

# Effects of New Technologies on the Translation Profession

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J.J. Strossmayer University of Osijek

Faculty of Humanities and Social Sciences

Study Programme: Double Major MA Study Programme in English Language and  
Literature – Translation Studies and Publishing

Saša Gogić

**Effects of New Technologies on the Translation Profession**

Master's Thesis

Supervisor: prof. dr. sc. Marija Omazić

Osijek, 2020

Sveučilište J. J. Strossmayera u Osijeku

Filozofski fakultet Osijek

Studij: Dvopredmetni sveučilišni diplomski studij engleskog jezika i  
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## **Summary**

New technologies, referring to digital technology inside an online context, have deep and diverse effects on translation. Advent of translation technology has made the translation process inconceivable without the help of a computer, with the potential of machine translation still not fully realized. Beyond the translation process, technology created new text types translation had to tackle, leading to the emergence of localization as a specific industry and field. Technology also enabled the rise of non-professional translation, redefining the role of a translator.

**Key words:** technology, translation, translation technology, localization, non-professional translation

## **Sažetak**

Nove tehnologije, a pri tome se ovdje misli na digitalne tehnologije u online okruženju, imaju dubok i raznoliki utjecaj na zanimanje prevoditelja. Prijevodne tehnologije su stvorile uvjete gdje moderni prijevodni proces nezamisliv bez rada na računalu, uz prisutnost strojnog prevođenja koje tek treba ostvariti svoj puni potencijal. Tehnologija je također dovela do stvaranja novih vrsta teksta za koje je potreban prijevod, što je dovelo do pojave lokalizacije koji je danas zasebno polje. Tehnologija je također omogućila veliki porast neprofesionalnog prevođenja koje mijenja tradicionalnu ulogu prevoditelja.

**Ključne riječi:** tehnologija, prevođenje, prijevodne tehnologije, lokalizacija, neprofesionalno prevođenje



## Table of Contents

<b>Introduction</b> .....	<b>1</b>
<b>1. Translation Technology: New Translation Process</b> .....	<b>3</b>
<b>1.1 Machine translation</b> .....	<b>4</b>
<b>1.1.1 Historical evolution of machine translation</b> .....	<b>5</b>
<b>1.1.2 Post-editing of machine translation</b> .....	<b>7</b>
<b>1.2 Computer-assisted translation</b> .....	<b>9</b>
<b>1.3 Interpreting and technology</b> .....	<b>11</b>
<b>1.4 Audiovisual translation and technology</b> .....	<b>14</b>
<b>1.5 Current and future effects</b> .....	<b>16</b>
<b>2. Rise of the New Text</b> .....	<b>20</b>
<b>2.1 Localization</b> .....	<b>21</b>
<b>2.2 Game localization</b> .....	<b>23</b>
<b>2.3 Web and other types of localization</b> .....	<b>25</b>
<b>3. Translators of the Online and Digital Era: New Translators</b> .....	<b>27</b>
<b>3.1 Language Service Providers</b> .....	<b>28</b>
<b>3.2 Freelance Translation</b> .....	<b>30</b>
<b>3.3 Non-professional Translation</b> .....	<b>31</b>
<b>3.3.1 Fan translation</b> .....	<b>33</b>
<b>3.3.2 ROM hacking and fan localization?</b> .....	<b>34</b>
<b>Conclusion</b> .....	<b>37</b>
<b>Bibliography</b> .....	<b>39</b>

## Introduction

Technology affects the translation process on many different levels, and the relationship between the two seems to grow only more and more complex, with a lot of history and even mutually beneficial arrangements for both sides. The most glaring example is the emergence of translation technology, a kind of a “marriage” of translation and technology, which is currently causing a lot of excitement in the translation industry, both positive and negative, depending on who you ask. But translation technology is only one aspect of how technology influences translation, many outside enabling factors which did not have translation in mind created the largest disruptions in the field, and we also have to consider the new developments which the translation technology created itself and what effects they have, so there are many variables to consider. To start demystifying some of those, the new technologies in this paper will refer to the rise of digital technology and the internet, although references of the older periods will be made when it is appropriate.

When presenting the effects of the new technologies on the translation profession, the main focus will be on three areas. Firstly, we will focus on *how* we translate – referring to the specific influence of technology on the translation process, how it changed and even what new types of translation emerged. Secondly, we will focus on *what* we translate – technological developments lead to the creation of new text types which also called for novel translation approaches. And thirdly, focus will also be on *who* is doing the translation – new technological landscape increased the amount of people who can carry out translations and is calling for a redefinition of the role of a translator. Rather than attempting the near-impossible task of showcasing all the possible effects technology has on these aspects of translation, we will focus on the most representative areas so we can give them sufficient attention and depth. Translation technology is the obvious candidate for this, with machine translation being the key area since the disruptive potential of fully automated translation cannot be ignored (Doherty 2016). Another example is the localization process, its unique relationship with technology and culture, not to mention the fast-growing global industry built around it, makes it very relevant for this kind of research (O’Hagan and Mangiron 2013). There is also the example of the emergence of collaborative and non-professional translation, while these practices have always existed, the technological conditions have carried them to a whole new level which can now serve as an alternative to many forms of more traditional translation (Doherty 2016). Other fields and examples will also be at least mentioned, but often for the sake of comparison with our main examples.

With our 3 areas of focus and one notable example for each to match, it is only practical that the paper will be divided into 3 chapters. The first chapter will deal with translation technology, most notably with machine translation, but also with computer-assisted translation, technology in interpreting, audiovisual translation, and a look into the future. The aim is to showcase both the historical development, current and potential effects, and some inner workings of these systems. The second chapter will deal with localization, with most of the focus being on game localization, although the general development and the process of localization will be described, with some time given to the other forms of localization as well. The third and final chapter will deal with collaborative and non-professional translation, including the main areas of crowdsourced translation, community translation and interpreting, and fan translation. The ultimate goal of this paper is in the showcasing of the most relevant effects of technology on translation while using these representative examples, but also to clearly define them and show their further potential of possible disruption they can bring.

To put it as simple as possible, the end-goal of this paper is to show all the current, past, and future effects of online and digital technologies on translation profession using the examples of translation technology, translation of new texts and the expansion of non-professional and collaborative translation, showcasing the development and the current landscapes in each, with some views on the future.

## 1. Translation Technology

We can assume that technology affected the translation process since its beginning, especially in the written form, so the history of this relationship ranges far back into the past. Simard (2020: 78) gives an iconic example of the Rosetta Stone, showcasing it as an ancient example of a parallel text, a translation tool that will appear electronically around the turn of 1980s and will become widely used, so this gives us one example of how far one aspect of translation-technology relationship can range. We can say that “the practice of translating, like writing, has always involved technologies, and those technologies have emerged and evolved over time in relation to a society’s cultural and socioeconomic needs” (Olohan, 2020: 574).

Effects of technology on the translation process today are very evident, virtually all translation is carried out with the help of a computer, but there are many effects which are not as easily identifiable and a lot of nuances in what way or how much are machines used to produce or enhance translations. Quah (2006: 6) gives out a set of terms which are traditionally used to describe translation tools in translation technology field, and they are: machine translation (MT), machine-aided/assisted human translation (MAHT), human-aided/assisted machine translation (HAMT), computer-aided/assisted translation (CAT), machine-aided/assisted translation (MAT), fully automatic high-quality (machine) translation (FAHQT/FAHQMT). Figure 1 shows this division of terms, as devised by Hutchins and Somers (1992: 148, as cited in Quah, 2006: 7), along a linear continuum which shows the degree of involvement of either human or machine.

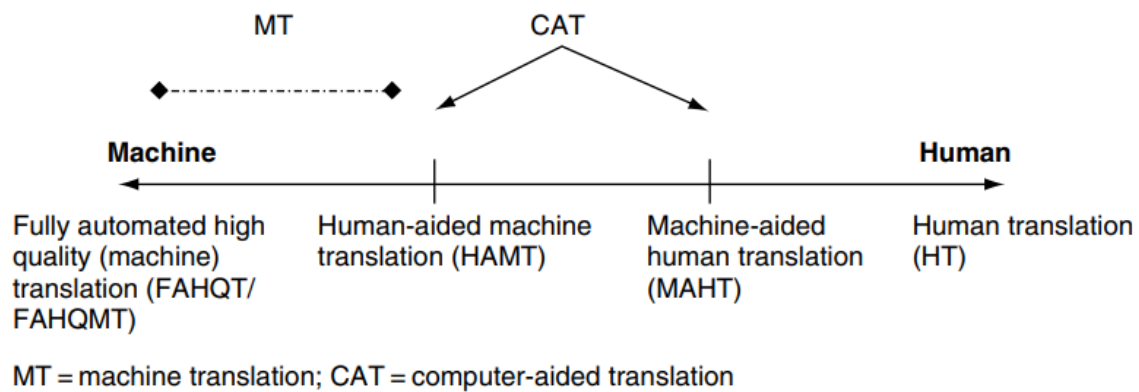


Figure 1: Human-machine continuum in translation (Hutchins and Somers 1992:148, as cited in Quah, 2006: 7),

Quah (2006: 8) already warns about the sustainability of such classification against increasingly multifunctional tools and, indeed, later authors like Kenny (2020a: 305-306) shift to a ‘primary agent’ which carries out a translation, be it machine or human translator, but it is nevertheless still useful as a starting point of reference. When it comes to the translation process, this paper will mostly focus on MT and CAT tools and systems regardless of the human factor involved, focusing on how they work and are used, with more attention devoted to MT since it is currently more disruptive and CAT has already been widely adopted as we will show later.

### 1.1 Machine Translation

MT, at first glance, can be simply defined as automatic conversion of text from one language to the text of another language done by a digital computer, but translation is now largely carried out using both human and machine factors which increasingly blurs the line between the two. So, as Kenny (2020a) argues, the key difference is in the primary agent of that language conversion, and in the case of machine translation it would fall to the machine to carry out the interlingual conversion, even though the machine relies on human input during the whole process; as well as preparation and post-editing. Castilo et al. (2018:28, as cited in Kenny, 2020a: 305) notes that “the traditional separation of human and machine is no longer valid, and drawing an arbitrary line between HT and MT no longer serves us in research, teaching and professional practice” (Castilho et al. 2018:28, as cited in Kenny,

2020a: 305), but that does not invalidate a general distinction between human and machine. Quah (2006, 8-9) notes that MT system can be defined as something that functions with or without human intervention, and that there has traditionally been many disagreements whether it needs to be defined as fully automated system or not, but for the purposes of this paper, MT will refer to systems with human intervention as well, like with pre-editing and post-editing. Stein (2018: 8) reminds us that it should be noted that the ultimate goal of MT is to produce fully automatic high-quality translation (FAHQT), which distinctly separates it from CAT, where the aim is to assist human translation.

### **1.1.1 Historical Evolution of Machine Translation**

When it comes to MT's development, Stein (2018:5-6) tells us that early influences come from secret languages and coding, one such example is Johann Joachim Becher who in 1661 developed a universal language system much akin to principles of early machine translation in 1940s. Code breaking during Second World War also used statistical systems that would mimic future machine translation systems. Stein (2018:7) continues with the Cold War period which marked the true beginning for the development of machine translation, but the negative report from the infamous Automatic Language Processing Advisory Committee (ALPAC) cut the funding due to lack of predicted usefulness of MT. But with the rise of personal computers and rapid technological advances in general, 1980s gave a new rise to the MT development, leading to data-driven statistical methods which relied on bilingual corpus or bitexts. "A corpus is a collection of texts in electronic form that are the object of literary or linguistic study" (Bernardini and Kenny, 2020), while they can be useful as monolingual, the bilingual and multilingual corpora are of special use for translation. According to Stein (2018:8), these systems would slowly learn to produce translations at first based only on specific words, but slowly evolved to groups of words, thus giving increasingly competent possible translation solutions.

On the theoretical side, Kenny (2020: 306) shows us that the first significant developments of machine translation in translation studies were heavily influenced by Chomsky's (1957) transformational grammar and its notion that sentences can be reduced to deep structural rules which could then be easily interlingually transferred, thus giving birth to rule-based machine translation (RBMT). But Kenny (2020: 306) also shows how such a robust system was expensive and difficult to code and with the increase in the human translated data volume and availability in the 1980s, parallel corpora shifted machine translation from rule-based to the more cost-effective empirical

approaches. RBMT is still used today, although often mixed with other systems and with varying degrees of practical usefulness, and according to Stein (2018:9-10), most RBMT systems are based on transfer method with 3 steps: 1. analysis, 2. transfer, 3. generation/synthesis.

Kenny (2020a: 307) continues the MT development with the 1990s, which saw the beginning of automatic alignment of the aforementioned corpora at a sentence level and data-driven machine translation systems were allowed to thrive, marking the functional start of statistical machine translation (SMT). Kenny (2020a: 307) also states that SMT system relies on bilingual data to decide on the most likely translation, therefore that volume of data becomes the key, a trend which only continues with the development of newer systems. Stein (2018:11) further explains how SMT uses data to weigh all possible translations of a particular sentence and then finds the most probable solutions, and since it is impossible for it to access all sentences in any languages it creates approximate models which are representative of all sentences. Since the repeated translation of exact same sentences doesn't occur very often, it was useful to reduce the focus of SMT analysis to words and phrases. But Stein (2018:12) also notes that in word-based SMT the obvious barrier is that one word often doesn't have the same one-word solution in different languages but requires a multi-word expression, and they also often don't have the same function in isolation. Phrase-based SMT attempts to tackle those problems, but also only processes phrases as sequences of words without further linguistic depth. Stein (2018:13-14) sees further potential in development which is heading towards an advanced syntax-based SMT, which could be more useful against these shortcomings.

SMT shines in its simplicity, one can create a SMT system without knowledge of the source or the target language and its usefulness will largely depend on the available corpora, and, in principle, the increase in the volume of data will increase the quality of translation. But Stein (2018:14) warns that the shortcoming of that is in the high difficulty of identifying and addressing common errors in the system, and those errors are especially evident when processing unparallel language pairs, not to mention that one can never really possess the optimal amount of data. Building up the corpora can also be difficult, from the labour-intensive alignment, uncommon language pairs, dominance of texts of parliamentary proceedings and professional translation against the lack of texts with standard language and so on. Stein (2018:15-16) sees one possible way to address these challenges, the usage of hybrid systems, but while the quality of the end-product is constantly increasing, so far there has not been a significant breakthrough. Kenny (2020a: 307-308) continues with the next shift from SMT, which is the neural machine translation (NMT), a system which also 'learns' from data but it does so by using artificial neural networks which allow it to handle full sentences and outperform SMT, but at the cost of more resources and higher complexity of the whole system. NMT uses a neural network,

which Koehn (2020: 67) describes as a “machine learning technique that takes a number of inputs and predicts outputs” with some additional strengths than other methods of machine learning, such as its deep learning ability with its multi-layered method.

Melby (2020: 425) also gives us five enabling elements outside of MT that helped its growth, and they are the emergence of: 1. large quantities of machine-processable text, 2. affordable computational power, 3. machine learning, 4. a substantial demand for translation, 5. and deep structure in linguistics. Word processing was a key development for MT, allowing the eventual digital storage of text, but so was the emergence of Unicode which could represent multiple languages in one text database. Huge increases in processing power and affordability were an obvious enabling factor, and so were machine learning and deep learning. Local languages have only become more relevant since the early MT development, especially with the rise of European Union, and despite the rise of English as a second language, first language use is increasingly less anglophone, with the United States Department of Labor expecting an 18% increase in employment of translators between 2016 and 2026, as well a survey which indicated that localized websites had greater success than those that lacked localization (United States Department of Labor 2016, as cited in Melby, 2020: 427). Together with the rise in usage of low-grade MT, like with its use inside instant messaging, we only see the growth of demand for translation. Deep structure in linguistics refers to underlying representation of language universal to all languages, mostly popularly represented by Chomsky’s generative grammar, leading to later generative semantics (Newmeyer 1986, as cited in Melby, 2020: 427), and the connection here is that AI might uncover and make use of these deep structures better than humans.

### **1.1.2 Post-editing of machine translation**

Currently, in most settings, the MT output needs to be post-edited to reach a certain standard of quality, a practice which has been rapidly evolving in the recent years, turning some human translators into machine’s “assistants”. Much like we wouldn’t publish any raw human translation without any sort of checking, editing or revision, why would we expect more than that from MT, especially at this stage (Arnold et al. 2002:8, as cited in Pavlović, 2017: 280). Nunes Viera (2020: 319) notes that due to poor past experience, post-editing of the MT output can be viewed negatively by translators, and even MT developers often view it as an undesirable final step of the development of their systems. Research has so far focused on quality, since any productivity benefits of MT would be undermined



if there was a significant lack in quality which would lead to post-editing requiring too much effort, so there is a question of needed effort in order to go with post-editing as well. According to Pavlović (2017: 287-289), the most common errors which require post-editing work are morphosyntactic ones at 67%, with lexical mistakes at 22%, which contrasts with un-edited human translation of the same texts where it is almost reversed, with lexical at 45% and morphosyntactic ones at 23%, indicating that the need for a different kind of post-editing for MT. Pavlović's (2017: 290-291) study also showed an important side of MT, showing that MT in its current form is much more suitable for texts with a high amount of repetitive content and with strict structure like legal documents and newspaper articles, showing the least amount of errors with those text types.

While studies like Green, Heer and Manning (2013, as cited in Nunes Viera, 2020: 321) and Autodesk (Plitt and Masselot 2010, as cited in Nunes Viera, 2020: 321, and Koehn, 2020: 22-23), which we can see illustrated in Figure 2, show an attractive prospect of the rise in productivity, the method of post-editing remains an open question, since they only focus on static post-editing where MT output is generated first and then edited. A new paradigm has since emerged where translators interact with MT system while that text output is being generated, thus having the ability to choose to alter the post-editing process and its product. While more recent research of interactive post-editing is needed, Green et al. (2014, as cited in Nunes Viera, 2020) suggest that it does produce a higher quality end-product than static post-editing. Emergence of NMT also has the potential to reshape the post-editing process, although possibly making it even more difficult to notice errors in the system. Nunes Viera (2020: 331) concludes with saying that “the human-machine interface is still relatively poorly understood in relation to issues such as decision-making, agency and cognitive processing, so research on these subjects should hopefully continue to evolve” (Nunes Viera, 2020: 331).

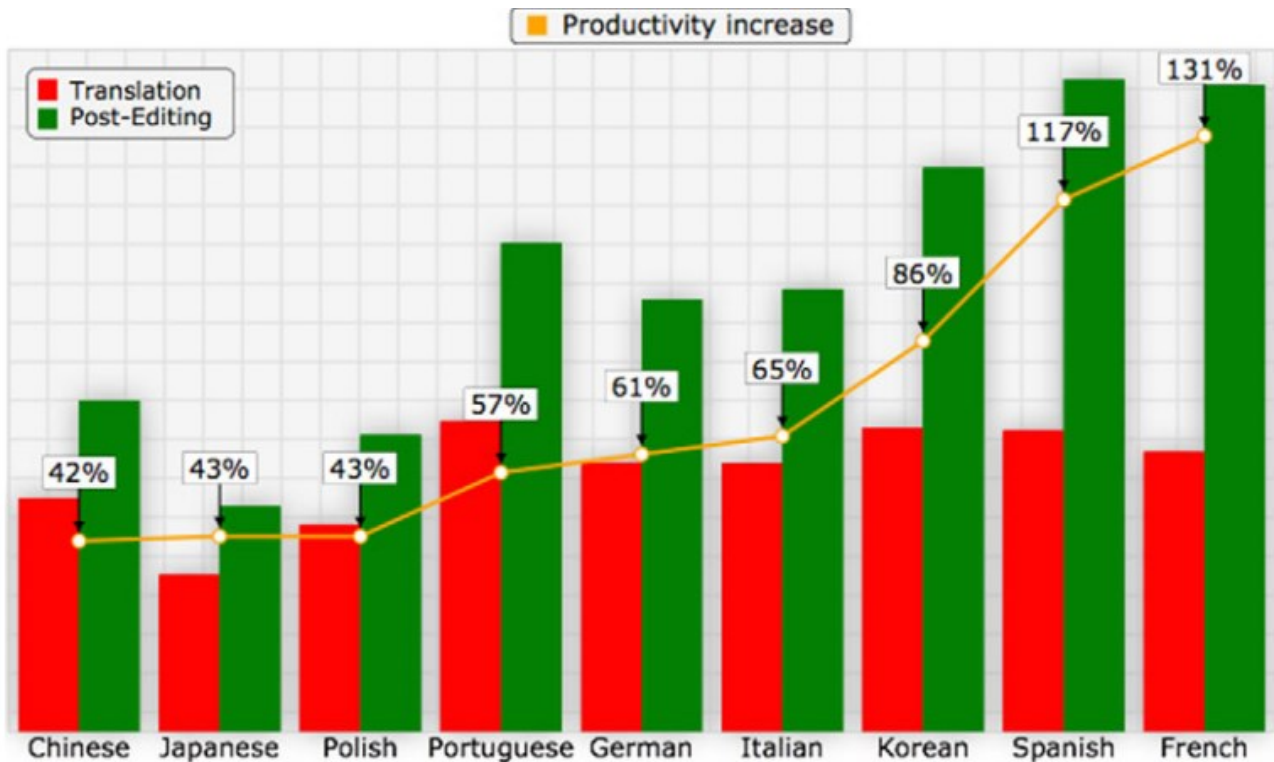


Figure 2: Increase in translator productivity when using MT, words per hour. (Autodesk, Plitt and Masselot 2010, as cited in Koehn, 2020: 21)

### 1.3 Computer-assisted Translation

According to Stein (2018:8-9), almost completely parallel to the development of MT, came the development of CAT, which unlike MT, aims to enhance the human translation rather than do the actual translating. One of the key CAT ingredients are the translation-memory systems (TMS). Doherty (2016:950) tells us that with the rise of computers, internet, and the need to increase the translation productivity, software companies began developing and offering CAT tools and these tools ended up having a profound effect on translation. The main part of CAT tools is in the aforementioned translation memory (TM) which stores all translations with the texts of both paired languages for future use, potentially drastically decreasing the translator's manual input when translator deems it appropriate to recycle or reuse old solutions. Doherty (2016:950-951) also states that CAT software also comes with customizable glossaries, search engines and the ability to share data inside translation project management features. O' Hagan (2020b) also suggests that CAT and

MT used to be clearly differentiated but now often come together inside a joint software package, and human translator is presented with choices produced both by TM and MT.

According to Chan (2017:30), there are 7 main concepts when we consider CAT in existing systems: 1. simulativity, 2. emulativity, 3. productivity, 4. compatibility, 5. controllability, 6. customizability, and 7. collaborativity (SEPCCCC), with some shared by both CAT and MT.

Chan (2017:30-31) further explains them, seeing simulativity as something which corresponds to CAT system's ability to simulate the behaviour of a human translator, claiming that there have been many approaches to the translation process suggested by the translation scholars depending on the text type and purpose, ranging from two to eight stages models, and CAT system has the ability to simulate all of these to a degree. One of the examples Chan (2017:34) gives is a CAT system with seven stages that goes through: sample text collection to term base creation, translation memory creation, source text selection, data retrieval, source text translation, and data updating. Chan (2017:34-37) sees emulativity as something that covers both CAT and MT systems and it corresponds to the functions that a human translator cannot perform, thus emulating human translation. These systems allow for alt-tag translation, chatroom translation, e-mail translation and even clipboard translation, they also allow the users to convert currencies or convert from and to metric and imperial measures, or even instant transliteration of different scripts. Many MT systems also offer instant online translations, they can translate on a sentence level rather than on the text level, they even have the ability to provide a gist translation of a longer text. According to Chan (2017:38-40), productivity increases with the use of technology don't need a particular explanation, virtually all translating today is aided by a computer in some way and employing a technology-competent translator is a must. But with new technologies, translations are now more regularly a collective effort inside a CAT system, which also allows recycling and reusing of stored previous translations from which translators can make a selection with evident productivity gains. Developing these systems can be a lucrative proposition for many entrepreneurs, so chasing productivity for profit is viable, as is the increase in efficiency by saving labour and costs.

Next, Chan (2017:41-49) notes that compatibility needs to be ensured across as many as possible file formats, operating systems, translation memory and terminology databases, as well as supported languages. Chan (2017:52-55) also notes that while there is little need for control of input text in human translation, there is such need in CAT translation because of the potentially unsatisfactory output, therefore needing a degree of controllability in forms of controlled language and pre-editing. Controlled language has clearly defined restrictions in lexicons, grammar and style rules with the aim

of easier processing and better understanding by users, although a controlled language system can be expensive to develop and maintain. Chan (2017:55-57) uses the term customizability to refer to the system's ability to adapt to specific translation needs, increasing the translation quality, editorial customization in pre-editing being one such key feature which is especially useful in localization when the needs of specific regions need to be customized into the system. There can also be various forms of lexicographical, lexical, syntactical customizations, as well as resource customization which include websites customization with the ability of creating resource profile settings, and MT system customization which allows for database customization. Finally, Chan (2017:57-60) views collaborativity as something which is all about working along with different parties inside a translation project, with continuous contact and sharing of resources, making the translation largely dependent on proper management. CAT system itself helps to both control the project with better monitoring and increased access, as well as better distribution of tasks and their more efficient completion, allowing the project manager to easily follow all steps in the process.

### **1.3 Interpreting and technology**

According to Braun (2020a: 569), the rise of communication technologies has only increased the demand for interpreting, leading to interpreting activity that can happen inside of virtual meetings, online conferences, video links between courts and prisons, phone calls between doctors and patients etc. Chan (2017:264-265) states that the influence of technology on interpreting is most evident in the development of speech translation systems, which now function both dependently and independently from the speaker, using automatic speech recognition and production. Braun (2020a: 569-570) further claims that technology also allows interpreters the luxury of not being physically present in these situations and allows remote interpreting, and this can happen regardless of the type of the medium, connection types, or whether it is a physical or cloud-based platform. While the consecutive and dialogue interpreting are less restrictive in these environments, simultaneous interpreting does require additional equipment and functionality. According to Braun (2020a: 569-570), this kind of interpreting is sometimes called webcast interpreting or remote simultaneous interpreting, and uses one umbrella term for all these practices: distance interpreting. Braun (2020a: 570) then outlines the development of distance interpreting, which has widely started in 1970s, associated with improvements to access to wide array of public services as well as reducing the cost, by the 1990s it became a standard practice in US and Europe. During the 1990s, the video-mediated interpreting

started as well, gradually pushing away its telephone counterpart which also continued its technological development, but the increase in videoconferencing naturally enabled use of video-mediated interpreting, with the interpreter initially physically present with one party, but later advances allowed the start of the remote interpreting as well. Braun (2020a: 571) also claims that all these practices shifted the working environment from face-to-face interaction to more of an indirect interaction through screen, camera and microphone, stating that quality differences between on sight and distance interpreting have so far seemed to be minimal in healthcare interpreting, but begin to be more noticeable in legal settings, with video interpreting also often being characterized as more stressful by interpreters. Lack of physical presence can also limit the ability of the interpreter to interact with all the subjects, though there are strategies that can help minimize the risk of misinterpretations. Braun (2020a: 572-573) also notes that many of these shortcomings can also be due to adaptation to new practices, especially when it comes to training new interpreters. While the new technology certainly expanded the access to interpreting services, they also increased the complexity of the process which is now not only a social practice but a socio-technological one, and the further technological advances look to only add new sets of solutions.

Braun (2020b: 271) distinguishes different categories of technology presence in interpreting, dividing them into: 1. technologies used to deliver and enhance the reach of interpreting (distance interpreting), 2. technologies that help support or enhance interpreter's preparation, performance and workflow (technology-supported interpreting), 3. technologies that are designed to replace human interpreters (machine interpreting), and 4. technology-enabled hybrid modalities such as respeaking. Distance interpreting emerged along with the technologies that enabled interpreting with or without physical presence on all sides with examples like virtual meetings, online conferences, video links between courts and prisons and phone calls between doctors and patients, but also led to remote interpreting where interpreter isn't physically present with any of the parties.

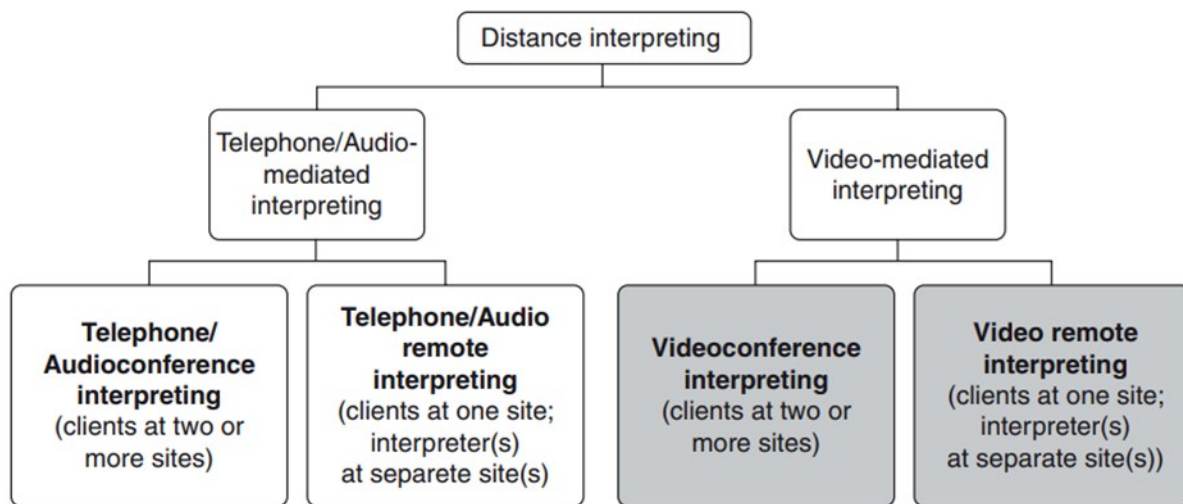


Figure 3: Modalities of distance interpreting (Braun, 2020b: 272)

Modalities of distance interpreting, as shown in Figure 3, refer to the medium of communication that is used broadly divided into telephone/audio and video, and are dependent on the interpreter's presence. Braun (2020b: 273) continues with saying that tools like digital pens and tablets are being adopted, as well as text-mining and corpus-based extraction tools, and are all changing how interpreting is being carried out, leading to a new hybrid method called simconsec or digitally-assisted consecutive interpreting. Another concept called tablet interpreting has also emerged when used both for preparation and real-time help with, for example, easy highlighting and hiding of certain parts of a speech manuscript, as well as note-taking and storing of notes for consecutive interpreting needs. Braun (2020b: 274) notes that, when it comes to machine interpreting, what is required are the systems which combine speech recognition and either speech synthesis or text-to-speech options with a MT system. While these systems exist, there hasn't been a significant breakthrough and computer assisted interpreting is generally viewed as a more viable option.

Davitti (2020) shows the example of healthcare interpreting as a specific field where the technology had a significant influence, which includes both signed and spoken language interpreting in support of bilingual health communication, sometimes also called medical or hospital interpreting, although healthcare interpreting is the broadest of those terms. Other than the crucially important benefit of preventing erroneous diagnosis due to miscommunication, it also serves the fundamental human right which allows everyone access to the healthcare service in their own language. Davitty (2020) notes that technology helped this type of interpreting with video-mediated interpreting, which increased access to such interpreters without compromising quality, even though not all cultural signs can be easily transferred via video.

## 1.4 Audiovisual translation and technology

According to Pérez-González (2020a: 30), audiovisual translation (AVT) refers to multimodal production of translation including language, image, music, colour, and perspective, all presented in a synchronized manner. AVT's development provided accessibility-driven practices, subtitling and dubbing, film and TV translation, media translation and led to coining of terms like screen translation, multimedia translation, and multimodal translation, intralingual subtitling for the sensory-deprived and integration of immigrants, as well as a shift towards all added elements that subtitles provide (responsive subtitling). According to Díaz Cintas and Massidda (2020: 257-258), AVT has shown a slow technological evolution until the emergence of DVD when digital technology first significantly disrupted the field, replacing the needed "heavy" equipment with a simple PC or a laptop needed to produce AVT, which is enough to gain access to advanced professional subtitling software, as opposed to earlier period when the expensive hardware was needed. Kapsaskis (2020: 554-55) focuses on the importance of subtitling, which has its origins in cinema when the subtitles were burned into the print as intertitles, and with the addition of sound subtitles became the preferred type of AVT in many countries, and while the technology has altered the production of subtitles, the basic principles and the format have largely remained the same. Romero-Fresco (2020: 549-550) further expands onto the subtitling for the deaf and hard hearing, which is closely linked to TV and teletext. Romero-Fresco (2020: 549) distinguishes these subtitles as: open, closed, prepared beforehand or delivered live, they can also provide non-verbal information in addition to verbal, and can be also used by people with learning difficulties and non-fluent speakers and language-learners. Nowadays, the subtitles for the deaf and hard of hearing are beginning to be increasingly produced interlingually as well as intralingually, and accessibility services like these are starting to be included in the production of the film, TV shows, and other types of media right away from its start.

According to O' Hagan (2020: 565), emergence of digital technologies has guided the production of AVT to much higher levels of efficiency, improving accessibility across the board, most notably with respeaking which enables live production for deaf and hard hearing users. Usage of MT for automatic subtitling has also both increased the productivity and cut the costs, and changes in the technological environment and in viewer preferences led to norm-breaking subtitles in both the professional and non-professional fields of translation. Fans now have the technology to produce and distribute their own subtitles which often go against commercial practices, and often against the copyright laws as

well. O'Hagan (2020a: 565-566) notes that just the rise of DVD fundamentally changed the production of subtitles, with the added space now came the inclusion of the subtitles of the source language which served as template which is already timed and segmented for translation. Subtitlers then also often had to translate from the file without being able to reference the actual audiovisual content, and such practice lead to a decline in quality. Another such area is dubbing, described as involving "the replacement of the original soundtrack with a target-language soundtrack in films, television series, advertising, videogames and other products destined for the screen that contain speech embedded in a multimodal context" (Pavesi, 2020: 156). Pavesi (2020: 160) also notes that multimodality is a key component of dubbing, and finds an increasing involvement of viewers in the production of dubbing. O'Hagan (2020a: 566) also suggests that the added capacity of DVDs also allowed inclusion of as many subtitled languages as possible in order to combat piracy at release, but the portability and malleability of this digital format only made it more vulnerable to piracy, further boosting fansubbing and fandubbing. Together with the rise of internet, which only gave further rise to user-generated content, only further increasing their visibility, and the advent of cloud computing has only encouraged user-generated translations even more, like with TED Open Translation Project, even though these practices existed before. We will further discuss these developments and the new translation practices that emerged from them in chapter 3.

According to Ciobanu and Secară (2020:91), since translation is a very mentally fatiguing process, making use of any available technologies to lower that mental strain is highly beneficial, and one such option are the speech tools, though they can offer some challenges along with solutions. Automatic speech recognition (ASR), otherwise known as speech-to-text (STT) or voice recognition (VR), is quickly improving and expanding access to more and more languages. There is a rise in all kinds of multimedia content that can be accessed via voice commands, video material is becoming more dominant as opposed to traditional text instructions, and static content is increasingly optimized for voice searches. Ciobanu and Secară (2020:94-96) suggest that audiovisual translation has been the field with the highest adoption of speech technologies, due to its inherent usefulness in that process, but captioning has also found application in cultural sector like with theatres, opera houses and museums. Meanwhile on television and similar media, live captioning or respeaking has been in use since 2000s, as well as later emergence of audio subtitles. According to O'Hagan (2020a, 568), MT systems, with the increases in data and further developing their machine learning, will likely lead to fully automatic useful translation (FAUT), and will likely be used for AVT too, especially thanks to the emergence of NMT. Some ethical problems can be identified with the usage of human translation in data which is often poorly credited in its vast volume because the mentioning of human



translators is not so widely practiced as it could be, nor do many companies do enough to preserve translator's right. O'Hagan (2020a, 568) concludes that further digitization of works also leads to many copyright problems where the existing legal landscape has many difficulties following the technological advances and in relation to fan work, it can either end in cessation or compromise. Further possible advances lie ahead for AVT, the potential of augmented reality platforms has hardly been tapped into, and that is only one example of an area where AVT can expand into.

Audio-visual media only looks to grow even more in the future, with the appearance of more and more streaming platforms and with the easier methods of translation, that trend of growth hardly looks like it is going to stop any time soon. Even a smaller markets like the Croatian one can reap the benefits of this growth, with giant streaming platforms like Netflix and Spotify finally arriving in Croatia in an official capacity, creating a whole new level of demand for Croatian subtitles, but there are still many holes in availability of official content in Croatia, which only looks like even more potential for growth. When it comes to speech recognition, for now only a small number of services offer direct speech recognition for Croatian, and even when it is offered it is difficult to compare it to the level of quality of the English one, but there is a good example in SpeakSubz which offers subtitling using speech recognition in Croatian (Screencast-O-Matic 2020).

### **1.5 Current and future effects**

To summarize, we have three dominant MT paradigms: RBMT, SMT, NMT. Which one has the most potential? K. Melby (2020: 419) further shows us how the RBMT systems operate under rules which were hand-crafted by humans, rules like sentence division, looking up words in a dictionary, syntactic analysis etc., making it very different from the SMT and NMT data-driven systems. RBMT was dominant from 1950s to 1980s, 1990s were a transition from RBMT to SMT, with SMT dominating the 2000s, and NMT started becoming dominant with the 2018. K. Melby (2020: 428) continues with explaining that RBMT systems are an attempted step towards interlingua, but they usually rely too much on word-level lookup and often ignore co-text, although potential of deep linguistic structure exists if there's a linguistic breakthrough in that area. RBMT systems generally do well with morphology and syntax, and performs well with similar languages, but the lack of interlingua-based system for substantially different languages remains an issue that may never be resolved if it turns out that there is a lack of a universal factor between languages. The main reason for SMT's victory over RBMT is its ability to produce a system automatically from TM database, and thus being much

more economically efficient. This leads us to the question of whether NMT is the end of the line for MT? While the deep learning with neural networks may be the ultimate answer (Marcus 2018, as cited in K. Melby, 2020: 430), others point to its limitation in architecture and NMT's ability to correct mistakes. Hutson (2018, as cited in K. Melby, 2020: 430) reports that it is currently not understood why some algorithms work and others don't, turning the choice of a particular architecture into guesswork, so if we can evolve from "alchemy to chemistry" in this regard, this might be the significant breakthrough NMT needs for the next stage of its evolution. That lack of insight into NMTs deep inner workings is related to error correction, since NMT systems are very uncooperative when it comes to finding out the source of any mistakes. Koehn (2020: 293-300) views challenges for NMT with its out of domain performance under low resource conditions and difficulties with noisy training data and rare words, but also notes that NMT systems are much less interpretable, calling for a clear need for the development of better NMT analytics. K. Melby (2020: 433) concludes that if NMT remains un-inspectable, it will probably reach a wall from which it won't develop any further, so MT development field will either need a breakthrough in that area, or an entirely new paradigm. We can see that the hype and reality around MT often don't necessarily match, something we can observe both historically and currently.

As far as the current use is concerned, "The 2018 European Language Industry Association (ELIA) survey of over 1,200 respondents across 55 countries highlighted 2018 'as the year in which more than 50% of both the companies and the individual language professionals reported as using MT' (ELIA 2018: n.p.m as cited in O'Hagan, 2020b: 1)". Earlier studies (Elia, EUATC and GALA 2016, as cited in Pavlović 2017: 280) put everyday MT use at 40%, so some increase is evident. O' Hagan (2020b) also claims that all commercial translation is computer-aided translation (CAT) now, regardless of the changing nature of computer usage even just in text production, although sometimes the term augmented translation (AT) is also used, putting human translator in the centre with the support of advanced technology. Quality is one of the most common concerns with regards to translation industry (SDL 2016, as cited in O'Hagan, 2020b: 2).

According to Chan (2017: 260-262), translation studies often has the reputation of providing theories with limited practical uses and many translators even think that their practical problems cannot be solved with some theoretical framework, however elaborate. The rise of corpus-based studies in the 1990's was a major shift, since the corpus-based studies, over all this time, have been proven to be both verifiable and very practicable, and with the bigger turn to technology in 2000s and the wide computer application in translation studies, no one will any longer propose a theory without sufficient data to back it. Therefore, Chan (2017: 262) notes, the theoretical approach in translation studies is

now both corpus-based and technology-oriented, meaning that the technology changed the approach to translation theories and will continue to shape it into the future. Translation technology is moving ahead along with computer science and linguistics in general, current trends that are most likely to continue to influence the development of translation technology according to Chan (2017: 266-267) are: 1. globalization of translation, 2. the creation of multiplicity, 3. the redefinition of translation, 4. the “networkization” of pedagogy, 5. the modernization of professionalism, 6. the generation of neologisms, 7. the formulation of concepts, 8. the perfection of automation, 9. the “enterprisation” of translation, 10. the emphasis of practicality, 11. the reorientation in research, and 12. the change of approach. Chan (2017) continues to elaborate these points and we will explain them further below.

Chan (2017: 267-272) starts with stating that with the advent of online options for translation, from online translation companies and online machine translation services to online CAT tools and online translation management systems, the globalization of translation is evident and will likely continue to rise. The emergence of multimedia translation like text-to-picture and text-to-video/animation and with the help of machine translation to process more efficiently, in the increasingly image and video-based world, the future of translation looks to be multimodal to further decrease any language and culture barriers. Key requirement for the translation profession in the future is the translator manpower that needs to be sufficiently equipped with the knowledge of proper usage of new technologies, wherever this knowledge is provided, be it at the universities, workshops, online, training at the agencies etc., it is essential that translator workforce is professional and universally certified. The globalization and technology development also created a demand for ‘intercultural mediators’, a role where translators and interpreters can fit. New terms are coined with the advance of technology, in translation studies it brought new concepts such as localization or controlled language, changing the research of translation and how it is carried out in practice, and we can expect new terms to emerge with further developments. The further research done within translation studies will not only remain data-driven objectivity, but will only increase with the volume of data which will be shared to a higher degree and processed more efficiently. Current machine translation systems, especially when they deal with non-kindred language pairs, still do not produce entirely satisfactory results, but given their further development it does seem likely that one day we may rely completely on machine translation capable of fully automatic high-quality translation (FAHQQT).

Chan (2017: 272-273) also claims that the technology has increased the productivity and decreased the cost of translation and quick project turnover only increases the demand for translation, creating

even more income, so we can say that technology has moved translation from profession to business. Development of translation technology has also led to a shift from literary text, which once used to dominate the focus of translation studies, to practical texts. When dealing with some practical text like a webpage, with a high degree of potential recycled text materials, computer-aided and machine translation are much more helpful in this environment and their functionality will only increase, thus continuing the shift to practical texts because of their higher practicality. The research of translation technology itself only looks to increase as well, with the further developments, more theories can be put into practice using new technologies, and more academic programmes will be established. Chan (2020: 274) claims that something which really needs to happen is a shift from reactive to proactive research. If we look at the focus of research in translation studies, it is largely based on observing past and current translation in practice, history, literature, religion and culture. While that research is of course useful, the whole translation industry would benefit from some kind of research work that will prepare all its participants for the changes to come and possible vast transformation of translation landscape.

Cronin (2020: 213-215) suggests that globalization's effects on business world in general created the conditions for the emergence of localization as a key constituent of global business, with the increase of non-English web users who prefer using their mother tongue. One consequence of this is an increased demand for huge volumes of translated text, and crowdsourcing emerged as one way to tackle that problem. Growth in supranational institutions further shifted the focus to tackling translation on a global level, but also the effects of inward and outward migration lead to increased demand for translation, especially the need for community interpreting. "If we consider that without the services of dubbers and subtitlers Hollywood dominance of global cinema markets would be inconceivable, we can see translation as the sine qua non of cultural dominance and an agent of centripetal globalization" (Cronin, 2020: 216-217).

Olohan (2020: 575) claims that Translation memory (TM) and machine translation (MT) are the most studied when it comes to translation-technology relationship, but more recently it has more significantly expanded to other fields. First research focused on usage, asking which tools are used, to what degree and what was the attitude towards new technologies. Olohan (2020: 578) suggests that research so far shows better translation conditions at the moment, as opposed to the past, calling it an general improvement and showing cautious optimism for the future, especially in the potential of speech input and MT postediting, a move to natural user interface (NUI) from graphical user interface (GUI). But also warns that possible redefinition of translation may await us in the wake of AI, as is the case in many other professions, so a collaboration with other fields should be welcome so all

professional workers can face the outcomes of automation together. Chan (2017: 274-275) concludes with saying that the ultimate future of fully automated translation, which is highly mobile and potentially operated solely by speech and without even the need to photograph the text, seems very possible. Absolute end-goal would be a world without barriers in all forms of communication, without the need of using one common language, but free expression of all languages, and highly technology-driven translators and interpreters can function as ambassadors between cultures.

So far, we have emphasized how important technological competence is for future translators, which raises the question of how and where will they attain this knowledge, and the ideal scenario would be for them to enter the workforce technologically well-equipped from their education, but how does that education look like? Kenny (2020b: 508-509) suggests that the best scenario is probably in close constant cooperation between the industry and academia, since it is very difficult to predict in advance what kind of technology will dominate the future business, this way the translators in training could at least have access to the current real state of the profession as the next best thing. This method may not be entirely suitable for smaller countries like Croatia which do not have a large language service industry and would rely on smaller agencies who may themselves be lagging behind and cannot easily adopt new technologies or handle changing their business models. In such cases, a more general technological competence should be in focus rather than having only a how-to of a particular tool, since no one knows what the dominant tool is going to be, and then we can supplement that with some practical usage and industry cooperation where possible. While it should probably be expected of an average worker of the 21<sup>st</sup> century to be able to adapt to the new software of any kind, some responsibility must also be on the developers in making it user-friendly, no matter how advanced the machine learning system is, it should still be fit for human use. Kenny (2020b: 509) also notes that the integration of machine learning in translator's education is the key current challenge, suggesting that it may even have wider benefits since it looks to affect many different future areas of life.

## **2. Rise of the New Text**

According to Doherty (2016: 956-957), with the 1990s, traditional forms of text, which have been well-defined by then, faced new entries in the field with the emergence of websites, computer software, technical documentation, video games, and subtitles, thus almost completely changing the

text landscape. Because such content demanded specific focus on specific geographical locations, process of translating this new format became known as localization, which demands not only linguistic adaptation but also compatibility of the end result with the local market and culture. Doherty (2016: 957) also notes that these new text types used new and unique language, computer code, and all kinds of files and formats, which often possessed high regional variation, so translating all these complex elements requires specific specialization. Unlike more traditional texts, these new formats are much less static and often require regular updating, thus, in a sense, making them some sort of “living texts”, as Doherty (2016: 957) calls them. The need to tackle translation of these new types of text, let localization to distinguish itself into a special field.

## **2.1 Localization**

As one definition puts it, “localization involves complex technological, textual, communicative and cognitive translational processes that introduce modifications to source interactive digital texts with the goal of rendering them usable in linguistic and sociocultural contexts other than those of production” (Jiménez-Crespo 2013b, as cited in Jiménez-Crespo, 2020a: 299). The term localization was coined by software developers in the late 1980s “to reflect the introduction of linguistic-cultural elements considered foreign to the initial source code, content and display in US/American English” (Folaron 2006:198, as cited in O’Hagan and Mangiron, 2013: 87-88). It is a significant part of the language technology which generates a lot of business growth, but is also in a way, as we will elaborate later, present in non-professional translation like crowdsourced or fan translations. According to Folaron (2020: 208-209), localization was first used in 1980s for software like operating systems, office suite applications, desktop publishing programs and editing programs. Website localization emerged from the mid-1990s, following the ever-increasing website production, and the web-based communication lead to higher prevalence of games and mobile devices. From about mid-2000s to the present, Web 2.0 social networking and social media platforms introduced peer-to-peer file-sharing, video sharing, mashup creation, self-publishing, collaborative networking, aggregation, syndication, curation, metadata tagging, archiving, search engine optimization, geolocation, third-party application program interfacing, streaming and tools for producing podcasts, blogs and microblogs. Folaron (2020: 211) concludes that together with high speed internet and cloud and mobile computing, all of this has sparked an enormous growth of digital user-generated content.

According to Jiménez-Crespo (2020a: 300), localization emerged largely together with the rise of personal computers when popular software companies, mostly based in United States, began to seek international expansion and needed more than mere language equivalents in the strings of programming code. At first, localization efforts were carried separately from the software development, but eventually localization would start to be present from the beginning of the development cycle and that led to emergence of a distinct localization industry. Localization would soon involve the World Wide Web, video games and mobile phone application, and an expansion to wide variety of other digital texts, leading to specific specialization of each field, as shown in Figure 4.

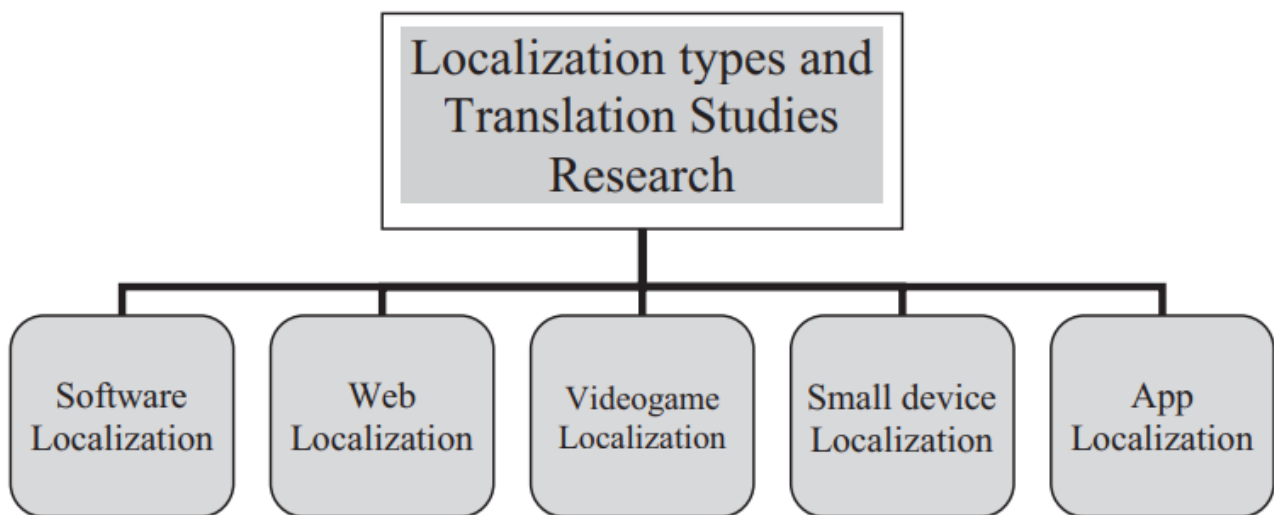


Figure 4: Different area of research in localization studies (Jiménez-Crespo 2011a: 4, as cited in Jiménez-Crespo, 2020a: 301)

Jiménez-Crespo (2020a: 304) concludes with saying that the web and video game localization are today the biggest of those fields. With the large number of users in all fields, crowdsourced localization became widely practice, and as the amount of content increases, the demand for localization of any form grows with it, in a volume that the professional translation manpower cannot match.

According to O’Hagan and Mangiron (2013: 87), localization is today an integral part of globalization, and the process of localization can be understood in terms of linguistic, technical, and cultural dimensions. Since it is dealing with text embedded in a technological platform, the linguistic

and cultural elements are subjected to technical limitations so there needs to be a seamless integration of software engineering and text translation in order to have a well-executed localization. Localization also needs to consider specific local market characteristics, making sure that the target users perceives is as an equivalent of their local products, which is evident in cultural elements like the script or from which side the text is read. Localization is often perceived as a translation sector which saw both the earliest and widest user of translation tools (Lommel 2006: 223, as cited in O'Hagan and Mangiron, 2013: 95), with many applications dedicated to localization which allow work with different types of files needed for localization (Esselink 2000: 383, as cited in O'Hagan and Mangiron 2013: 95). High usage of CAT tools in localization comes from high volume of repetitive text with regular updates and constant last-minute adjustments due to simultaneous releases of original and localized versions. High degree of text recycling and the need for consistent terminology usage makes translation memories very useful especially when used together with MT since source text is often written using controlled language which is very helpful for MT, which can then also be post-edited. O'Hagan and Mangiron (2013: 96-97) conclude that software localization did saw earlier and wider usage of CAT tools, which does differentiate game localization as a sector that aims for more than mere functionality with its localized products.

## **2.2 Video game localization**

According to O'Hagan and Mangiron (2013: 17), in video game localization, we differentiate between the full localization and the partial localization depending on whether game dialogue is dubbed, process which in this case is called voiceover, or is it only subtitled in the target language. Voiceover used to be only applied to biggest titles, but has since met with wider usage, with poor localization sometimes seen as the reason for some titles underperforming in certain markets (Ashcraft 2012, as cited in O'Hagan and Mangiron, 2013: 16). Much like the user experience with website localization, the focus with localization of video games is on player experience, so this practice is close to the process of transcreation, highly dependent on translator's creativity. As opposed to software localization which has been very US-centric with its source code, game localization is equally shared among US and Japan when it comes to the source coding.

O'Hagan and Mangiron (2013: 111) distinguish two main localization models, the outsourcing model and the in-house model. They also make note of the trends like sim-ship and post-gold localization, as well as a level or a degree of localization which can be full, partial, or "box and docs localization;



also addressing the specific game assets which are subject to translation like the in-game text, audio and cinematic assets, and the printed materials. O'Hagan and Mangiron (2013: 113-114) also take note of the fact that many video game releases today are "cross-platform" or "multi-platform" games, meant for the releases for multiple consoles, so it is often to address that at the initial stages of development, much akin to having localization in mind at the creation of the source text and code, or even usage of controlled language. One advantage of sim-ship localization is that sometimes translators can have an input on the changes in the game while it is still being developed (Tinnelly, personal communication, 15 February, 2012, as cited in O'Hagan and Mangiron, 2013: 117). Post-gold localization implies a delay of localization after the release that can last months or years, and although it represents a waiting period for the consumers, translating a fully finished product does have its advantages. Most widely used model is the outsourcing model, which most commonly involves commissioning a specialized vendor who then manages the localization project. The lack of context awareness, with translators often being unable to play the game they're translating, leads to "blind localization" (Dietz, 2006, 2007, as cited in O'Hagan and Mangiron, 2013: 119) which involves assessing the risk of multiple possible translations in order to pick the most appropriate solution. To make up for any such of similar limitations due to the lack of access to the game, vendors will usually be provided with a localization kit which would ideally include: general information about the project and the game content, reference materials, software programs and CAT tools, code, and assets to translate. O'Hagan and Mangiron (2013: 120-121) note that although this is becoming a more widespread method, it is still very common that developers provide only the script and some excel files.

When it comes to game assets, according to O'Hagan and Mangiron (2013: 122), they all need to be localized consistently, even together with possible additional assets like readme files, press and marketing releases, website of the game, online help, and official strategy guides. All in-game text encompasses user interface UI and all narrative and dialogue lines, and they are subject to strict space limitations like in software localization, but here they should never interfere with the gameplay experience. O'Hagan and Manigorn (2013: 122-125) continue with saying that the text which includes system messages from the console is also included in the translation and localizers need to be familiar with the standard terminology of the manufacturer. Art assets refer to all graphics and images like maps, sign, and notices, often having to be redesigned to fit the target language and are as a result sometimes ignored in order to save time.

The localization process can be divided in stages, and O'Hagan and Mangiron (2013: 128-131) distinguish three main stages; pre-localization, translation, and post-localization. Pre-localization

includes the creation of the localization kit, appointment of a localization coordinator, and preparatory work like: familiarization with game, compiling glossaries, creating a style and characterization guide etc. Translation is, of course, the key stage of localization process, the unique case here is the aforementioned possibility of a sim-ship model where translator is translating a source text which keeps changing, as opposed to a finished product of a post-gold model localization, and using a pivot language is a common practice. Another difficulty, much akin to software localization, is that source text often comes fragmented without context or indication of what type of a text it is, translator can also face difficult character space constraints, mandated platform-specific terminology and need to be very careful with variables that can work in all contexts. Once the translation is done, editing begins, as well as recording for any needed voiceovers which can be unrestrained or time-constrained to match technical constraints of the original, but can also be sound-synched and lip-synched. Post-localization includes integration done by engineers to bind everything into a playable version and debugging and quality assurance (QA). Most common types of errors in localized games included: functionality errors relating to the game itself and UI, compliance errors relating to the standards of the manufacturer like age ratings, and linguistic errors like grammar mistakes and typos (O'Hagan and Mangiron 2013: 132-141).

There are different levels of game localization, Chandler (2005, 12-14, as cited in O'Hagan and Mangiron, 2013, 141-142) categorizes four main possible levels: no localization, box and docs localization, partial localization, and full localization. No localization refers to games sold in their original language, box and docs one refers to translation of just the package and the manual of the game, which is very common for games that include little text or expect to do well in regions with good handling of English. Partial localization translates the in-game text but keeps the original voiceover files and subtitles them, leaving us with the full localization which is the translation of all game assets, a level usually reserved only for the biggest titles. According to Steusy (2010b, as cited in O'Hagan and Mangiron, 2013: 145), one example of localization approach is Sony Online Entertainment, which usually translates into French, German, and Japanese, uses a standardization approach to localization which is based on following points: an integrated translation engine, English strings with persistent and unique ID which enables tracking of changes in English text, standardized translation data exchange format for easier importing and exporting, and a modern localization workflow with a centralised translation database and tools also providing feedback.

### **2.3 Web and other types of localization**

No traditional form of text can match both the volume or potential as a source and provider of both knowledge and entertainment as the World Wide Web, nor its business potential in offering and/or selling services and products. According to Bowker and Ciro (2018, 29-30), a very significant factor of how much a webpage is successful at reaching its intended purpose is known as User eXperience (UX), and it is itself a wide topic of research with a lot of debate and many approaches to it, as individual experience are not always universal, but its importance in the ever-growing array of offered webpages battling for the users and customers, only grows more important. Bit less of research of UX is focused of text than it is on visual aspects of UX, but the translatability of a webpage text is a key issue in its localization. Bowker (2015, as cited in Bowker and Ciro, 2018: 32-33) studied the relationship between the UX and translatability with pair of English and Spanish, and found the following relation: “as translatability increases, the UX of source-language readers begins to decrease, while the UX of target-language readers begins to increase” (Bowker 2015: 25, as cited in Bowker and Ciro, 2018: 30-31). Bowker and Ciro (2018) conclude with saying that this delicate relationship needs to be considered when doing something time-consuming and expensive as localization, and one possible strategy is using a form of pre-editing like “controlled authoring” that prepares the source text for future translation at its creation, and when it is paired with post-edited machine translation system, the costs go further down. Zanettin (2020: 78) claims that translation of comics can be regarded as a form of localization, because visual and verbal signs need to be adapted for the targeted market (wide difference in onomatopoeia between English and Japanese). With the digitalization, production of comics itself became streamlined to accommodate future localization, art, dialogue balloons and onomatopoeia are provided as multi-layered lines. Zanettin (2020: 79) also points that comics also connect to other forms of new media, and internet brought further access to foreign visual literature, leading to scanning and non-professional translation outside official channels.

It would be foolish to ignore localization with its growing industry and its high adoption of technology, we may even use it as an insight into how some aspects of future translation may look like, with its focus on cultural and technical aspects. We can imagine a scenario where a physical book containing a novel uses some form of augmented reality, is translation of such a book not much more akin to localization? And does the process of transcreation not require a comprehensive analysis of the target culture very similarly to localization? We have already established that the lack of localization can be a detrimental to the performance of many products in specific markets, so perhaps it is not unreasonable to suggest that the presence of a translator while the product is being developed

and their ability to influence the product before its finish, like it can happen in localization, offers some inherent advantages. Of course, we have seen that scale of localization can vary a lot from case to case, as well as standards and quality can vary, and that not every product is or should be suitable for localization, but that does not take away from its potential and from the lessons we can take from it. Localization can be useful for all kinds of markets, even smaller ones like it is the case with Croatia, with all kinds of applications and websites becoming increasingly more available in Croatian, even the entertainment giants like Sony lately regularly localize their major video game titles in Croatian (Ilinčić 2020).

### **3. Translators of the Online and Digital Age: New Translators**

Other than what is being translated and how it is being translated, new technologies also brought the question of who is translating. Doherty (2016:960) notes that with the rise of open-source communities and crowd-sourcing, the translation landscape now also includes a number of non-professional or semi-professional translators who voluntarily participate in sometimes very large online projects that cover all sort of niche fields like social media, video games, animation etc. Fan subtitling of specific films and TV shows known as “fansubs”, not only covers the lack of official subtitle translations, but is sometimes acknowledged by the audience as superior specifically because it was done by fans who are more familiar with the source materials. Doherty (2016:961) also states that with the advent Google Translate and Microsoft Bing, rudimentary translation can now also be carried out by any everyday Internet user which can be helpful and a quick fix in many situations, despite concerns about the quality of translation. With the rise of both the simple MT and non-professional translation which clearly shows that there is a need for translation in many uncovered areas, the translation profession has ample opportunities for expansion and an ever-growing responsibility to preserve the translation quality.

Contexts where these new translators came to prominence are digital and online, and according to Desjardins (2020: 386), online context refers to activities which are networked or connected to the Internet, while digital refers to technologies that have surpassed analogue circuits, and both cause some confusion and constantly create new terms, like to “Google” something, while making some other terms obsolete. Desjardins (2020: 387) suggests six categories of research of translation in online and digital contexts: 1. crowdsourced translation and collaborative translation, 2. translation and activism, 3. translation and crisis management, 4. professional translation and the impact of the

web, 5. digital mobility and social media, 6. fan translation. Widespread usage of mobile phones and connection to the web helped spread revolutions in 2010, translation played a key role in spreading the protestor's content to international audiences. The Government of Canada enlists their citizen's mobile phone numbers to make sure they receive all kinds of alerts, available in both English and French, revealing invisible translation activity, and crisis management in general demands careful linguistic mediation as well as technological one. YouTube now provides translation tools themselves to boost the video experience and help both the viewers and content creators, and so does the TED platform, and user-generated feedback on social media is also a useful tool for translation quality assessment (TQA). Some attention also needs to be given to the organization of larger companies who conduct translation projects, as well as individual freelance professional translators that often cooperate with them, so we can better understand the translation industry landscape and how it contrasts with the emergence of non-professional translators.

### **3.1 Language Service Providers**

According to Esselink (2020:109), Language Service Providers (LSP) are large and often multinational companies who offer a wide array of language-based services like copywriting, video localization, post-editing and layout services, often working together with freelance translation and employing mostly the staff who ensures the quality of translation projects, although they may have some in-house translators. As Koehn (2020: 22) notes, LSPs and smaller agencies remain the biggest providers of high-quality translation, which also pays the most, and neither MT or a non-professional can compete in that regard yet, but they can be used to increase productivity. Evolution of technology usage in LSPs was similar to many other industry sectors, at first, they only supported their translation with tools such as translation memories (TM), but now use new technology with the aim of automating most of their business. Esselink (2020:110) divides that historical trajectory as: desktop translation tools (early 1990s), server-based translation tools (1990s), project management and team collaboration platforms (early 2000s), translation management systems (late 2000s), and cloud translation platforms (2010s). Desktop tools mostly refer to CAT tools with the TM and an editor, and server tools allowed sharing of those TMs with the introduction of localization tools. These tools are then expanded with management tools for easier coordination between everyone involved in the process and even the customers who will use the end-product, and today many of those systems use cloud storage and web-based connection. Esselink (2020:111) concludes that with further

development, AI might not only automate translation process, but can also automate project decisions such as choosing the most suitable translator for any given translation or crowdsource an army of translators.

Most LSPs now use translation management systems (TMS) that allow them to manage all aspects of their business, although these still often have stronger and weaker areas and it is hard to find one single system to rely on, with language processes often taking the biggest hit.

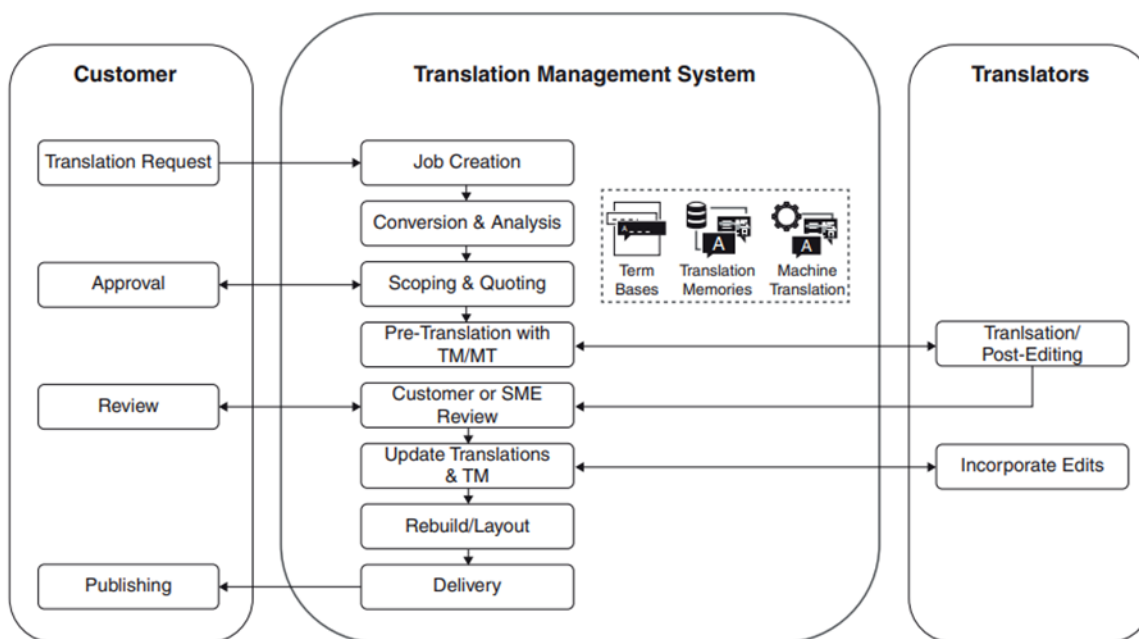


Figure 5: TMS workflow (Esselink, 2020:112)

Figure 5 shows the general workflow of LSPs, although they may be more steps depending on the project type, like for example some legal process, and there isn't only one type of LSP so there's a lot of space for variation. We can still establish four main core activities: process management and automation, project management and administration, customer management and commerce, and translation and quality management. Zetzsche (2015, as cited in Esselink, 2020:121-122) lists some of the requirements and key aspects that are still missing, such as a more complete translation environment, a more organic productive integration of MT, independence of operating systems and finding a new and sustainable business models through translation technology. Esselink (2020:123-124) notes that the future of translation inside LSPs looks to be largely post-edited and rarely made from scratch, pooling from existing TMs and MT systems, and one key relationship is the one between LSPs which possess translation knowledge and possession of data, and the platform developers with

their technical knowledge and developing capabilities, relationship that can lead to more universal systems with better integration of general business and translation if it is well-maintained.

### **3.2 Freelance Translators**

Zetzsche (2020:168) claims that most freelance translators use more than just CAT tools, they also use electronic dictionaries, accounting and project management tools, third-party tools specializing in some aspect of CAT tools' capabilities (like file conversion), some kind of speech recognition software, and social media tools. These of course largely depend on the languages in question, but the level and speed of adoption of individual tools varies, while electronic dictionaries were quickly adopted, terminology management tools took way longer. Zetzsche (2020:169-171) suggests CAT tools use was low well into 2000s, sparking a lot of heated debates from early adopters, because time and money investments seemed to be too high for most. Today, even though there are some unwilling voices; especially with the most recent tools, CAT tools are generally considered necessary in the translation process. Costs do continue to plague adoption of many tools, which also leads to piracy. Goldsmith's (2014, as cited in Zetzsche 2020:173) anonymous survey of freelance translators reveals that about 50% use some pirated software, leading many developers in this small industry to their early death, and making larger companies look like more feasible clients, and we ended with tools which do not cater to freelancers. One possible route of escape from this is in open-source development, like with the example of successful OmegaT, though this field this hasn't be able to present itself as more accessible. Biggest translation web portal ProZ.com found in 2013 that 88% of its survey respondents used at least one CAT tool with 76% of those using more than one (Prozcomblog 2013, as cited in Zetzsche 2020:176). Another study (Steurs, van der Lek-Ciudin and Vanallemeersch 2017, as cited in Zetzsche 2020:176) showed that translation memories are the most heavily used feature, with 52% only using "basic categories". Adoption of MT is plagued by fear for their livelihood that is often associated with MT, with most freelances lack the technical ability to fully understand it and effects of general public attitude to AI, but many are also unwilling to work in MT post-editing and it is just another element outside of their control. Zetzsche (2020:178-179) also suggests that cloud-based systems also face resistance due to poor early quality of first web-based CAT tools as opposed to desktop ones, limitations in terms of number of options, less control of their "own data" and higher degree of client oversight. This is a stark difference from LSPs which adopted cloud-based system more readily. In general, Zetzsche (2020:179) concludes that freelance

translators slowly adopt new technologies, and when they do, they tend to stick to those specific tools and are slow to switch to newer and presumably more advanced tools, thus negatively influencing software development which would cater to them, although there is some progress in that regard when compared to the earlier periods.

### **3.3 Non-professional and collaborative translation**

According to Jiménez-Crespo (2020b: 239), non-professional translation (NPT) is tied closely to the impact of digital technologies and World Wide Web, opening up translation as an online activity accessible to translators with or without any formal education in translation. Although they are mostly not compensated for their work, these amateur or volunteer translators can still be highly skilled in technical knowledge required for this sort of work. These translations can be solicited like it is usually the case with crowdsourced translation, or they can be unsolicited like it is most common with online collaborative translation. Antonini et al. (2017: 6) point to non-professional as the most appropriate umbrella term, including interpreting as well as translation, claiming that it's unbiased nature can encompass a wide range of practices. Antonini et al. (2017: 1) also address the rise of NPT, giving the example of the organization of the First International Conference on Non-professional Interpreting and Translation where it was pointed out that “traditional focus on translator and interpreter training and on the advancement of the status of translators and interpreters as professionals is no longer sufficient to address the complexity of real-life situations of translating and interpreting” and that “non-professionals translate and interpret in a wider range of contexts and in more diversified forms, their work emerges not only as an alternative to established professional practice, but also as a distinctive phenomenon, which the discipline has yet to recognize as a noteworthy area of study” (Pérez-González & Susam-Saraeva 2012: 149, as cited in Antonini et al, 2017, 1-2). These conferences confirmed the existence of a wide NPT communities and helped bring it into the research spotlight, revealing new phenomena like fansubbing, fandubbing, recruitment through crowdsourcing etc.

Jiménez-Crespo (2020b: 242-243) also notes that the emergence of Web 2.0 only gave further rise to user-generated translations, making the communication easier and the management of its projects simpler, but also led to companies starting to make use of web-based communities for crowdsourced translations. Google launched the Google in Your Language localization campaign in 2001 where volunteering workforce localized its user interface, and around the same time Wikipedia launched its



collaborative translation project. These models are based on open participation and only grew since then and reached further commercial viability, with similar projects hitting Facebook, Twitter, and Amazon. With the commercial crowdsourcing, the non-profit crowdsourcing also developed further, especially with the development of cloud-based web technologies, leading to new rise of activist or crowd subtitling, and an emergence of more efficient management collaboration like it is the case with TED Open Talks initiative and Amara. All these examples showcase a strong relationship between NPT and technology, making it hard to predict further developments due to its dynamic nature, but NPT only looks to continue and evolve further.

Robert Neather (2020: 70) paints a common isolated and singular traditional image of a translator, which prevails even when the translation effort is collaborative. Development of online collaboration and sophisticated collaborative translation technology changing the very concept of translation and what it means to be a translator. On the web, multiple-users interact simultaneously, commenting on and correcting each other's work, leading to concepts such as volunteer translation, community translation, user-generated translation and crowd-sourcing. Robert Neather (2020: 71) also suggests, similarly like Jiménez-Crespo (2020b) before, that these collaborative efforts can be both bottom-up and user-driven, as well as top-down and solicited. Online collaborative projects include fan subbing, activist translation, and wiki-based translation communities. Robert Neather (2020: 74) emphasises again that collaborative projects are blurring the line between and redefining professional and non-professional translation, including the change of public perception of translators. Boéri (2020: 1-4) suggests that activism through social media, online tools, and other online services allow quick collaborative translation action and can mask the translator's visibility for their security as one form of non-professional translation, and gives examples of Egyptian Revolution, and Translators Without Borders. On the other side of the spectrum, as McDonough Dolmaya (2020: 124) writes, translation is crowdsourced when internet users, regardless of their formal profession, translate online text collaboratively for little or no financial gain. User-generated translation is another term used for this practice, and even community translation can be used in some cases. McDonough Dolmaya (2020: 125) also suggests that the crowdsourced projects are, unlike some other online projects of similar kind, generally solicited by the content owner, and even when that is not the case, there is no copyright infringement. Motivation for participating in these projects varies but it includes feeling of affinity to certain cause and desire to contribute, as well as a sense of belonging. McDonough Dolmaya (2020: 126) also makes an observation that crowdsourcing, through mass voting on suggested translations, might be an effective way of producing more natural-sounding translation which would cater better to the target market region than more traditional forms.

According to Yamada (2020:183), with the rise of translation technology, all kinds of non-professional translators rose with the with initiatives like Wikipedia entries, YouTube subtitles, TED Talk translations and Facebook’s user localization. Online MT services like Goole Translate also allow donating translation to improve its systems, along with sharing of TMs on other platforms, and other examples like these can further empower non-professional ability to translate. Yamada (2020:184) also suggests that this can aid in professional translators feeling more threatened by the translation technology, with non-professional translator being more acceptive of it, potentially leading to a crisis of professionalism. Professional translators need not treat non-professional translators like an invading army pouring over the walls of their livelihood, much like it is often the case with the perception of MT, but can use their activity to guide them to the potential area where there is clearly a demand for translation, or they can learn to share the vast translation landscape they cannot possibly cover on their own, inside a new model that would serve the mutual economic benefit.

### **3.3.1 Fan translation**

According to Evans (2020: 177), fan translation focuses on the types of text which are relevant to a specific group of people, usually some form of a fandom. Internet made these texts widely available and easy to produce, and fans will translate media like animated shows, live-action TV shows, films, video games, comics (scanlation<sup>1</sup>), fiction, board games and video games (romhacking), and song lyrics. Evans (2020: 178) suggests that while fan translation usually just fills the hole in the languages where official translation is missing, often because of perceived lack of commercial validity, but sometimes fan translation even acts as an alternative to the official translation and also may cause changes in official translations. While examples of all of these practices exist in all types of media, fan translation tends to be most extreme when it comes to “improving” or competing with official translations. Evans (2020: 180) also notes that all fan translations and places where fan translators gather and compile translations have been threatened by the source owners to some degree, being that they are technically illegal, but they are also often tolerated in many cases because they also generate free promotion. The added benefits that the fan translations have lie in deep knowledge of the source material professional translators often lack and, in more language freedom because they work outside of potential censorship rules due to restrictive age ratings tied to official releases. Fan translation of

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<sup>1</sup> Scanning + translation, a form of fan comic translation where physical comics are scanned and then send to digital processing for translation (Evans 2020).

fan fiction is also one example of even deeper fan interaction with the source material. Evans (2020: 181) concludes that the widespread availability and demand for fan translation can show us a lot when it comes to perception of a role of the translator in people's lives.

Jiménez-Crespo (2020b) suggests that fansub communities, referring to fans engaging in subtitling, tend to show coherent structures akin to professional translation projects with positions such as: community managers, administrators, moderators, translators, junior translators, revisers and pre-revisers. First and foremost is the shared fan interest in the source matter, then the raw video and script are downloaded, or maybe generated with some voice recognition software or making use of subtitles for deaf and hard hearing. Everything is then delegated to translators and revisers with set deadlines. Subbers can work either with direct text files or with some of the freely available subtitling software, some subbers may be responsible solely for subtitle synchronization. The end-product is, upon revision, uploaded to sharing websites and databases. Jiménez-Crespo (2020b) also suggests that fan translation of comics and video games follow a similar process with its own unique steps and challenges. Video game fan translation was driven in the 1990s by the demand for games with large amounts of text which were deemed commercially unviable to localize, even though some of these titles were widely popular. High degree of technical knowledge is a key characteristic of fan video game translating, due to all kinds of technical modifications that can be required. Pérez-González (2020b: 172) also focuses on the example of fansubbing and suggests that early development of fansubbing came forward with the rise of Japanese animation, in response to lack of official dubbing, as well as due to high degree of "Americanization" of official dubs where they existed. First fan translations were very rudimentary due to limited technology, but with the advent of internet it quickly rose to global prominence, soon leading to a rise in fandubbing as well. Pérez-González (2020b: 174) also notes that fansubbing and fandubbing projects somewhat resemble professional translation projects organizationally, and they often include roles such as: raw provider, translator, timer, typesetter, editor, encoder and distributor. These projects are usually not geographically limited, but people involved still possess a high degree of shared identity. Pérez-González (2020a: 34) emphasises fan subbing as a special area of research and its ever-growing importance, playing a role in the trend of ordinary citizens resisting commercial dynamics.

### **3.3.2 ROM hacking and fan and user localization?**

As Altice (2020: 220) explains, Read-Only Memory (ROM) refers to the physically encoded data to an integrated circuit inside a videogame cartridge, and it can no longer be modified in any way without physically re-inscribing the circuit, leading to the process of “dumping” the ROM contents to a disk where it can be saved and further modified, and that process is known as ROM hacking. With the emergence of cloud-storage and the internet, most of the ROMs are easily accessed in online databases, even though this process constitutes unauthorized access and manipulation of game data, but ROM hacking is mostly a non-malicious practice, sometimes being the sole way of preservation of some games, often modified for better experience, or localized for a new audience. According to Pérez-González (2020b: 179), fan audiovisual translation connects to ROM hacking, a process which is here described as the one which entails localization the spoken and written data contents which may include wider modding, but also connects to fandubbing and fansubbing, even though they can be a part of ROM hacking as well. Although localization usually only refers to official products which are translated for and sold legitimately to a specific market, the technical and cultural effort needed for this are not all that different from legitimate localization.

Altice (2020: 220) produces one notable example in the “Arabic Translation Patch” by Ahtbi Alyshlyh for Dragon Warrior, role-playing game originally released in 1989. This process doesn’t just involve translating the text from one language to another, but since the game engine never intended the use of an Arabic script, the whole display routine needed to be rendered to right-to-left reading order, so this is a massive achievement as a technical as well as a linguistic endeavour. Altice (2020: 221) claims that this also showcases the unique aspect of localization, while a good translation will always be aware of any cultural transfers, the interplay of language, culture, hardware and software is what truly differentiates localization from traditional translation. Alyshlyh’s patch is not a proper complete localization that is meant to be sold for Arabic market either, it is a fan translation and would require even more work as a legitimate localized product, but nicheness of this product probably doesn’t make it commercially viable anyway, as Altice (2020: 222-223) concludes.

As we have mentioned before, while there is a need for maintaining a degree professionalization, non-professional translation usually does not compete with professional translators and often just fills the gaps in the supply of translation while satisfying the demand which often lacks commercial viability. In our view, there is a great potential in utilizing something like fan translations, since many copyright holders seem to tolerate their existence, why not utilize the fan translators through some platform that would allow them to legitimately publish their work, we have already demonstrated the ability of the fan translation projects to resemble professional translation projects. It also seems unfair to equate all non-professional translation with low-quality translation, the domain of high-quality

remains solely in the hands of the professionals, even when many of those professional translators work in the industry without any related translation or linguistic degree. One possible way to bridge these differences is in creating even more gateways for competent non-professional translators to ‘professionalize’, and while some of those gateways exist, there still seems to be more possible areas of expansion, it does not seem useful for anyone to gatekeep any translators away from areas which professional translators cannot fully cover by themselves anyway. We should also not ignore the fact that there is a demand for translation that is not of the highest quality, such translation could be useful in many scenarios, especially when the time is limited, so maybe translation should head more towards being made fit-for-purpose as Bowker (2020) suggests. Whether we get there through non-professional human means, where we shouldn’t dismiss volunteer or crowdsourced translators, or through the means of the machines, professionalism should include “using professional judgment” (Bowker 2020: 465) about how to correctly meet the purpose of a particular translation. Projects like TED Translators are just an extension of volunteer non-profitable activities that probably cannot exist in some sort of professional environment and there is no reason why they should, and it is difficult to see how they disrupt the translation industry, some of the subtitling tools and cloud technology developed for this purpose and giving it a wide platform probably only helped the development of translation technology.

## Conclusion

We have seen the depth of effects that technology has on translation, continuously evolving translation according to the socioeconomic circumstances. Just looking at the development of the translation technology which already completely transformed the translation process, it is very evident that translation profession has changed fundamentally in many areas and its future looks full of potential and challenges. Automation of translation that comes with MT, whether it is a low quality output that needs to be post-edited or the potential high quality fully automated translation, already visibly affected how translation is carried out, both in professional and non-professional circles, even though there's plenty of work left to do on improving MT systems. Any commercial translation today is inconceivable without the help of CAT tools, which now also include MT systems and management tools for the translation business in general, leaving us with the delicate human-machine co-operation when it comes to translation process. Technology has influenced interpreting, most notably through remote interpreting, but it also led to the rise of audiovisual translation, especially the use of speech recognition which has potential for even more areas of translation. Future faces us with a lot of rethinking and redefying of the role of a translator with all the possible disruptive elements that technology can bring.

More than just the effects on translation process, technology has created new types of texts which needed translation, leading to a specific translation field of localization, used for software, video games, websites, comics etc. The specific process that localization entails, incorporating technical and cultural elements along with the linguistic ones, separates it in a way from traditional translation, and with the growth of localization industry in a globalized world earns it special relevance today. Technology has affected translation differently at different levels, LSPs have different approached to technology than the lowly freelance translator. It has also led to the emergence of non-professional translation, which has always been present but has now, enabled by digital technology and online context, risen to a much higher level of prominence, further changing the perception of the role of a translator in society. Relationship between translation and technology only looks to remain dynamic in the future, bringing in both the positive and negative excitement in the translation and language industry where there will certainly be some short-term winners and losers in the wake of automation, and all the industry segments need to come together and address all the emerging issues.

At the end, we do not want to present technology as something that will fix all the problems for the translators or the whole translation industry, or to downplay the concerns for the future livelihood or

scepticism towards the big claims of the MT developers, we have even seen an increase in client demands for faster translations under the influence of wider usage of MT. In our view, healthy scepticism can co-exist together with the willingness to try and be open to new technology, and this is not a requirement unique to the translation profession, and the process of the adoption of the new technology can certainly be a challenge even under best conditions, but in this paper we have shown many positive effects of technology, as well as further potential, and that we cannot dismiss. We can all remain hopeful that translation industry can continue to navigate the balance between the human and the machine for the benefit of all, but that also requires some effort from the translators to continue to grow, educate and adapt to the new translation environment, and perhaps that is easier for someone who has always been exposed to the translation technology since they started translating, like the author of this paper, but we see no reason why there is not enough space for anyone to participate in future translation. Participating in a smaller market and using a smaller language like it is the case with Croatia does not only bring disadvantages when compared to bigger markets and languages, we have showed that globalization also brought the trend of localization which brought a new level of catering to local languages, and Croatian language has its place here as well. It is up to us to make the best use of all these opportunities enabled by technology, because at the on the day, no matter how sophisticated or advanced it is, technology is just a tool that can be used by us in a productive or in an unproductive way.

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