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Computer-aided translation tools – the uptake and use by Danish translation service providers

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ABSTRACT

The paper reports on a questionnaire survey from 2013 of the uptake and use of computer-aided translation (CAT) tools by Danish translation service providers (TSPs) and discusses how these tools appear to have impacted on the Danish translation industry. According to our results, the uptake in Denmark is rather high in general, but limited in the case of machine translation (MT) tools: While most TSPs use translation-memory (TM) software, often in combination with a terminology management system (TMS), only very few have implemented MT, which is criticised for its low quality output, especially when Danish is one of the languages, though some also express willingness to consider using MT (more) when output quality improves. Most respondents report that CAT has changed the translation industry, mentioning that the technology facilitates improved productivity and consistency, but also that sometimes it results in lower prices and decreasing output quality.

KEYWORDS

Computer-aided translation (CAT), translation memory (TM), terminology management system (TMS), machine translation (MT), questionnaire survey, translation service provider (TSP).

1. Introduction

As most translation practitioners would confirm, practically all modern-day professional translation is carried out by means of various kinds of computer software (e.g. Garcia 2007; O'Hagan 2009; Pym 2011; Garcia 2012; Taravella and Villeneuve 2013), i.e. as computer-aided translation (CAT). This digitalisation of translation processes was initiated during the 1990s (e.g. Maylath 2013: 41), when commercially available translation-memory (TM) tools, typically integrated with terminology management systems (TMS), became popular with most translation service providers (TSPs), because the tools helped them improve translators' productivity and through-put rates. Nowadays, the implementation of still more advanced translation technology, sometimes comprising both TM, TMS and machine-translation (MT) software, seems to be a must in the translation industry, as the globalised translation market is becoming fiercely competitive with a growing pressure on prices and delivery deadlines. Moreover, there seems to be an ever-increasing demand for larger and larger volumes of translated texts. Thus, for instance, according to a 2009 EU estimate, the use of CAT tools in the language industry is likely to increase due to "exponentially rising translation needs in increasingly globalised contexts" (Rinsche and Portera-Zanotti 2009: v).

Categorising CAT tools is known to be rather complex (Folaron 2010: 433; Bowker and Fisher 2010: 60; Taravella and Villeneuve 2013: 65), but, for our

purposes, Hutchins and Somers' scale of translation automation (1992: 148) will be sufficiently helpful. On this scale, modes of translation are categorised according to the degree of human involvement vs. automation in the translation process. At one end of the scale, we find human translation, which is carried out by humans without any form of "mechanization," i.e. as translation has been carried out for centuries, only aided by pen and paper. At the other end of the scale, we find what is referred to as "fully automatic, high-quality translation," which is performed entirely by the computer. In 1992, this was seen as utterly utopian, and, generally speaking, it remains so today if no controls or restraints are applied to the language in the texts. Between the two extremes of the scale, we find the types that use and require CAT tools of some kind, but with varying degrees of automation. In "machine-aided human translation," the translator is in charge of selecting and using the tools "as required or desired" (Hutchins and Somers 1992: 150), which is different from "human-aided machine translation" carried out by the system itself, but aided by humans, who carry out pre- or post-editing, for instance. In the following, we shall refer to these two kinds of translation as TM translation and MT, respectively.

TM technology is still the most frequently used CAT tool in professional translation (e.g. Lagoudaki 2006; Fišer 2008; ProZ.com 2011). A TM is basically a database of segmented and paired source and target texts that translators can access in order to re-use previous translations. Thus, while translating, the translator is provided with translation proposals, the so-called matches, which s/he can accept, reject or revise. Relatively recently, TSPs have started to implement (statistical) MT software that is integrated into a TM suite, meaning that an MT match is provided when no match can be found in the TM database (Koby 2013; Flanagan and Christensen 2014; Bundgaard *et al*. 2016). In this new kind of translation, which we shall refer to as MT-assisted TM translation, the translation process is more automated than in regular TM translation, but not so automated as in MT, which places it in the middle ground of Hutchins and Somers' (1992) technology continuum.

Though some research has been carried out on the uptake and use of CAT (see section 2) and on the impact of the tools on translators' mental processes (see Christensen 2011 and Bundgaard *et al.* 2016), we still need knowledge of the consequences for the translation profession. The whole issue is particularly pertinent as many now question the centrality of translators in their own profession due to the advent of CAT and as the loss of centrality may have a negative influence on translators' professional status and income levels. Thus, for instance, Bowker and Fisher (2010:63) note that translators' status and their remuneration are gradually decreasing because clients tend to regard CAT as less prestigious than more traditional kinds of translation. This is probably even more worrying as translators' status was never high. Thus, for instance, in Dam and Zethsen's (2010) questionnaire study of occupational status within a sociology of professions, the Danish translation profession is

characterised as a low-status profession due to a lack of recognition of translators' level of expertise and education.

According to the European translation quality standard (DS/EN 15038 2006), a TSP is defined as an "organisation or person who supplies translation services", which may also be referred to as a Language Service Provider. In our paper, we shall concentrate on that part of the profession that is represented by a subpopulation of Danish TSPs, comprising individuals who translate for a living. Based on a questionnaire survey conducted in May 2013, we shall map the uptake and use of CAT tools by these TSPs, and we shall report on the perceived impact of the tools on the topology of the Danish translation industry (referred to as *oversætterbranchen* in the questionnaire). Due to space restrictions, we shall confine ourselves to a discussion of selected results from the questionnaire study. (For a full and detailed presentation of the survey, see Christensen and Schjoldager 2014.) The data analysed for this paper were selected with a view to answering the following research questions:

1. What is the uptake and use of CAT tools by the TSPs? Which tools are currently used and how are they combined? What are the reasons for this?

2. What is the perceived impact of CAT on the translation industry in general? What is it in terms of prices offered to clients, rates paid to freelancers, job contents and status?

In section 2, we shall give a brief review of recent empirical studies of the uptake and use of CAT. Section 3 explains the set-up, data and methods of our study and provides some background information about our respondents and their TSPs. Section 4 reports on selected results regarding the uptake and use of CAT tools by the TSPs and the perceived impact on the Danish translation industry. Section 5 concludes our paper.

2. Recent empirical studies

This section offers a brief review of recent empirical studies that have informed and inspired our work dealing with the uptake and use of CAT. By means of a questionnaire study, Fulford and Granell-Zafra (2005) studied freelance translators' uptake of information and communication technologies, including TM and MT, in the UK. Based on responses from 591 freelancers, just under half of the respondents were not really familiar with CAT tools at all back in 2005. 28% of the respondents stated that they use TM technology and 5% that they use MT technology. Interestingly, 75% of the respondents were not familiar with MT systems at all.

Based on questionnaire responses from 699 translation professionals (translators, terminologists, project managers, reviewers, etc.) from 54

countries, Lagoudaki (2006) reports on a survey of the implementation of TM technology and users' attitudes towards TM technology. In contrast to Fulford and Granell-Zafra (2005), Lagoudaki found that the implementation of TM technology appeared to be considerable: 82.5% of respondents reported using a TM system.

Fišer (2008) carried out a study that explored recent trends on the Slovene translation market, discussing, among other things, the use of translation technology. Drawing on a business register, website analyses and a few follow-up interviews in selected TSPs, she found that the Slovene translation industry is a fast-growing service sector both in terms of volume and turnover (Fišer 2008: 23) and that the number of TSPs keeps growing. Of the top-ten Slovene companies, three companies (specialised in less technically oriented translation) did not use technology. The remaining companies all used TM and TMS systems. None of the companies reported using MT technology, which may, at least partly, be explained by the fact that, back in 2008, MT tools were not integrated into TM suites.

In 2010, a questionnaire survey of TSPs based in North America, Europe, Asia-Pacific and South America carried out for TAUS (Translation Automation User Society, formed in 2004) showed that MT had definitely arrived in certain parts of the translation industry (Joscelyne and Brace 2010). According to this survey, 49.3% of 75 TSPs offered post-editing of MT output. This result corresponds to that of a 2011 state-of-the-industry survey of freelance translators carried out for ProZ.com, a web-based, international network of professional translators. According to the ProZ.com survey, 30% of freelance translators made use of MT technology in 2011 (ProZ.com 2011).

In order to determine the competence requirements of professional translators within the European translation industry, the Optimale (Optimising Professional Translator Training in a Multilingual Europe) project was launched in 2011 by the EU Commission based on a questionnaire survey of TSPs. According to the results of this project, the ability to use TM systems was considered "essential" or "important" by over 75% of the respondents, while (MT) post-editing skills were required by 28%, out of a total of 531 TSPs responding to this question (Optimale 2011: 8-9). Thus, the Optimale project clearly indicates an increasing use of CAT tools in general as well as a growing interest in integrating MT into translation processes. This tendency is confirmed by a more recent TAUS market report that foresees a massive adoption of MT technology complementing and replacing well-known TM systems in the translation industry at large (van der Meer and Ruopp 2014).

In a workplace study carried out in three Canadian TSPs, LeBlanc (2013) documents a widespread use of TM technology, regardless of genre or subject-matter. When asked about the disadvantages of TM technology, the translators stated, among other things, that TM technology changes the translator's

relationship with the text because the system segments the text into smaller units, typically sentences, that it is a barrier to creativity, that it makes translators lazy and passive, that it contributes to a recycling of errors, and that it renders the translator's work more mechanical, which might lead to a de-skilling of the translator and a lowering of job satisfaction and status (LeBlanc 2013: 7-10).

In another workflow study, Silva (2014) investigated the process of adopting MT tools into the workflow of a Madrid TSP. Unlike Garcia (2011), who found marginal gains in productivity in connection with post-edited MT, Silva's (2014) results show that higher productivity could be achieved when post-edited MT was integrated into the translation workflow. Discussing the strategies of the TSP and some critical points in the process, Silva (2014: 47) draws attention to some crucial lessons learned in the process, namely that companies need to acknowledge the role of the translator/post-editor and that they need to be able to measure accurately the extent to which the company can benefit from the implementation of MT technology. Silva also stresses that TSPs need to collaborate more with the research community to gain more knowledge of how to optimise their use of tools.

3. Data and methodology

As already mentioned, the present study focuses on the uptake and use of CAT tools in the Danish translation industry and on the perceived impact of the tools. Inspired by Fišer (2008), who studied Slovene TSPs, we chose to focus on what happens in TSPs rather than on individual translators (in-house or freelance translators) because TSPs can be assumed to reflect what is generally practised within the translation industry and because they tend to act as trendsetters too. To ensure that participating TSPs would be as representative as possible, we decided to contact TSPs that could be assumed to play an active role within the translation industry. For the purposes of our survey, we used the following selection criteria: TSPs were to be VAT-registered, to have at least two employees (not necessarily translators), to be represented by a Danish-language website, to operate from at least one physical and active office in Denmark and to offer written translation as a regular service (as opposed to focusing on services such as interpreting, subtitling or language teaching, for instance).

We searched a Danish company database called CD-Direct, which contains information about all Danish VAT-registered business entities, listing key company figures, number of employees and business areas. We accessed the database and generated a list of 2,175 companies belonging to the business area of Translation and Interpreting (*Oversættelse og tolkning*). Of these, 80 companies were registered as having at least two employees. Next, we checked the companies by visiting their websites, if any, and phoned them, if

necessary. As it turned out, several companies on the list could not be included in the survey because they did not fulfil all our selection criteria: Perhaps they did not have a Danish-language website, or they were not TSPs after all (some were really language schools). This resulted in a shortlist of 50 companies.
We then realised that several Danish TSPs that we knew of personally were missing from the list, which initiated a manual search via the Google search engine using Translation (*oversættelse*) and TSP (*oversættelsesvirksomhed*) as keywords. This search resulted in an additional list of 19 Danish TSPs. Checking these companies as we had done with the ones found in CD-Direct, we learned that 11 of these fulfilled our criteria. Our final shortlist therefore comprised 61 TSPs.

Emails containing a link to an online questionnaire were then sent to potential respondents, addressing the person responsible for the use of translation tools in the TSP in question and/or the owner/CEO. At the final deadline, we had obtained responses from 29 out of the possible 61 TSPs, giving us a response rate of 47.5%. Of these, 25 respondents had clicked their way all through the questionnaire, while four companies had only responded to some initial questions. We consider this response rate to be sufficiently high for us to discuss the current uptake and use of CAT tools by the Danish translation industry and also for us to draw some conclusions on the perceived impact of the tools on the industry.

Respondents' answers to closed questions were subjected to quantitative analyses in order for us to present statistical mean values. Respondents' answers to open-ended questions were subjected to qualitative, inductive content analyses, in which no categories were determined beforehand, in order for us to suggest some general tendencies within the industry (cf. Saldanha and O'Brien 2013: 190).

Respondents were first asked to answer some background (mainly closed) questions about themselves and their TSPs. According to these responses, 23 of the 29 TSPs (79%) are Danish-owned companies. 26 TSPs (90%) are without international subsidiaries, and 25 (86%) are without Danish affiliates. On average, the TSPs have operated on the translation market for 13.6 years with an individual range between 3 and 30 years. In 2012, the average annual turnover of the companies was DKK 20.4 million, though the majority (55%) had turnovers below DKK 10 million. On average, the companies employ 13.6 full-time employees and 828 freelancers (with a range from 2-10,000 freelancers). As for the full-time employees, the survey indicates that today Danish TSPs employ more project managers (with an average of 5.2) than in-house translators (with an average of 4.2).

18 respondents out of 25 (72%) who answered this question said their TSPs have an employee who is responsible for CAT tools, but only five of these have job titles that indicate this (some mentioned in English): "Technical Director",

"Technical Project Manager", "Translation Tools Director", "Chief of Operations and Technology Officer" and "sprogteknologichef" (director of language technology). Other employees who are responsible for translation tools have titles that indicate that they have other job functions too: "Direktør" (CEO), "produktionsdirektør" (director of production), "konsulent" (consultant), "projektkoordinator" (project coordinator) and "projektadministrator" (project administrator), for instance. When asked if the respondents themselves were this person, 11 out of 18 (61%) who answered this question said they were. Seven respondents who said they were not responsible for managing the CAT tools themselves were CEOs or had other executive functions, meaning that they must have the overall responsibility for the uptake and use of CAT tools. Interestingly, based on what they reported about their job titles, which 27 out of 29 did, 10 of these had more than one title. Thus, for instance, one respondent reported that s/he had three: translator, HR manager and translation tools manager (respondent 22).

Regarding the services provided by the TSPs, respondents indicated that most Danish TSPs offer a variety of services. According to our analyses, the TSPs provide between three and 13 types of services that were listed as options in the questionnaire. In order of decreasing frequency, the 27 respondents who answered this question reported the following main services (assessed by the respondents as one of three most important services): technical translation (14), legal translation (10), creative translation (10), financial/business translation (9), non-specialised translation (9), IT localisation (6), medical translation (4), proofreading (4), EU translation (3), interpreting (3), technical writing/text production (3), terminology management (2) and desktop publishing (1). Thus, according to the respondents, most Danish TSPs typically offer traditional translation services such as technical, legal and financial/business translations. Relatively recently, some TSPs have started to provide new kinds of services such as website localisation and technical writing and layout.

4. Results

Answering the research questions mentioned in the introduction, section 4.1 reports on results regarding the uptake and use of CAT tools, while section 4.2 presents results concerning the perceived impact of CAT on the industry.

4.1 Uptake and use

When asked whether their TSPs use CAT tools, 22 of the 25 respondents who answered this question (88%) stated that they do. The three respondents who reported that their TSPs do not apply CAT tools also reported that they specialise in interpreting, non-specialised translation/proofreading and creative translation (the translation of life style magazines), respectively, for which

there is no or little need for CAT tools. When these three TSPs were invited to participate in our survey, their specialisations within the mentioned areas were unknown to us.

All 22 TSPs that use CAT tools apply TM technology. 18 of these (82%) use TMS software, while MT technology is applied by six (27%). On average, the 22 TSPs using CAT tools have used TM tools for 11 years and TMS software for 10.4 years. MT technology has been applied for 7.8 years, on average. Many use more than one TM system, but, without a doubt, the most frequently used TM suite is the one offered by SDL Trados. The most frequently used TMS system is MultiTerm from SDL Trados. Of the six companies using MT technology, four apply open-source MT systems such as Google Translate and Bing Translator from Microsoft and Moses. Two of them combine the open-source MT engine with a commercial MT system, namely SDL BeGlobal from SDL Trados. The remaining two TSPs using MT technology state that they use MT systems developed by themselves.

The 22 respondents who use CAT tools were asked to estimate how often the above-mentioned tools are used and in which combinations. All 22 answered this question. We gave them six options to choose from: No tools, Only TMS, Only TM, Only MT, TMS and TM, TM and MT, and TMS, TM and MT; and we asked them to choose between four frequencies: Rarely (1-25% of all jobs), Sometimes (26-50% of all jobs), Usually (51-75% of all jobs), and Always or mostly (76-100% of all jobs). Table 1 shows the total numbers of TSPs using each option (the final column) as well as the frequencies in which they use them (the preceding columns).

Options	Rarely 1-25%	Sometimes 26-50%	Usually 51-75%	Always or mostly 76-100%	Total
No tools	7	2	0	1	10
Only TMS	4	0	0	0	4
Only TM	4	5	3	4	16
Only MT	0	0	0	0	0
TMS and TM	7	2	3	6	18
TM and MT	5	0	0	0	5
TMS, TM and MT	5	0	0	1	6

Table 1: How many companies use these tools/combinations? How often?

Our study demonstrates that few translation jobs are carried out completely without CAT tools. As shown by Table 1, seven respondents said their translators 'rarely' work without tools, two said it occurs 'sometimes', while none said they 'usually' work without tools, and only one reported that this is

'always or mostly' so. The TSP of the latter respondent, which was also mentioned above, specialises in interpreting rather than written translation, which probably explains their lack of interest in CAT.

A total of 10 out of 22 respondents (45%) chose the option of No tools. Only four respondents reported that for some jobs they only use TMS technology, but this is rarely so. A total of 16 (73%) use a TM on its own for some of their jobs, and four of these said they do this always or mostly. None of the companies apply MT technology on its own. What most TSPs (18; 82%) tend to do is obviously combine TMS and TM tools.

Five respondents said they combine TM and MT technology, but they only use this combination rarely. Six indicated that they combine TMS, TM and MT tools. Five of these use this combination rarely, whereas one uses it always or mostly. As we know that the five companies that clicked on both combinations are the same companies, we conclude that five respondents use MT technology rarely, that they sometimes combine MT with TM tools, and that they sometimes use MT with TM and TMS tools. The single company in our study that reported using MT technology 'always or mostly' indicated that this is always in combination with TMS and TM tools. We take these results to mean that the six companies in question apply some form of MT-assisted TM translation, i.e. the new form of professional translation that now occupies the middle ground of Hutchins and Somers' (1992) technology continuum (section 1).

When asked about their reasons for the use of TM and MT tools, respondents could click on the following options: Efficiency, Consistency, Competitiveness, and Competitors. All 22 companies using TM technology indicated that they use it due to an expected increase in efficiency, and 21 (95%) stated that they use it to improve consistency. 19 (86%) said it is to increase their competitiveness, while 14 (64%) have implemented TM technology because their competitors use it. Of the six companies that use MT, all said that they expect MT to make them more efficient, while three companies said that they expect MT to improve consistency. Four companies use MT to increase their competitiveness and because their competitors use it.

The four companies that do not use TMS technology were asked to comment on this and give reasons for it, which they did, basically saying that they no longer use this tool because TM systems allow for terminology to be retrieved from the TM database, by means of concordance searches, and because using a TMS is very time consuming.

As already mentioned, out of the 22 using CAT tools, 16 do not use MT technology. These were asked to comment on this and give their reasons, which they all did. The analysis shows that nine out of the 16 TSPs (56%) said that the quality of MT output (still) is not good enough. Three said that, in their

experience, it is faster to translate from scratch than to post-edit MT output. Two mentioned that MT is not compatible with their most frequently translated text types. One said that MT into and from Danish still is not sufficiently useful, and one reported that their customers do not demand MT. A reason for not adopting MT might also be that it is counterproductive to a professional image of offering only high-quality (human) translation, but, interestingly, no one mentioned this.

To a later question, answered by 25 respondents, about any plans for changing their use of tools, 14 (56%) said that they are considering or planning to initiate changes and that they might implement MT (more) in the future, when MT quality from and into Danish improves sufficiently. 11 of the 25 respondents (44%) reported that they do not expect to change anything.

4.2 Perceived impact

In an open-ended question, respondents were invited to write freely about the impact of CAT on the translation industry as they saw it, which 19 respondents did, mentioning a total of nine consequences. 13 out of 19 respondents (68%) who answered the question said that CAT has increased productivity, and 12 (63%) mentioned that the consistency of translations has increased. Nine mentioned that the pressure on prices has increased, and five said that the overall translation quality has decreased. Three said that their clients now expect faster through-put rates and lower prices. Three said that translation processes have become less dependent on individual translators, which they saw as an advantage. Two mentioned that to survive financially TSPs generally need to find new types of services to offer. One said that all translators now need to know how to use several types of tools in order to make a living. Another mentioned that CAT tools have increased the level of competition within the translation industry, which is connected to a higher pressure on prices.

In closed questions, we asked respondents to assess how prices offered to clients and rates paid to freelancers have changed due to the implementation of CAT technology. We had expected all 22 respondents who use TM technology to tell us that this has led to lower prices, but only 14 respondents (64%) confirmed this, while the remaining eight (36%) said that their prices have not changed. Similarly, we had expected our respondents to report that rates paid to freelancers have gone down, but this was only confirmed by 11 respondents (50%), while the rates appear to be unchanged in the other 11 TSPs. As for the impact of MT technology, three of the six companies that make use of MT technology reported that this has led to lower prices and rates, while three respondents reported that both prices and rates are unchanged. Here it is worth mentioning that, even if prices and rates sometimes stay the same, this does not mean that the translators in question actually earn the

same as before, as the past decade has seen a moderate level of inflation in the Danish economy, resulting in a slow, but steady depreciation of real wages. As mentioned in the introduction, CAT tends to be regarded as less prestigious than more traditional kinds of translation, which appears to have led to a lowering of translators' professional status (Bowker and Fisher 2010: 63). Therefore, in an open-ended question, respondents were asked to assess how, in their experience, CAT tools have impacted on translators' jobs and status. 20 respondents answered this question, though status was only mentioned (directly or indirectly) by eight (40%). However, all 20 respondents seem to agree that the implementation of CAT technology has certainly changed translators' jobs. Various points were made in response to this question and seven were categorised. Seven said that translators' productivity has increased, which they saw as a positive development. Five said that the translation process has become less creative and that translators are turned into machine operators, which they all regret. Another negative point was mentioned by four respondents who said that translators are now more pressed for time. Three mentioned that knowing how to use translation technology has become a must for translators, a development that is mentioned as neither positive nor negative. Two said that the implementation of tools has made translation easier, because translators no longer need to spend so much time doing research, which they see as an advantage. One mentioned that CAT facilitates teamwork, and another emphasised as a fact that CAT tools are now used for all types of texts.

As for the eight respondents who mentioned translators' status explicitly, three answer categories were found. Four said that the implementation of tools has not impacted on translators' status, whereas two said that it has impacted negatively. Two other respondents mentioned that the use of tools has caused translators' income levels to decrease, which we assume they see as a sign of decreasing status.

Finally, we tried to ascertain if respondents who are not translators themselves, namely 22 out of 27 respondents (81%) who indicated their job titles, seemed to concentrate more on the management side of CAT (seeing it mainly as a means of improving productivity and through-put rates, for instance) than respondents who are translators, namely five out of 27. However, based on an analysis of responses to our open-ended questions about the impact of CAT on the translation industry, we found little or no difference between the answers of these two groups of respondents. Below, we shall try to illustrate this by quoting two respondents' answers to our questions about the impact of CAT tools on the translation industry. One of these (respondent 29), with an MA in communication studies, is a branch manager, while the other (respondent 22), with an MA in specialised German, bears the titles of translator, HR manager and translation tools manager. While the questionnaire study was conducted in Danish, the quotes below are in our English translations.

Respondent 29, who is not a translator, clearly took a management perspective in the following comment on the impact of CAT on the translation industry, listing facts as s/he saw them.

> Better quality (consistency) especially in connection with translations of non-marketing texts. Faster time-to-market for clients. We are keenly aware that it is a must to stay updated on technology because clients focus increasingly on prices (though expecting the same high quality) (Respondent 29).

When asked to reflect specifically on translators' jobs and status, however, respondent 29 took a translator's perspective, explaining how CAT is a restraining factor when translators work:

> CAT tools are helping translators to achieve more consistency in their translations. But when translating marketing texts, tools may actually restrain translators (at the segment level) and prevent them from translating fluently. Translators' status hasn't improved. On the contrary. There is much focus and pressure on word prices. And an expectation that translators can translate faster and better all the time. I don't think that translators' low status has much to do with the advent of technology. I reckon that the technology is here because of the market pressure and perhaps also because of the competition between translation service providers (Respondent 29).

Respondent 22, who is a translator, took a management perspective in the following answer to our question about the impact of CAT on the translation industry, making a similar point to that of respondent 29:

> The implementation of CAT tools has led to a significant rise in quality and efficiency in translation processes. Machine translation will possibly lead to new kinds of translation services and new workflows (Respondent 22).

In his/her response to our question about translators' jobs and status, however, respondent 22 took a translator's perspective, deploring the loss of creativity, though also expressing some optimism for translation as a skilled profession:

> You might say that TM technology has moved the translator's role away from creative processes, making translation a process of mechanical *linguistic* processing. Uncritical use of TM technology can, as I see it, make you lose sight of [the coherence of] the text, as you're bound to use a more segment-oriented method, but translation as a skill still thrives, certainly it does – though more for some types of jobs than others (Respondent 22).

5. Concluding remarks

Based on a questionnaire survey conducted in May 2013 on a subpopulation of TSPs assumed to play an active role within the Danish translation industry, our paper has discussed the uptake and use of CAT tools and has explored the perceived impact on the industry. We realise that the respondents who chose

to participate in our survey might have been more knowledgeable of and keener on CAT than those who did not — a fact that naturally lowers the ecological validity of our results, which are not directly generalisable to the translation industry as a whole. However, we find our response rate of 47.5% sufficiently high for us to suggest some trends.

The uptake of CAT technology is clearly widespread among our respondents, as 22 out of 25 respondents who answered the full questionnaire indicated that their TSPs use CAT on a regular basis. The main reason mentioned for this is the same as that of other surveys (e.g. Lagoudaki 2006, Fišer 2008 and LeBlanc 2013), namely that CAT is helping TSPs improve productivity and through-put rates. In all cases, CAT tools in the participating TSPs include TM technology, often combined with a TMS and sometimes MT software (see Table 1, above). Unlike what was found by other surveys (e.g. Joscelyne and Brace 2010 and van der Meer and Ruopp 2014, ProZ.com 2011 and Optimale 2011), the Danish TSPs still appear to be hesitant towards using MT technology, as only six out of 22 respondents who indicated that their companies use CAT tools said they use MT technology, and as only one single company carries out MT on a regular basis (combined with TM and TMS technology). The main reason given for this is that the current output quality of MT into and from Danish is not regarded as sufficiently good. However, there is also a clear indication that, in the near future, many TSPs are considering or planning to use (more) MT technology once the level of output quality has improved.

Our respondents were specifically asked how CAT has impacted on the translation industry in terms of prices offered to clients, rates paid to freelancers, job contents and status. Though we had expected respondents to state that prices and rates have gone down due to the use of CAT tools, this was only confirmed by 14 out 22 respondents whose companies apply CAT tools. All seem to agree that CAT has definitely changed the contents of translators' jobs, making them less creative and more segment-oriented. Few commented explicitly on translators' status, but most respondents who did thought that CAT has not impacted on translators' status, suggesting that it was never high (cf. Dam and Zethsen 2010).

The critique of CAT offered by many respondents mirrors that of the literature, as many express regret that using CAT technology has led to a decrease in the general level of quality and that translators nowadays work more like fixers of machine-generated texts than the skilled, creative professionals that they used to be. Our respondents also pointed out that CAT has led to more competition and an increased pressure on delivery deadlines and prices, which, in turn, may lead to a decrease in translators' remuneration and status. Yet, respondents do not seem to be overly worried about the future of the profession. Presumably this could partly be explained by the fact that most respondents (22 out of 27 who gave us their job titles) were managers of translation tools or CEOs, whereas only a few (five) worked as translators

themselves, but, as explained in section 4.2, we could not ascertain if respondents who were not translators themselves tended to answer our questions in ways that were (obviously) different from those of respondents who were. To find out more about translators' experience with and attitudes towards CAT tools, we would need to carry out a different kind of study, namely one focused on individuals.

Whether taking a business or a translator's perspective, we will probably all have to come to terms with the fact that one day translators will mainly be called on to work as post-editors of machine-translated texts, checking linguistic correctness and textual cohesion — a job function that most people would not regard as translation. However, even in this brave new world, competent translators will probably still be called on to carry out creative and specialised jobs, in which they remain in charge of the translation process. Examples of such jobs may be found in an extension of business activities by offering more text-oriented kinds of services, such as the localisation of websites and technical writing, which some Danish TSPs are already beginning to offer (section 3). Be that as it may. As translation scholars and translator trainers, we shall certainly need to monitor and keep abreast of developments in professional translation.

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