product produced with a given TM system.³² In the TMS Usability Model above, I have depicted three tool-internal aspects which I consider to be of particular relevance in producing a high-quality translation.

The first tool-internal aspect probably contributing to translation quality is the representation of the translation units in their wider and/or their original context. The wider context refers to the immediate co-text of a given translation unit, i.e. the text immediately preceding and following the translation unit. Serrano Piqueras (2011: 123) assumes that the (usually sentence-based) segmentation enforced by TM systems may affect the translator's text-pragmatic competence, for example their use of transphrastic cohesive devices (such as pronouns or pronominal adverbs used to establish anaphoric or cataphoric reference). If the translation memory system makes it easy for the translator to keep the immediate co-text of a given translation unit in focus, this may ultimately improve the cohesion of the target text (provided the translator's text-pragmatic competence is sufficiently developed).³³ Both the presentation of translation units in their wider context and the presentation of these units in their original context can be supported by the preview function of the TM system (if available). For example, memoQ features a live preview of the translation in the original format at the bottom of the screen and therefore provides the translator with (potentially) valuable information on formatting and co-text. Using an eye tracker, we could investigate if and how often the translator consults this live preview and how often the translator fixates the co-text of the present translation unit (in the editor or the preview). Also, if we focus on the issue of sentence-based segmentation and TT cohesion, we could check the final translation product for an adequate use of cohesive devices, such as pronouns, pronominal adverbs, etc. If these data were compared with the data obtained from another TM system (ideally used by the same translator to translate a similar source

³² For an up-to-date and exhaustive discussion of translation criticism, see Reinart (2014).

³³ At the EMT Network Meeting in Riga in November 2015, the Working Group "Tools and Technology" initiated a research project entitled "Use of CAT Tools and Translators' Perception of Document Coherence and Cohesion". Basically, this research project sets out to investigate the segmentation aspect of the TMS effectiveness dimension outlined above.

text), we could establish potential differences between the two data sets and check whether these differences can be linked to any specific characteristics of the two TM systems.

The second aspect of translation quality immediately affected by the TM system is the completeness and precision of TM/concordance/termbase match retrieval (cf. Lagoudaki 2006: 23). If the search results obtained from the translation memory or from the termbase are not complete and adequately precise, this may affect, for example, the internal consistency of the target text (at word/term, phrase, sentence or paragraph level) or the external consistency of the TT with previous translations produced for the customer. The retrieval performance of TM systems can be impacted, among other things, by the occurrence of placeable and localizable elements in the translation segments (cf. Azzano 2011). The general view in translation technology research is that the retrieval performance of commercial TM systems still offers room for improvement. For example, Reinke claims that “[a]lthough commercial TM systems have been available for over two decades, their retrieval performance has not improved considerably in terms of quality and quantity” (Reinke 2013a: 41).

The third and last tool-internal contributor to translation quality is the availability and performance of integrated QA tools and the compatibility of the TM system with external QA tools. For example, if the translator performs the translation in a TM system offering no integrated spellchecker, he or she will have to copy the translation into a text-processing software such as Microsoft Word, probably remove formatting information which should be excluded from the spell check, run the check, and correct the identified errors in the TM system. This process is not only rather time-consuming (which would actually affect the efficiency dimension of TMS usability) but also very error-prone. TM systems such as Trados Studio offer an integrated spell check using the Microsoft Word spell checker. This allows the translator to use the Microsoft Word dictionary which he or she may have customized during previous spell checks in Microsoft Word (or in other TM systems supporting the Word spell checker). Also, Trados Studio can be configured to ignore certain match types such as 100 %, context and perfect matches. This is particularly useful if the text to translate is embedded in large amounts of context/perfect matches and the customer instructs the translator to translate and proofread only the new segments and leave the other segments alone (which are usually not paid for in these kinds of assignments). The internal spell checker of Trados Studio could then be configured to check only the newly translated matches; again, there is a temporal aspect to this function, which would also affect the efficiency dimension of TMS usability. The compatibility with external QA tools is mostly dependent on the file format into which the TM system converts the files to translate. Ideally, the TM system should use standardised formats such as XLIFF or formats derived from this format (such as the Trados Studio format SDLXLIFF, see the discussion of the *translation preparation* phase in section 3), which can be checked by most of the commercially available QA tools.

4.2.2 The TMS Usability Dimension of *Efficiency*

I now turn to the *efficiency* dimension of the TMS Usability Model. The time required to complete the translation can be measured quite easily in respective usability experiments. However, this parameter should probably not be interpreted in isolation but rather be correlated with the quality of the translation product in order to account for the fact that high-quality translations cannot be done in a rush but simply require a certain amount of time. If we want to make comparative statements about this temporal efficiency aspect of two TM systems, we would therefore have to check whether the two translations produced with these TM systems are roughly similar in quality.

The reliability of a translation memory system is concerned with the number of errors occurring during the translation and the recovery performance of the system in the case of an error. One relevant question which could be asked in this context is whether the TM system features a function for automatically saving the translation and whether this function can be configured by the user. For example, Trados Studio features a specific *AutoSave* function which can be activated or deactivated and for which the user can specify a certain interval. If the TM system crashes during translation, the file can be restored to the last (auto)saved version.

The frequency of use of documentation was discussed briefly in the context of the general model of CAT tool usability. I will address the issue of documentation in some more detail in the discussion of the learnability dimension of TMS usability.

The configurability of the TM system refers to how well the tool can be customised according to specific work and user requirements. In this context, we could also evaluate the suitability of the standard configuration of the system. While the question of suitability is usually dependent on the actual context of use (see the discussion in 4.1 above), there are also some relatively context-independent aspects to it. For example, in the standard configuration of Trados Studio, the minimum ST and TT font sizes are set to 8 (this can be changed in the editor options). Depending on the size of the monitor the translator works with and the size of the editor window, text displayed in font size 8 is hardly discernible to the eye. Regardless of the actual context of use, this standard setting may therefore violate the principles of ISO 9241-12 (2011) "Presentation of Information", which requires that on-screen information must be displayed in a suitable font type and font size (cf. Rudlof 2006: 25-26). Another aspect that could be mentioned in this context is the standard assignment of keyboard shortcuts to frequently used functions such as the concordance function.³⁴ For example, Trados Studio features a concordance function for both source and target segments of the TM. In most cases, the translator will probably want to search for unknown strings in the source segments of the translation memory in order to check whether the TM contains any suitable translation solutions. If the cursor is placed in the source segment of the

³⁴ For a study on the general usefulness of the concordance function of TM systems, see O'Brien, O'Hagan and Flanagan (2010).

editor, this function can be accessed quite easily via the function key F3; if the cursor is placed in the target segment of the editor, the more complex key combination Ctrl+F3 has to be used. It is common practice for translators to copy the source-segment text into the target segment and then overwrite this text with their translation (cf. Ehrensberger-Dow/Massey 2014b: 71; this is particularly the case when the source segments contains non-translatable elements such as proper names, numbers, email addresses, etc.). Therefore, when the need to perform a concordance search (usually in the source segments of the TM) arises, the cursor will often be placed in the target segment of the editor. However, the key combination required to access the source segments of the TM from a target segment in the editor view (Ctrl+F3) is quite inconvenient since it forces the translator to remove his or her hands from their normal writing position on the keyboard. Since this use of the concordance feature can be claimed to be the prototypical one, the easier shortcut F3 (or another ergonomic shortcut) should be assigned to it.³⁵ In both cases, the standard configuration of the TM system can be claimed to be suboptimal (regardless of any specific context of use), but at the same time, the configurability of the tool allows the user to actually optimise the standard configuration.³⁶

If the TM system features a good expandability, it will allow the user to add new functions to the system. The suitability of the standard functionality is concerned with the question of whether the original functions of the system are sufficient to perform a given translation task. Again, the issue of expandability seems to be strongly dependent on the actual context of use (for example, on the individual user preferences or the nature of the translation task to be performed with the TM system). On TranslationZone.com, SDL offers a wide variety of apps and plugins (most of them free of charge), which can be downloaded and integrated into Trados Studio to expand its standard functionality (for example, apps for configuring customised menus, for integrating machine translation services such as SYSTRAN into Studio, for performing advanced number checks, etc.). Translators can use this wide variety of tools to expand and fine-tune the functionality of Trados Studio according to their individual work preferences. However, it should not be disregarded that both configuring and expanding a TM system according to individual preferences or requirements is often a rather time-consuming task which many practicing translators may have to skip because of the (often enormous) time pressure involved in their work.³⁷ This observation is confirmed by the results of the *Capturing Translation Processes* (CTP) research

³⁵ The keyboard shortcuts can also be changed in the options of Trados Studio.

³⁶ In this context, Krüger and Serrano Piqueras (2015: 14-15) point out that translators should attempt to optimise the psycho-motor routines involved in the translation process (which would involve, among other things, optimising the keyboard shortcuts used in the writing phase of the translation process). The intensive use of peripheral devices in computer-assisted translation is illustrated in a corresponding ergonomics study by Ehrensberger-Dow and Massey (2014a: 204).

³⁷ In the Cologne Model of the Situated LSP Translator depicted in figure 1 above, this potential time pressure is covered by the category *physical and psychological factors*.

project conducted at Zurich University of Applied Sciences. The results show that translators, instead of adjusting CAT tool settings according to their personal preferences, "might be adapting their performance to software rather than the converse" (Ehrensberger-Dow/Massey 2014b: 80).

If the TM system features a good workflow adaptability, it can be adapted flexibly and easily to different workflows (as discussed in section 4.1.2, this workflow adaptability can be considered as an aspect of *organizational ergonomics*). An example of good workflow adaptability of Trados Studio is that the system offers different translation workflows (the *single document* workflow, the *package* workflow and the *GroupShare* workflow) for different translation scenarios. If the translator is assigned a rather straightforward translation job (for example, a single file to translate using a TM which the customer provided already for an earlier assignment), the economic and quick *single document* workflow can be used. On the other hand, complex assignments including multiple files and new translation memories will usually be handled via the more extensive *package* workflow. An example of suboptimal workflow adaptability of Trados Studio is that the tool creates fixed folder structures for specific batch tasks such as *Analyze Files*, *Export for Bilingual Review*, etc. (see the discussion of the computer-assisted translation process in section 3). These folder structures, which cannot be changed in the options of the system, may be incompatible with the translator's preferred folder structures (which may be independent of specific CAT tools). In this case, the file management workflow specified by the TM system is imposed on the translator's file management workflow. The integration of the TM system with other software is concerned, for example, with the compatibility between a given TM system and a given terminology management system. While systems provided by the same vendor (for example, SDL Trados Studio and SDL MultiTerm) will usually be optimally compatible, inter-vendor compatibility cannot be taken for granted.³⁸

The speed and ease of use of TM/concordance/termbase match retrieval is concerned with how quickly the user can perform these retrieval tasks using the TM system (cf. Lagoudaki 2006: 23-24) – which will affect the overall time required to complete the translation. For example, MultiTerm termbases can be queried directly from the editor component of Trados Studio, relieving the translator from accessing MultiTerm every time he or she wants to search for a specific term in the termbase. This function is due to the good integration of Trados Studio with MultiTerm (see the discussion of the previous efficiency category) and adds to the speed and ease of use of termbase match retrieval. The concordance shortcuts in Trados Studio discussed in the context of the configurability of TM systems could also be addressed in the present category of the efficiency dimension. In this case, the shortcut of the prototypical concordance search function is not very ergonomic or user friendly, which adversely affects the overall speed and ease of use with which this task can be performed.

³⁸ Although this inter-vendor compatibility has improved considerably with the introduction of standardised XML-based data exchange formats such as XLIFF, TMX and TBX.

The last aspect of the efficiency dimension of TMS usability is the treatment of placeable and/or localizable elements in the translation memory system. Questions which are relevant in this context are, for example, how tags are displayed, whether the system allows reordering tags or deleting unnecessary tags in the target text, how hyperlinks or email addresses are displayed and localized, etc. Placeable and localizable elements are a vast topic and certainly influence the overall usability of the TM system but they cannot be addressed here in detail. For an exhaustive discussion and investigation of these elements, see Azzano (2011).

4.2.3 The TMS Usability Dimension of *Satisfaction*

This dimension is concerned with the user's subjective satisfaction with the functions and characteristics offered by the TM system. In section 4.1.3 above, I discussed the System Usability Scale (SUS), which is a rather coarse-grained scale that can be used to measure user satisfaction with a wide range of potentially very different software systems. If we want to measure user satisfaction with specific software systems such as TM systems and if we also want to take into consideration the specific context of use of these systems, this scale could be specified and expanded accordingly. For example, question 1 of the SUS could be reformulated as "I think that I would like to use this system frequently in context of use/translation scenario xy."³⁹ Also, question 3 of this scale could be tailored to specific functions of the system, for example, by reformulating it as follows: "I found the concordance feature/the tag verifier/the PM component, etc. of the TM system easy to use". The System Usability Scale in its original form should therefore be regarded primarily as a template which can be adapted to measure user satisfaction with specific systems.⁴⁰ Also, user satisfaction could be correlated with various elements from the other TMS usability dimensions. For example, we could measure the satisfaction of users working with the standard configuration/functionality of the TM system and the satisfaction of users who configured/expanded the system according to their individual work preferences. Such a differentiated and context-sensitive TM System Usability Scale seems to be a necessary supplement to the TM Usability Model. However, developing such a scale is an ambitious undertaking, which is beyond the bounds of the present article.

³⁹ An example of such a context of use or translation scenario would be a freelance setting, where a freelance translator works regularly for translation agencies providing him/her with preprocessed XLIFF files to translate.

⁴⁰ Dillon and Fraser (2006: 77) developed a questionnaire in order to measure translators' perception of TM adoption. However, the questionnaire is mostly concerned with the overall impact of using TM systems (for example, users can agree or disagree with statements such as "I would use out on work if I did not have TM software", or "Using TM makes translation easier"). Still, several elements of this questionnaire could be used to develop a specific TM System Usability Scale.

4.2.4 The TMS Usability Dimension of Learnability

As discussed in the context of the general model of CAT tool usability (see section 4.1.4 above), the learnability dimension consists of three elements: 1) the effort that the user has to invest in order to become familiar with the TM system; 2) the scope, level of detail and accuracy of the documentation provided for the system; and 3) the support offered by the provider of the TM system. While the effort to become familiar with the TMS is partly dependent on strictly tool-internal aspects (i.e., the intuitiveness of the TM system, for example, the self-descriptiveness of dialog boxes, menus, etc.; cf. Rudlof 2006: 54), it will also depend on the quality of the documentation and the support offered by the provider. If the documentation of the TMS system is comprehensive, adequately detailed and free of errors and if the support offered by the TMS provider is targeted to the user's needs, this should support the translator's process of becoming familiar with the TM system. There is a link here between the learnability dimension of TMS usability and the *frequency of use of documentation* as one aspect of the efficiency dimension. If the TM system features a good intuitiveness, the need to consult the documentation should be relatively low. Also, if the translator consults the documentation and finds the required information right away and this information is sufficiently detailed, the need for future consultation of the documentation may decrease. Documentation and support services for a given TM system should be understood in a wide sense, ranging from traditional product briefs, user guides and technical data sheets (both in printed and electronic form) to online help and FAQ pages to moderated forums hosted on the website of the TMS provider, YouTube channels, webinars, etc. These resources, if available and of adequate quality, will certainly add to the learnability and ultimately to the overall usability of the TM system.

5 Conclusion and Outlook

In this article, I attempted to contextualise CAT tools from a theoretical and a professional perspective and to model the usability of these tools. The theoretical contextualisation linked CAT tools to the cognitive translational theory of Situated Translation, which claims that the translator's cognition is not isolated in the head but emerges from the translator's interaction with his or her working environment.⁴¹ This link underlined the general relevance of CAT tools for the translator's cognitive performance. The Cologne Model of the Situated LSP Translator served as a bridge between the theoretical and the professional contextualisation of CAT tools. In this model, CAT tools are conceptualised as relevant artefacts in the translation environment and can therefore be viewed as an integral part of the translational ecosystem and hence of the translator's

⁴¹ Such a link is also proposed by Christensen: "As regards a theoretical frame for future TM research, the paradigm of situated, embodied cognition seems highly useful, because it takes into account the fact that translation as a distributed activity does not take place only within the brain of an individual human." (Christensen 2011: 155).

cognition. The professional contextualisation of CAT tools took the form of an overview of these tools in the different work phases of the computer-assisted translation process. This overview was derived from the Cologne Model of the Situated LSP Translator and illustrated which work phases and sub-tasks of the translation process can be supported in which way by CAT tools. Then, the usability of CAT tools was moved into focus. In this context, I first discussed the notion of usability from a general software perspective, before proposing a coarse-grained general model of CAT tool usability and a finer-grained model of translation memory system usability, which are both structured along the four usability dimensions of effectiveness, efficiency, satisfaction and learnability and which are embedded in a variable context of use.⁴² These models attempt to capture all relevant aspects of CAT tool usability from a user-oriented perspective and may be used as foundations for structured approaches to testing the usability of CAT tools. Such structured approaches to CAT tool usability testing are a prerequisite if we want to elicit meaningful empirical data on the different components of the two usability models and to obtain a differentiated and holistic picture of CAT tool usability. Also, if the two models are to be applied in order to measure the usability of specific CAT tools, we need to define the specific contexts of use of these tools. At various points in this article, I stressed the fact that usability is an *in vivo* concept which can only be established for specific users, specific tasks and specific work situations (in other words, for specific contexts of use).⁴³ Both the different translation settings identified by Reinke (2004: 101-103, see footnote 12 above) and the work phases of the translation process depicted in the Cologne Model of the Situated LSP Translator may serve as a template for specifying such contexts of use.

It is a desideratum that the results of well-structured CAT tool usability research be fed back to the developers of translation technology, which eventually may lead these developers to optimise the usability of their tools to the benefit of their users. Cognitive translational theories such as Situated Translation stress the relevance of such high-usability technology for the professional translator, a fact which is also underlined by Ehrensberger-Dow and O'Brien in the context of translational ergonomics:

If we take seriously the notion of translation being a situated activity, then we have to provide opportunities for translators to explain what their personal preferences are and to have their voices heard by designers of translation workspaces and language technology.

(Ehrensberger-Dow/O'Brien 2015: 112)

⁴² In the two models, there are some interdependencies between the different dimensions, particularly between the effectiveness and efficiency dimensions (see the corresponding discussions above). For the sake of simplicity, I refrained from making explicit these interdependencies by means of corresponding arrows in the models.

⁴³ In the discussion of the two models, I pointed out that some components of these models are more context-dependent (for example, the suitability of the standard configuration/functionality of the CAT tool/TMS) while others are more context-independent (for example, the standard font size and keyboard shortcuts in TM systems such as Trados Studio). Again, for the sake of simplicity, I did not reflect this relative context-(in)dependence of the various components explicitly in the two models.

Ideally, then, the efforts of translational ergonomics and CAT tool usability research will lead to the development of more “caring” translation technology (O’Brien 2012: 103), which effectively supports the situated translator as the central agent of the computer-assisted translation process.

References

- Abran, Alan; Adel Khelifi, Witold Suryn (2003): “Usability Meanings and Interpretations in ISO Standards.” *Software Quality Journal* [11]: 323-336
- Adams, Fred; Ken Aizawa (2010): “Defending the Bounds of Cognition.” Richard Menary (ed.): *The Extended Mind*. Cambridge: MIT Press, 67-80
- Arntz, Reiner; Heribert Picht, Klaus-Dirk Schmitz (1989): *Einführung in die Terminologiearbeit*. 7th ed. 2014. Hildesheim: Olms
- Austermühl, Frank (2012): “Using Concept Mapping and the Web as Corpus to Develop Terminological Competence among Translators and Interpreters.” *Translation Spaces* [1]: 54-80 – <https://benjamins.com/#catalog/journals/ts.1.09aus/fulltext> (10.11.2015)
- Azzano, Dino (2011): *Placeable and Localizable Elements in Translation Memory Systems*. PhD Thesis Munich: Ludwig Maximilian University – https://edoc.ub.uni-muenchen.de/13841/2/Azzano_Dino.pdf (10.11.2015)
- Baker, Mona (2006): “Contextualization in Translator- and Interpreter-mediated Events.” *Journal of Pragmatics*, Special Issue: *Translation and Context* 38 [3]: 321-337
- Brooke, John (1996): “SUS – A Quick and Dirty Usability Scale.” Patrick W. Jordan, Bruce Thomas, Bernard A. Weerdmeester, Ian L. McClelland (eds): *Usability Evaluation in Industry*. London: Taylor & Francis, 189-194
- Bundgaard, Kristine; Tina Paulsen Christensen, Anne Schjoldager (2016): “Translator-computer Interaction in Action – an Observational Process Study of Computer-aided Translation.” *JoSTrans – The Journal of Specialised Translation* [25]: 106-130 – http://www.jostrans.org/issue25/art_bundgaard.pdf (05.02.2016)
- Campbell, Susan G.; Sarah C. Wayland, Alina Goldman, Sergey Blok (2013): “Speaking the User’s Language: Evaluating Translation Memory Software for a Linguistically Diverse Workplace.” *Proceedings of the 57th Annual Meeting of the Human Factors and Ergonomics Society*, 2042-2046
- Chan, Sin-Wai (ed.) (2015): *The Routledge Encyclopedia of Translation Technology*. London/ New York: Routledge
- Christensen, Tina Paulsen (2011): “Studies on the Mental Processes in Translation Memory-assisted Translation – the State of the Art.” *trans-kom* 4 [2]: 137-160 – http://www.trans-kom.eu/bd04nr02/trans-kom_04_02_02_Christensen_Translation_Memory.20111205.pdf (05.02.2016)
- Christensen, Tina Paulsen; Anne Schjoldager (2010): “Translation-Memory (TM) Research: What Do We Know and How Do We Know It?” *Hermes – The Journal of Language and Communication* [44]: 1-13 – http://pure.au.dk/portal/files/10113/Hermes-44paulsen_christensenschjoldager.pdf (10.11.2015)

- Christensen, Tina Paulsen; Anne Schjoldager (2011): "The Impact of Translation-Memory (TM) Technology on Cognitive Processes: Student-Translators' Retrospective Comments in an Online Questionnaire." Bernadette Sharp, Michael Zock, Michael Carl, Arnt Lykke Jakobsen (eds): *Proceedings of the 8th International NLPICS Workshop: Special Theme: Human-Machine Interaction in Translation*. 20.-21. August 2011, Copenhagen, Denmark, 119-130
- Colominas, Carme (2008): "Towards Chunk-based Translation Memories." *Babel* 54 [4]: 343-354
- Cooper, Alan (2004): *The Inmates Are Running the Asylum: Why Hi-Tech Products Drive Us Crazy and How to Restore the Sanity*. Indianapolis: Sams
- Dillon, Sarah; Janet Fraser (2006): "Translators and TM: An Investigation of Translators' Perceptions of Translation Memory Adoption." *Machine Translation* 20 [2]: 67-79 – <http://link.springer.com/article/10.1007%2Fs10590-006-9004-8#/page-1> (10.11.2015)
- Dix, Alan; Janet Finlay, Gregory D. Abowd, Russel Beale (1993): *Human-Computer Interaction*. 3rd ed. 2004. Upper Saddle River: Prentice Hall
- Dragsted, Barbara (2004): *Segmentation in Translation and Translation Memory Systems – An Empirical Investigation of Cognitive Segmentation and Effects of Integrating a TM System into the Translation Process*. Copenhagen: Samfundslitteratur
- Dragsted, Barbara (2006): "Computer-Aided Translation as a Distributed Cognitive Task." *Pragmatics & Cognition* 14 [2]: 443-464
- Drewer, Petra; Wolfgang Ziegler (2011): *Technische Dokumentation. Eine Einführung in die übersetzungsgerechte Texterstellung und das Content-Management*. Würzburg: Vogel
- Ehrensberger-Dow, Maureen; Gary Massey (2014a): "Translators and Machines: Working Together." Wolfram Baur, Brigitte Eichner, Sylvia Kalina, Norma Keßler, Felix Mayer, Jeanette Ørsted (eds): *Man vs. Machine? The Future of Translators, Interpreters and Terminologists. Proceedings of the XXth FIT World Congress*. Berlin: BDÜ Fachverlag, 199-207

trans-kom

ISSN 1867-4844

trans-kom ist eine wissenschaftliche Zeitschrift für Translation und Fachkommunikation.

trans-kom veröffentlicht Forschungsergebnisse und wissenschaftliche Diskussionsbeiträge zu Themen des Übersetzens und Dolmetschens, der Fachkommunikation, der Technikkommunikation, der Fächersprachen, der Terminologie und verwandter Gebiete.

Beiträge können in deutscher, englischer, französischer oder spanischer Sprache eingereicht werden. Sie müssen nach den Publikationsrichtlinien der Zeitschrift gestaltet sein. Diese Richtlinien können von der **trans-kom**-Website heruntergeladen werden. Alle Beiträge werden vor der Veröffentlichung anonym begutachtet.

trans-kom wird ausschließlich im Internet publiziert: <http://www.trans-kom.eu>

Redaktion

Leona Van Vaerenbergh
University of Antwerp
Arts and Philosophy
Applied Linguistics / Translation and Interpreting
Schilderstraat 41
B-2000 Antwerpen
Belgien
Leona.VanVaerenbergh@uantwerpen.be

Klaus Schubert
Universität Hildesheim
Institut für Übersetzungswissenschaft
und Fachkommunikation
Universitätsplatz 1
D-31141 Hildesheim
Deutschland
klaus.schubert@uni-hildesheim.de

- Ehrensberger-Dow, Maureen; Gary Massey (2014b): "Cognitive Ergonomic Issues in Professional Translation." John W. Schwieder, Aline Ferreira (eds): *The Development of Translation Competence: Theories and Methodologies from Psycholinguistics and Cognitive Science*. Cambridge: Cambridge Scholars, 58-86
- Ehrensberger-Dow, Maureen; Sharon O'Brien (2015): "Ergonomics of the Translation Workplace – Potential for Cognitive Friction." *Translation Spaces* 4 [1]: 98-118
- ErgoTrans (2015): *Cognitive and Physical Ergonomics of Translation – Final Report* – https://www.zhaw.ch/storage/linguistik/forschung/uebersetzungswissenschaft/ergotrans_final_report.pdf (20.04.2016)
- Gouadec, Daniel (2007): *Translation as a Profession*. 2nd ed. 2010. Amsterdam/Philadelphia: Benjamins
- Guillardeau, Sébastien (2009): *Freie Translation Memory Systeme für die Übersetzungspraxis: Ein kritischer Vergleich*. MA Thesis Wien: Universität Wien – http://www.omegat.org/resources/DA_Guillardeau.pdf (10.11.2015)
- Höge, Monika (2002): *Towards a Framework for the Evaluation of Translators' Aids' Systems*. PhD Thesis, Department of Translation Studies, University of Helsinki – <https://helda.helsinki.fi/bitstream/handle/10138/19236/towardsa.pdf?sequence=2> (10.11.2015)
- Holz-Mänttäri, Justa (1984): *Translatorisches Handeln. Theorie und Methode*. Helsinki: Suomalainen Tiedeakatemia
- House, Juliane (1997): *Translation Quality Assessment. A Model Revisited*. Tübingen: Narr
- International Ergonomics Association (n.d.): "What Is Ergonomics? Definitions and Domains of Ergonomics." – <http://www.iea.cc/whats/index.html> (20.04.2016)
- ISO 16642 (2003): *Computer Applications in Terminology – Terminological Markup Framework*. Geneva: International Organization for Standardization
- ISO 17100 (2015): *Translation Services – Requirements for Translation Services*. Geneva: International Organization for Standardization
- ISO 9241 (2011): *Ergonomics of Human-System Interaction*. Geneva: International Organization for Standardization
- ISO/IEC 25010 (2011): *Systems and Software Engineering – Systems and Software Quality Requirements and Evaluation (SQuaRE) – System and Software Quality Models*. Geneva: International Organization for Standardization
- ISO/IEC 9126 (2001): *Software Engineering – Product Quality*. Geneva: International Organization for Standardization
- Kade, Otto (1968): *Zufall und Gesetzmäßigkeit in der Übersetzung*. Leipzig: Enzyklopädie
- Keller, Nicole (2011): "Neun auf einen Blick." MDÜ [5] – <http://www.bdue-fachverlag.de/download/mdue/1090> (10.11.2015)
- Krings, Hans P. (1986): *Was in den Köpfen von Übersetzern vorgeht. Eine empirische Untersuchung zur Struktur des Übersetzungsprozesses an fortgeschrittenen Französischlernern*. Tübingen: Narr
- Krüger, Ralph (2012): "Working with Corpora in the Translation Classroom." *Languages in the Globalised World: Interpreting Multilingual Literacy and Cross-Cultural Encounters*, Special Issue: *Studies in Second Language Learning and Teaching* 2 [4]: 505-525 – https://repozytorium.amu.edu.pl/jspui/bitstream/10593/5724/1/SSLT%202%284%29%205_05-525%20Kruger.pdf (10.11.2015)
- Krüger, Ralph (2015): "Fachübersetzen aus kognitionstranslatologischer Perspektive – das Kölner Modell des situierten Fachübersetzers." *trans-kom* 8 [2]: 273-313 – http://www.trans-kom.eu/bd08nr02/trans-kom_08_02_01_Krueger_Modell.20151211.pdf (11.12.2015)

- Krüger, Ralph; Jesús Serrano Piqueras (2015): "Situated Translation in the Translation Classroom." *Current Trends in Translation Teaching and Learning* [7], 5-30 – http://www.cttl.org/uploads/5/2/4/3/5243866/chapter_1_situated_translation_in_the_translati_on_classroom_revised.pdf (07.12.2015)
- Krüger, Ralph (forthc.): "Situated LSP Translation from a Cognitive Translational Perspective." *Lebende Sprachen* 61 [2]
- Lagoudaki, Elina (2006): "Translation Memories Survey 2006: Users' Perception Around TM Use." *Translating and the Computer* [28]: 1-29 – <http://www.mt-archive.info/Aslib-2006-Lagoudaki.pdf> (10.11.2015)
- Lagoudaki, Elina (2008): Expanding the Possibilities of Translation Memory Systems: From the Translator's Wishlist to the Developer's Design. PhD Thesis London: Centre for Translation Studies, University College London
- Mieth, Christiane (2015): "Vernetzt übersetzt." *technische kommunikation* 37 [6]: 29-33
- Nielsen, Jakob (1994): *Usability Engineering*. Boston: Academic Press
- O'Brien, Sharon (2012): "Translation as Human-Computer Interaction." *Translation Spaces* 1 [1]: 101-122
- O'Brien, Sharon; Minako O'Hagan, Marian Flanagan (2010): "Keeping an Eye on the UI Design of Translation Memory: How Do Translators Use the 'Concordance' Feature?" *European Conference on Cognitive Ergonomics*. Delft, 1-4 – http://doras.dcu.ie/16693/1/ECCE_2010.pdf (05.02.2016)
- Pym, Anthony (2011): "What Technology Does to Translation." *The International Journal for Translation & Interpreting Research* 3 [1]: 1-9 – <http://trans-int.org/index.php/transint/article/viewFile/121/81> (10.11.2015)
- Reinart, Sylvia (2014): *Lost in Translation (Criticism)? Auf dem Weg zu einer konstruktiven Übersetzungskritik*. Berlin: Frank & Timme
- Reinke, Uwe (2004): *Translation Memories. Systeme, Konzepte, Linguistische Optimierung*. Frankfurt/M: Lang
- Reinke, Uwe (2013a): "State of the Art in Translation Memory Technology." *Translation: Computation, Corpora, Cognition, Special Issue: Language Technologies for a Multilingual Europe* 3 [1]: 27-48 – <http://www.t-c3.org/index.php/t-c3/article/view/25/29> (10.11.2015)
- Reinke, Uwe (2013b): "Computergestützte Qualitätssicherung in der Fachtextübersetzung." Monika Krein-Kühle, Ursula Wienen, Ralph Krüger (eds): *Kölner Konferenz zur Fachtextübersetzung (2010)*. Frankfurt/M.: Lang, 33-49
- Risku, Hanna (2004): *Translationsmanagement. Interkulturelle Fachkommunikation im Kommunikationszeitalter*. Tübingen: Narr
- Risku, Hanna (2005): "Translations- und kognitionswissenschaftliche Paradigmen – Der Mensch im Mittelpunkt." Lew N. Zybatow (ed.): *Translationswissenschaft im interdisziplinären Dialog*. (Innsbrucker Ringvorlesungen zur Translationswissenschaft III.) Frankfurt/M.: Lang, 55-69
- Risku, Hanna (2010): "A Cognitive Scientific View on Technical Communication and Translation. Do Embodiment and Situatedness Really Make a Difference?" *Target* 22 [1]: 94-111
- Risku, Hanna (2013): "Extended Translation. A Sociocognitive Research Agenda." *Target* 25 [1]: 33-45
- Rudlof, Christiane (2006): *Handbuch Software-Ergonomie – Usability Engineering*. Tübingen: Unfallkasse Post und Telekom – <http://www.ukpt.de/pages/dateien/software-ergonomie.pdf> (10.11.2015)
- SAE J2450 (2005): *Translation Quality Metric*. Warrendale: Society of Automotive Engineers

- Schubert, Klaus (2007): *Wissen, Sprache, Medium, Arbeit. Ein integratives Modell der ein- und mehrsprachigen Fachkommunikation.* Tübingen: Narr – <http://d-nb.info/1045615382/34> (10.11.2015)
- Serrano Piqueras, Jesús (2011): *Überlegungen zur Untersuchung des Einflusses von Translation-Memory-Systemen auf die Übersetzungskompetenz.* MA Thesis Köln: Institut für Translation und Mehrsprachige Kommunikation, Fachhochschule Köln
- Siegel, Melanie; Christian Lieske (2015): "Beitrag der Sprachtechnologie zur Barrierefreiheit: Unterstützung für Leichte Sprache." *trans-kom* 8 [1]: 40-78 – http://www.trans-kom.eu/bd08nr01/trans-kom_08_01_03_Siegle_Lieske_BARRIEREFREI.20150717.pdf (10.11.2015)
- Siever, Holger (2010): *Übersetzen und Interpretation. Die Herausbildung der Übersetzungswissenschaft als eigenständige wissenschaftliche Disziplin im deutschen Sprachraum von 1960 bis 2000.* Frankfurt/M.: Lang
- Stolze, Radegundis (1994): *Übersetzungstheorien. Eine Einführung.* 6th ed. 2011. Tübingen: Narr
- Strohner, Hans (1995): *Kognitive Systeme. Eine Einführung in die Kognitionswissenschaft.* Opladen: Westdeutscher Verlag
- Usability.gov (2016): System Usability Scale (SUS) – <http://www.usability.gov/how-to-and-tools/methods/system-usability-scale.html> (02.06.2016)
- WebCorp Live (2015): WebCorp Live – <http://www.webcorp.org.uk/live/> (02.06.2016)

Author

Ralph Krüger is a lecturer in translation studies, specialised translation and translation technology at the Institute of Translation and Multilingual Communication at Technische Hochschule Köln (Cologne University of Applied Sciences), Germany. He holds a PhD in translation studies from the University of Salford, UK. His main research interests include translation technology, cognitive translation studies, the interface between scientific and technical translation and cognitive linguistics, the didactics of specialised translation and the application of electronic corpora in the translation classroom. Prior to joining academia, Ralph worked as LSP translator for a major German translation agency.

Email: ralph.krueger@th-koeln.de

Web page: <https://www.th-koeln.de/personen/ralph.krueger/>

Neu bei Frank & Timme

TRANSÜD. Arbeiten zur Theorie und Praxis des Übersetzens und Dolmetschens

Herausgegeben von
Prof. Dr. Klaus-Dieter Baumann,
Dr. Susanne Hagemann,
Prof. Dr. Dr. h.c. Hartwig Kalverkämper,
Prof. Dr. Klaus Schubert

Susanne Hagemann: **Einführung in das translatiionswissenschaftliche Arbeiten.** Ein Lehr- und Übungsbuch. ISBN 978-3-7329-0125-8

Anja Maibaum: **Spielfilm-Synchronisation.** Eine translationskritische Analyse am Beispiel amerikanischer Historienfilme über den Zweiten Weltkrieg. ISBN 978-3-7329-0220-0

Franziska Heidrich: **Kommunikationsoptimierung im Fachübersetzungsprozess.** ISBN 978-3-7329-0262-0

FFF: Forum für Fachsprachen-Forschung

Herausgegeben von
Prof. Dr. Dr. h.c. Hartwig Kalverkämper

Eva Martha Eckkrammer: **Medizin für den Laien: Vom Pesttraktat zum digitalen Ratgeber**text. 2 Bände im Schuber.
ISBN 978-3-86596-312-3

Kommunikation – Partizipation – Inklusion

Herausgegeben von
Dr. Bettina M. Bock,
Prof. Dr. Ulla Fix,
Daisy Lange

Nathalie Mälzer (Hg.): **Barrierefreie Kommunikation – Perspektiven aus Theorie und Praxis.** ISBN 978-3-7329-0231-6

TTT: Transkulturalität – Translation – Transfer

Herausgegeben von
Prof. Dr. Dörte Andres, Dr. Martina Behr,
Prof. Dr. Larisa Schippel,
Dr. Cornelia Zwischenberger

Marc Orlando: **Training 21st century translators and interpreters: At the crossroads of practice, research and pedagogy.** ISBN 978-3-7329-0245-3

Christian Trollmann: **Nationalsozialismus auf Japanisch?** Deutsch-Japanische Beziehungen 1933–1945 aus translationssoziologischer Sicht. ISBN 978-3-7329-0281-1

