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Towards Inclusive Translation Technology: Perceptions and Practices of Accessibility among Translation Technology Developers

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Abstract

This study investigated the perceptions and implementation strategies regarding accessibility among professionals engaged in translation technology development. It addressed three key inquiries: 1. How do translation technology developers perceive accessibility within the broader context of technology development and specifically within translation technology? 2. What strategies do these developers employ to integrate accessibility in their technologies? 3. What organisational practices characterise translation technology development?

Data were collected through an online survey questionnaire featuring both closed and open-ended questions. The questionnaire was structured into three thematic sections, exploring perceptions of accessibility in technology development generally, within the realm of translation technology, and strategies for implementation along with organisational practices. Employing a mixed-method approach, the study utilised quantitative and qualitative techniques, with findings contextualised against prior research on web and translation technology accessibility.

The results indicated that translation technology developers acknowledge the significance of accessibility, extending beyond disability needs to enhance overall usability and user satisfaction. Developers use Various integration strategies which are mainly dependent on awareness of individual developers. Thus, a lack of organisational practices is noted, with respondents expressing a strong desire for enhanced collaboration, particularly with end-users.

These findings align with recent accessibility initiatives undertaken by translation technology companies, anticipating a more promising landscape for accessible translation technology.

Key words: translation technology, accessibility, inclusivity, usability, design for all.

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1 Introduction

The rapid development of technology and digitalization has removed many barriers and created numerous opportunities for people with visual impairments. Advanced assistive technologies currently enable persons with visual impairments to study, work and live relatively independent lives comparable to their sighted peers. However, poorly designed technology can also become a disabling barrier, excluding people with disabilities from opportunities in their personal, educational and professional lives. Therefore, accessibility must be a priority for developers and organisations to create high-quality sites and tools that are inclusive for all (Henry 2024).

The translation profession is highly technologized, making proficiency in translation technology essential for career success. Translation technology encompasses tools such as translation memories (TM), machine translation (MT), term bases (TB), and computer-assisted translation (CAT) tools. In this thesis, “translation technology” specifically refers to CAT tools, which often integrate a translation editor, TMs, TBs, MT, localisation tools, and project management tools.

As Rodriguez Vázquez and Mileto (2016, 116–117) observe, the development of assistive technologies, such as screen readers and Braille displays, alongside the advancements in translation technology, suggests that translators using assistive technologies could compete more equally with their sighted colleagues. However, even technologically competent translators using assistive technologies can face accessibility challenges due to incompatibilities with translation technology. These barriers disadvantage them in job applications, as many language service providers require the use of specific, often inaccessible, translation systems (Refaat 2021).

Accessibility has various definitions across disciplines. In this thesis, accessibility refers to digital accessibility or web accessibility, as defined by the Web Accessibility Initiative (WAI): "Web accessibility means that websites, tools, and technologies are designed and developed so that people with disabilities can use them” (Henry 2024).

Additionally, accessibility improves the overall user experience and satisfaction for other user groups (ibid.).

Despite the importance of accessibility, previous studies have shown that few translation technology developers currently prioritise it (see, for example, Refaat 2021; Rodriguez

Vázquez, Fitzpatrick and O'Brien 2018; Rodriguez Vázquez and Mileto 2016). Rodriguez Vázquez, Fitzpatrick and O'Brien (2018) found that web-based CAT tools could be more accessible for screen reader users because web development is more standardised than other computer programming styles, allowing for higher accessibility levels.

Most research has focused on the experiences and perceptions of translators with visual impairments or the technical features of translation technology regarding accessibility. No study has yet examined the accessibility perceptions of translation technology developers. However, studies have explored accessibility perceptions of web developers (e.g., Yesilada et al. 2015; Yesilada et al. 2012; Freire, Russo, and Fortes 2008). Yesilada et al. (2015) found that web developers viewed accessibility as a crucial component of usability and inclusion, particularly for blind individuals. Although there are differences between the development of web content and translation technology, the increasing prevalence of web-based translation systems makes comparing these two developer groups relevant.

This study aims to fill the gap in research by answering the following questions:

How do translation technology developers perceive accessibility within the broader context of technology development and specifically within translation technology?

What strategies do these developers employ to integrate accessibility in their technologies?

What organisational practices characterise translation technology development?

Exploring the accessibility perceptions of translation technology developers is crucial for fostering inclusivity and enhancing usability of translation technology.

The study employed a survey method, gathering data through an online questionnaire with open and closed questions. The data analysis combined qualitative and quantitative approaches.

Section two outlines the theoretical background, reviewing previous research on accessibility in web and translation technology development, defining key terminology, and introducing relevant accessibility guidelines and regulations. Section three details the methods used in this study, including the method for data collection and survey construction. Section four presents the results of the analysis and discusses the findings, reflecting on prior studies. Finally, section five draws together the conclusions of this study and offers further ideas for investigation and practice.

2 Theoretical background and terminology

This section reviews existing research on the perceptions of accessibility among web and software development professionals, as well as the accessibility of translation technology. Additionally, it provides definitions of key concepts relevant to the context of this thesis.

2.1 Accessibility, usability, and design for all

This section introduces the definitions of *accessibility* and *assistive technologies*, *usability*, and *design for all* and examines their relationships based on prior studies.

2.1.1 Accessibility and assistive technologies

Historically, the term accessibility has referred primarily to the built environment, focusing on the removal of physical barriers hindering persons with disabilities. Contemporary discourse has expanded this notion to include digital environments, positioning accessibility as a critical element of social inclusion. Accessibility is increasingly recognised as benefiting not only persons with disabilities but also other demographic groups, thereby presenting opportunities also within business contexts.

Despite ongoing discussions, a unified understanding of accessibility remains elusive, with definitions varying based on user-centric perspectives, interaction levels, equal access, and usability considerations (Yesilada et al. 2012, 2). Given this multidimensional nature, it is essential to clarify the concept of accessibility within the scope of this thesis.

Within academia, several efforts have been made to unify the concept of accessibility. Yesilada et al. (2012) aimed to foster a more unified definition of the concept, to facilitate communication about accessibility to a broader audience beyond the realm of web accessibility, and to enhance the integration of accessibility principles in commercial and industrial settings. Participants were asked to rank five definitions of accessibility, with the results indicating that the definition provided by the Web Accessibility Initiative (WAI), also referenced in this thesis, emerged as the most preferred across all respondent groups (Yesilada et al. 2012, 7). The definition outlined in the United States' Section 508 of the Rehabilitation Act was the second most favoured (ibid.). Both definitions prioritise the inclusion of people with disabilities, with the WAI definition particularly emphasising the active participation of persons with disabilities in contributing to the internet, rather than merely positioning them as passive recipients of accessibility efforts.

Petrie, Savva, and Power (2015) conducted a conceptual analysis encompassing a broad collection of web accessibility definitions sourced from books, papers, standards, guidelines, and online sources to understand the key components and to formulate a unified definition of web accessibility. They defined web accessibility as “All people, particularly disabled and older people, can use websites in a range of contexts of use, including mainstream and assistive technologies; to achieve this, websites need to be designed and developed to support usability across these contexts” (Petrie, Savva, and Power 2015, 3).

A comparison of these definitions with that of WAI reveals significant similarities, particularly in their inclusivity of diverse user groups. However, in contrast to the WAI definition, the compilation of Petrie, Savva, and Power (2015) does not address the active contribution of users.

In this thesis, accessibility adheres to the definition outlined by the Web Accessibility Initiative (Henry 2024), which conceptualises it as the design and development of websites, tools, and technologies to facilitate use by persons with disabilities. This definition encompasses various disability categories, including sensory, cognitive, neurological, physical, as well as non-disabled persons facing situational or temporary limitations, such as users of different devices, aging populations, and those with slow internet connections (ibid.). While WAI primarily addresses web accessibility, its definition extends to various tools and technologies, aligning with the scope of this thesis.

Assistive technologies encompass products, systems, and services designed to maintain or enhance an individual’s functioning across various domains, including cognition, communication, hearing, mobility, self-care, and vision (WHO 2024). For persons with visual impairments, particularly those who are blind, screen readers and Braille displays represent the most prevalent form of assistive technology. screen readers and Braille displays render visual content audibly or tactilely, facilitating the inclusion of blind persons in the digital sphere by enabling them to engage in activities such as studying, working, and managing affairs independently. However, this necessitates that digital content be formatted in a manner interpretable by the assistive technology in use, requiring adherence to specific coding languages and structural conventions (Kearney-Volpe and Hurst 2021, n.p.).

2.1.2 Usability

Usability refers to "the extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (ISO 9241-11, 2018).

Although interconnected, accessibility and usability are distinct concepts. Accessibility ensures that all users, particularly those with disabilities, are able to navigate and interact with digital content. Usability, on the other hand, pertains to the overall user experience, emphasizing ease of use and user satisfaction. While accessible digital content should inherently possess usability characteristics, usable digital content is not necessarily accessible. For example, a visually appealing and easy-to-navigate website may still pose barriers to users with disabilities.

The relationship between accessibility, usability, and design for all is complex and interconnected. Yesilada et al. (2015) conducted a survey exploring the perceived relationships among accessibility, user experience, usability, inclusion and exclusion. Their objective was to determine whether respondents viewed usability and accessibility issues as interlinked, the extent to which accessibility issues exclusively affect persons with disabilities, and the significance of web accessibility for a satisfactory user experience (Yesilada et al. 2015, 119). The findings revealed a strong correlation between accessibility and usability, with accessibility exerting a greater influence on usability than vice versa (Yesilada et al. 2015, 122). Moreover, there was moderate agreement regarding the integral role of accessibility in achieving a satisfactory user experience (Yesilada et al. 2015, 125).

Petrie and Kheir (2007) also delved into the relationship between accessibility and usability and introduced the concept of user-centric accessibility, which entails tailoring usability specifically for persons with disabilities. They distinguished their approach from a technical one that relies solely on adherence to technical guidelines (Petrie and Kheir 2007, 397). Categorising usability and accessibility problems, they identified three types: pure accessibility issues that exclusively impact people with disabilities, Pure usability issues that solely affect people without disabilities, and universal usability issues that impact both users with and without disabilities (Petrie and Kheir 2007, 398). Their findings challenge the conventional belief that accessibility concerns are merely a subset of usability considerations or vice versa, highlighting the necessity for empirical evidence to inform guidelines (Petrie and Kheir 2007, 405).

Reflecting on the ISO standard of usability within the context of this thesis, the domain of translation technology involves specified users, namely translators, whose task is to produce translations. The context of use can vary significantly. For instance, a visually impaired translator might use a screen reader, and an inaccessible translation system can hinder their ability to achieve their "specified goals with effectiveness, efficiency and satisfaction". Consequently, such technology is not considered usable for screen reader users.

2.1.3 Design for all

The European Institute for Design and Disability (EIDD) defines design for all as follows:

> Design for All aims to enable all people to have equal opportunities to participate in every aspect of society. To achieve this, the built environment, everyday objects, services, culture and information – in short, everything that is designed and made by people to be used by people – must be accessible, convenient for everyone in society to use and responsive to evolving human diversity. (EIDD n.d.)

Universal design, often considered interchangeable with design for all, is defined by the Centre for Excellence in Universal Design (CEUD) as "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialist design" (n.d.). Unlike accessibility, the design for all approach shifts the focus away from the separation of persons with disabilities and recognises that poorly designed products and environments discriminate against and disable large groups of individuals with diverse life situations (Barnes 2011, 70). To address this, universally designed products and environments adhere to seven principles: equitable use, flexibility of use, simple and intuitive design, effective communication of information, error tolerance, efficient usage with minimum effort, and appropriate space for approach and use (CEUD n.d.). Design for all thus extends beyond meeting the needs of persons with disabilities to consider the needs of all user groups regardless of age, sex, health or disability. While this shift away from the separation and marginalisation of persons with disabilities is positive, it also presents challenges. As Barnes (2011, 72) elaborates: "The concept of design for all or universal design is broad and vague, lacking in measurement and examples against which it could be judged. Consequently, achieving a design that caters to the needs of every user group or individual is not entirely realistic". This underscores the importance of defining the user groups of products and environments with precision.

2.2 Regulations and guidelines

Numerous guidelines and legal regulations exist to guide digital content providers towards accessible solutions, often grounded in the United Nations' Convention on the Rights of Persons with Disabilities (CRPD). However, these regulations typically apply to public entities and services deemed essential for societal participation, such as banking, housing, transport services, and education. This leaves out commercial entities, which, for example, develop technology for professional purposes. It is crucial for commercial agents to also play their part to achieve full equality in all aspects of life and to ensure that also people with disabilities are able to fulfil their whole potential.

2.2.1 Web Content Accessibility Guidelines

The Web Content Accessibility Guidelines (WCAG), particularly its latest iterations, WCAG 2.1 and 2.2., stand as widely recognised recommendations for accessibility. Addressing a broad spectrum of disabilities, WCAG also enhances usability for all users. These recommendations apply to all technologies and a wide range of devices, including laptops, desktops, mobile devices etc. Notably, WCAG's testable criteria can be assessed using automated tools, thereby streamlining the accessibility evaluation process for developers.

WCAG 2.2 comprises several layers, including general guidelines, testable success criteria, a collection of sufficient and advisory techniques, common failures with examples, links, and code (Campbell et al. 2023). At its core lie the four fundamental principles of accessible content: perceivable, operable, understandable, and robust (ibid.).

While developers are encouraged to consider all guideline levels, it is acknowledged that achieving universal accessibility may not be feasible. Therefore, developers are urged to prioritise target user groups when striving for accessible solutions. This aligns with the previous assertion by Barnes (2011) about the impracticality of addressing all potential user groups and their diverse needs during development.

2.2.2 Laws and regulations

In this thesis, laws and regulations concerning accessibility are examined within the context of the European Union and North America, acknowledging the variations on a national level.

In the European Union, the principal directive governing accessibility-related legislation among Member States is *the European Accessibility Act 2016/2102*. This Directive aims to

enhance accessibility within the internal market of the EU and harmonise national regulations (Directorate-General for Employment, Social Affairs and Inclusion n.d.). Grounded in the United Nations' Convention on the Rights of People with Disabilities, the Directive emerges from consultations with stakeholders and accessibility experts (ibid.). Encompassing a wide range of products and services, including computers and software, smartphones, and transport services, the Directive, however, does not explicitly address accessibility in the context of employment. Nevertheless, *Directive 2014/24 on public procurement* emphasises the necessity for public contracts awarded by Member States' authorities to adhere to accessibility criteria, as outlined in the Treaty on the Functioning of the European Union (TFEU). Article 76 of the Directive states:

> For all procurement intended for use by persons, whether general public or staff of the contracting authority, it is necessary for contracting authorities to lay down technical specifications so as to take into account accessibility criteria for people with disabilities or design for all users, except in duly justified cases. (DIRECTIVE 2014/24/EU on public procurement)

Furthermore, the Directive mandates monitoring, reporting conformity, and the provision of an accessibility statement on content compliance (Directive 2016/20102, Article 50; Article 44).

In the United States, *Section 508 of the Rehabilitation Act* establishes requirements for electronic and information technology developed, maintained, procured, or used by the federal government (U.S. Access Board n.d.). Applicable to all federal entities, the provision pertains to computers, software, and electronic office equipment, ensuring accessibility for both employees and the public, with exceptions granted only in cases of undue burden (ibid.). Federal entities subject to Section 508 are also required to report on the implementation of the Section (ibid.).

Introduced in the US Senate in 2022, *the Websites and Software Applications Accessibility Act* seeks to mandate accessibility for persons with disabilities across websites and online applications operated by employers, public entities, and public accommodations, along with stipulating review and reporting requisites (Congress). As of May 2024, this legislative proposal has not yet been enacted into law.

In Canada, *the Accessible Canada Act* (ACA) came into effect in 2019, aiming to achieve a barrier-free Canada by 2040. The ACA identifies, removes, and prevents accessibility barriers across seven priority areas, including employment, the built environment, and information and communication technologies (Office of the Accessibility Commissioner 2019). Applicable to federally regulated entities, the ACA mandates the formulation and publication of accessibility plans, establishment of feedback mechanisms, and transparent reporting on progress (ibid.). Additionally, the legislation establishes *Accessibility Standards Canada* (ASC) tasked with formulating national accessibility standards (ibid.).

All aforementioned regulations share common characteristics, foregrounding social inclusion and equality within the public sector while aligning with the UN Convention on the Rights of Persons with Disabilities. All mandate regular monitoring and reporting as well as feedback mechanisms to address accessibility concerns.

2.2.3 Effectiveness of regulations

Liginlal and Al-Emadi (2022) analysed the effectiveness of accessibility regulations, with a particular focus on digital accessibility within the context of the CRPD. Their study revealed significant variations in the effectiveness of these regulations across different regions. They observed that the European Union has demonstrated notable success in implementing accessibility guidelines across its Member States (Liginlal and Al-Emadi 2022, 197). Moreover, they highlighted the forthcoming incorporation of the updated European Accessibility Act into national laws by all EU Member States before 28 June 2025. This places a strong emphasis on accessibility across various domains, including computers, operating systems, automated teller machines, e-commerce, and software applications (ibid.). Additionally, they underscored the significance of the Web Accessibility Directive (2016/20102), which mandates compliance with WCAG 2.1 levels A and AA for public service websites and mobile applications (ibid.).

In contrast, Liginlal and Al-Emadi identified a less favourable scenario in the US, where legislation such as the Americans with Disabilities Act (ADA) and state-level statutes do not explicitly address web or digital accessibility, often leading to case-by-case interpretations by the courts (2022, 198). However, they noted the reliance of Section 508 on WCAG for compliance and highlighted the introduction of the Websites and Software Applications Accessibility Act in both the US House of Representatives and the Senate. This act aims to extend ADA's applicability to digital technologies(ibid.).

Liginlal and Al-Emadi affirmed Canada's substantial progress in fostering inclusivity, echoing the European Union's strides. They cited the ACA alongside provincial regulations as significant steps towards this goal (2022, 198).

In conclusion, adherence to these regulations has the potential to incentivise translation technology developers to prioritise accessibility. This is due to the mandate for public entities to procure software accessible to all users, including employees and the public.

2.3 Exploring accessibility perceptions

The investigation of accessibility perceptions among translation technology developers is a novel endeavour, as far as the current author is aware. While prior studies have delved into the accessibility perceptions among web developers, accessibility practitioners, and users benefiting from accessibility, the perspective of translation technology developers remains unexplored. However, existing research within translation studies has examined the accessibility of translation technology, primarily focusing on user experiences.

This thesis builds upon this foundation by examining accessibility perceptions among both web and translation technology developers and seeks to contextualise these findings by comparing them with outcomes from previous research. This comparative analysis is relevant due to the increasing prevalence of web-based translation systems or those offering both web-based and desktop applications. Such systems present increased opportunities for the integration of accessible solutions. Additionally, insights gained from studies in web development could potentially inform the improvement of accessible features in translation technologies. However, it is crucial to acknowledge that translation technology may pose unique challenges distinct from those encountered in general web accessibility. This underpins the importance of adopting a user-centred design approach tailored to the specific requirements of translation technology. The exploration of accessibility perceptions is significant, as highlighted by Freire, Russo, and Fortes (2008, 87): "The success in producing accessible Web systems depends on how people involved in Web development projects are aware of accessibility".

This underscores the pivotal role of awareness and understanding among stakeholders in driving the creation of accessible solutions in both web development and translation technology domains.

2.3.1 Accessibility perceptions in web development

In the ever-evolving landscape of digital technology, ensuring accessibility for all users, including those with disabilities, has emerged as a critical concern.

This section presents existing literature on accessibility perceptions, focusing on studies conducted within the broader fields of web development, user experience, and multilingual localisation.

Freire, Russo, and Fortes (2008) conducted a comprehensive survey to explore accessibility awareness among various stakeholders in Brazilian academia, government, and industry sectors. Their study, which garnered over 600 valid responses, provided an overview of the prevailing attitudes towards accessibility in web and software development within the Brazilian context (Freire, Russo, and Fortes 2008, 87). The findings revealed a significant gap in the consideration of accessibility, highlighting the need for further investigation into the underlying factors contributing to this lack (ibid.). However, it is important to interpret these findings while recognising the temporal and cultural context of the research, as recent years have brought significant technological advancements and changes in attitudes and regulations concerning accessibility, which can vary across regions.

Yesilada et al. (2012) explored accessibility perceptions among both accessibility experts and non-experts, shedding light on the motivations driving engagement with accessibility initiatives. Their findings underscored the importance of inclusivity and product improvement as primary drivers, signalling a shift away from purely profit-driven motivations (Yesilada et al. 2012, 3). Additionally, research challenges and compliance with legislation were also reported as motivations for the implementation of accessibility (ibid.). Furthermore, definitions of accessibility disseminated by well-known institutions were favoured among al respondent groups (ibid.).

In a subsequent study in 2015, Yesilada et al. expanded their investigation to explore the perceived relationships between accessibility, user experience, and usability among accessibility practitioners with diverse backgrounds. Their findings revealed perceptions of a strong correlation between accessibility and usability, with accessibility exerting a significant influence on user experience (Yesilada et al. 2015, 122). Additionally, respondents emphasised the broader societal impact of accessibility issues, extending beyond people with disabilities (Yesilada et al. 2015, 122). They were also advocating for user-centred evaluation practices instead of relying solely on technical methods such as source code evaluation (Yesilada et al. 2015, 123–124).

Complementing these studies, Putnam et al. (2012) explored accessibility perceptions among user experience (UX) and human-computer interaction (HCI) professionals, offering insights into the integration of accessibility considerations in digital product development. Their findings revealed a widespread acknowledgement of the importance of accessibility among UX and HCI professionals despite the limitations in its implementation (Putnam et al. 2012, 93). Factors such as empathy and personal experiences emerged as influential in shaping attitudes towards accessibility, suggesting the need for targeted training and awareness initiatives (ibid.). The research also revealed that job titles and geographical location did not significantly influence accessibility considerations, although respondents commonly reported lacking the authority to make accessibility-related decisions (ibid.).

Turning to translation-related studies, Rodriguez Vazquez and O'Brien (2017) examined accessibility considerations within multilingual localisation processes. Their objective was to determine whether adherence to the WCAG 2.0 was standard practice in web localisation projects, explore the rationale behind the decisions of localisation companies to adopt or forgo accessibility measures, and identify factors that could incentivise the integration of these measures (Rodriguez Vazquez and O'Brien 2017, n.p.).

The research revealed a significant lack of attention to accessibility among language service providers, with economic constraints and misconceptions about the feasibility of implementation cited as key barriers (Rodriguez Vazquez and O'Brien 2017, n.p.). Despite this, respondents generally expressed interest and curiosity towards the topic (ibid.). Potential drivers for implementing web accessibility best practices included client requests and added value for clients, such as improving their image or increasing sales (ibid.). However, some respondents felt that the social impacts of accessibility implementation were insufficient motivation and suggested restricting accessibility to content targeted at "people with special needs" (ibid.). Additionally, one respondent mentioned laws and regulations as a motivating factor (ibid.). The study also highlighted a disconnect between accessibility awareness and its integration into routine localisation workflows, emphasising the need for greater education and awareness within the industry (ibid.).

In summary, several common themes emerge from these findings, including the importance of inclusivity, user-centred design, and awareness-building initiatives in promoting accessibility. Significant challenges persist, including economic constraints, misconceptions about accessibility, and a lack of integration into routine development processes.

Previous studies on accessibility perceptions among web developers suggest a generally positive outlook. The importance of accessibility is widely acknowledged, and its integration into digital products is primarily driven by social considerations, such as promoting inclusion and enhancing user experience. Legal regulations appear to exert limited influence as a driver for the adoption of accessibility practices. Significant barriers to the implementation of accessible solutions include a lack of knowledge and education.

2.3.2 From desktop to web: The evolving accessibility landscape of CAT tools for blind translators

The accessibility of translation technology, particularly for persons with visual impairments, has gained attention in recent years, with multiple studies assessing the current state and identifying areas for improvement.

Rodriguez Vazquez and Mileto (2016) conducted two exploratory studies, spanning over five years, focusing on the accessibility of the desktop versions of computer-aided translation (CAT) tools for blind translators and students. They emphasized the importance of proficiency in CAT tools for translators with visual impairments, highlighting its necessity not only to meet workplace demands but also to ensure translation quality on par with their sighted colleagues (2016, 116). accessibility challenges occurring in CAT tools were highlighted as potential contributors to professional self-esteem issues and inequalities in recruitment opportunities, emphasizing the vital role of accessible CAT tools for the social inclusion of visually impaired translation professionals within the broader translation community (Rodriguez Vazquez and Mileto (2016, 118).

A series of three case studies and a complementary survey revealed widespread dissatisfaction among participants regarding the accessibility of the tools they used (Rodriguez Vazquez and Mileto 2016, 128). Participants reported that language service providers often require them to use specific, often inaccessible, software, which significantly limits their professional opportunities (Rodriguez Vazquez and Mileto 2016, 129). Moreover, over half of the participants expressed dissatisfaction with the responsiveness of CAT tool providers in addressing accessibility issues, suggesting a potential lack of accessibility awareness among developers (Rodriguez Vazquez and Mileto 2016, 131).

At the time of their study, Rodriguez Vazquez and Mileto (2016, 132) found only one fully accessible CAT tool on the market, Fluency Now by Western Standard. However, subsequent

research by Rodriguez Vazquez, Fitzpatrick, and O'Brien (2018) and Refaat (2021) challenged this assertion, expanding the scope of analysis beyond traditional CAT tools to include web-based platforms.

Rodriguez Vazquez, Fitzpatrick, and O'Brien (2018) investigated the feasibility of using web-based CAT tools as substitutes for the inaccessible desktop versions, particularly targeting translators with visual impairments. They claimed that web development techniques adhere to more standardized practices, facilitating higher accessibility levels with relative ease (Rodriguez Vazquez, Fitzpatrick, and O'Brien 2018, 32).

In their study, they assessed the usability of two web-based CAT tools, Matecat and Memsource, among translators using screen readers (Rodriguez Vazquez, Fitzpatrick, and O'Brien 2018, 32).

While Matecat exhibited superior accessibility, users encountered some challenges, whereas Memsource presented insurmountable accessibility barriers, which hindered the ability of visually impaired translators to use their usual coping strategies to overcome the issues (Rodriguez Vazquez, Fitzpatrick, and O'Brien 2018, 33–34).

Refaat 2021 expanded further on this inquiry, employing surveys, interviews, and case studies. Their findings validated earlier observations regarding the existence of partially accessible CAT tools alongside fully accessible ones like Fluency Now (Refaat 2021, n.p.).

Notably, Memsource, in both its web and desktop versions, was identified as highly accessible, signaling advancements in accessibility within the translation technology landscape (ibid.).

However, inconsistencies in accessibility across different versions were noted among leading CAT tool providers such as SDL Trados and Wordfast, suggesting a lack of awareness (Refaat 2021, n.p.; Rodriguez Vazquez and Mileto 2016, 126–127). For example, despite accessible menus and buttons, SDL Trados 2015 and subsequent versions have rendered the translation editor inaccessible(ibid.). As emphasized by Refaat (2021, n.p.) and corroborated by the author, SDL Trados 2021 lacks accessibility entirely.

Interestingly, most accessible technologies seem to be affordable or even free, suggesting a negative correlation between cost and accessibility. This contradicts previous notions regarding economic constraints hindering accessibility implementation.

Despite notable advancements, challenges remain, particularly concerning compatibility across different tools, highlighting the need for continued awareness-raising and improvement initiatives aimed at ensuring translation technology accessibility.

2.3.3 Overview of accessibility initiatives among translation technology companies

This chapter presents an overview of the current accessibility landscape within companies developing translation technology based on information publicly disclosed on their websites. It is important to note that this overview encompasses only those companies that have publicly disclosed information regarding their accessibility initiatives. Hence, it does not represent the exclusive entities considering such matters.

In early 2024, one of the leading CAT tool providers globally, Trados, announced its commitment to develop a fully accessible CAT tool. Previous studies on the accessibility of CAT tools for blind translators have indicated a divergence from accessibility with each successive release of Trados Studio (Refaat 2021, n.p.; Rodriguez Vazquez and Mileto 2016, 126–127). Paul Filkin, Senior Customer Enablement Director, introduced the Accessibility Initiative supported by the RWS Foundation (2024). The RWS Foundation, a charity primarily engaged in language and content transformation, diversity, equity and inclusion, and quality education, aims to facilitate the work of blind translators through this initiative (RWS n.d.). Filkin's blog post also references the United Nations Sustainable Development Goals (SDGs), particularly SDG 8: Decent Work and Economic Growth, highlighting the broader social and economic implications of this development (2024). Additionally, he mentions the WCAG 2.2 and the European Accessibility Act, set to take effect in 2025 as motivations for enhancing accessibility. This initiative emphasises RWS Foundation's commitment to diversity, equity, and inclusion (Filkin 2024).

The accessibility initiative was introduced by an Italian blind translator, aiming to enhance Trados' accessibility through their PHD thesis (Filkin 2024). Trados is engaging with over a thousand blind translators, offering them complimentary licences to the latest version to solicit direct feedback (ibid). This emphasises the importance of active participation by the blind translators' community in fostering a more accessible translation industry.

Zsófia Lelner, Content Marketer at MemoQ, discusses accessibility features incorporated into MemoQ version 10.1 in their blog post published in 2023. MemoQ has contributed to accessibility by ensuring its web-based CAT tool and documentation are accessible. For

instance, they have added alternative text to visual presentations, provided more descriptive labels for links on their web pages, and introduced an accessibility mode to MemoQ 10.1 optimised for screen readers (Lelner 2023). Lelner mentions that additional accessibility features can be expected in forthcoming MemoQ versions and accessibility will be considered for user groups beyond persons with visual impairments.

Unlike Filkin, Lelner does not make reference to any guidelines or regulations in her discourse.

While only Trados and MemoQ have explicitly communicated their ongoing efforts to enhance accessibility and inclusivity to the public, several other accessible CAT tools exist in the market, as mentioned previously. The disclosure of significant accessibility improvement projects by two leading translation technology companies globally may serve as a commendable example to all other companies in the translation industry.

In summary, while the journey towards comprehensive accessibility in translation technology is not without its hurdles, recent efforts by industry leaders offer hope for a future marked by greater inclusivity. Continued collaboration between developers, end-users, and advocacy groups will prove essential in driving further advancements and fostering accessibility standards across the translation industry. However, this journey is not finished yet, and there remains an urgent need for ongoing collaboration, innovation, and research as the landscape of accessibility in translation technology continues to evolve.

Transitioning from this examination of the broader industry context, the subsequent section delves into the specific data and methods utilised in the present study, offering a detailed framework for understanding its finding sand implications.

3 Data and methods

Theories and methodologies derived from the social sciences, including interviews and surveys, have recently gained prominence within translation studies, particularly in the exploration of translation as a social practice and the roles of translators (Olohan 2019, 384; Saldanha and O'Brien 2014, 188). Nevertheless, sociologically oriented research has up to date shown less interest in the social dimensions of translation technology (Olohan 2019, 384).

Sociological research on translation technology has addressed topics such as usage extent, interface features, ergonomic considerations, and perceptual, cognitive and emotive responses to technology (Olohan 2019, 388). These approaches offer valuable insights into the dynamics between various social groups interacting with translation technology, shedding light on how technological choices can either reinforce or challenge existing power structures (Olohan 2019, 393).

This study adopts a mixed methods approach, integrating both quantitative and qualitative methods to provide a nuanced understanding of the implications derived from this research.

3.1 Data collection and introduction to participants

This section introduces the method employed for data collection, followed by a detailed description of the questionnaire crafted for this study and an introduction to the respondents.

3.1.1 Questionnaires for data collection: Practicality, benefits, and challenges

Questionnaires and interviews serve as traditional sociological methods for gathering insights into perceptions, attitudes, and opinions. In translation studies, these methods have been utilised to gather data on various aspects such as the profession, translation technology, and the perspectives of translation students (Saldanha and O'Brien 2014, 151).

Several factors influenced the decision to employ a questionnaire as the primary method for data collection in this study. Firstly, no previous research has been conducted on the specific topic under investigation. Hence, a questionnaire was deemed a practical approach to gain an initial understanding of the subject matter, as supported by Saldanha and O'Brien (2014, 152), who advocate for the use of questionnaires to collect exploratory data.

Secondly, given that the intended participants are likely geographically dispersed, an online questionnaire offers a convenient means of organising data collection. Thirdly, time constraints inherent in this thesis project precluded more in-depth interviews with participants. Additionally, the structured format of the questionnaire facilitates subsequent data analysis (Saldanha and O'Brien 2014, 152). Moreover, the absence of the researcher during the response period minimises potential biases that may arise from the researcher's presence, which could be particularly pertinent in this study given that the researcher is a blind translator (Saldanha and O'Brien 2014, 166). Such social or ethical considerations can influence respondents' answers during a questionnaire or interview, leading them to tailor their responses based on perceived expectations (ibid.). Thus, the questionnaire was deemed a fast, straightforward, and accessible means of data collection.

However, there are also drawbacks associated with questionnaires. As identified by Saldanha and O'Brien (2014, 151), the primary concern in translation studies is the lack of evidence supporting good questionnaire design and a comprehensive discussion of the questionnaire's role as a research instrument within the field. Validity, reliability, and ethical considerations necessitate careful planning in questionnaire design (Saldanha and O'Brien 2014, 151). Additionally, response rates to questionnaires tend to be low, and online surveys may lack the depth of face-to-face interviews due to the absence of spontaneity and interaction (Saldanha and O'Brien 2014, 165, 188).

3.1.2 Questionnaire structure and data collection

The questionnaire for this study aimed to gather both quantitative and qualitative data on the accessibility perceptions and implementation among translation technology developers. Before distribution, the questionnaire was tested by both Translation professionals and students to ensure clarity and relevance. Translation technology developers in this context refers to any individuals participating in the design and production of translation technology, such as translation memories (TM), machine translation (MT), term bases (TB), and computer-assisted translation (CAT) tools, or translation systems which integrate various technologies within one platform.

The data collection was conducted through an anonymous online survey hosted on the Webropol platform, ensuring that responses could not be linked to individual participants and that no personal data was collected. An invitation to participate in the survey was sent via email to representatives of fifteen translation technology companies, identified through the

personal contacts of the author and the thesis supervisor. Additionally, the survey was shared on two translation technology-related groups on LinkedIn and one group on Facebook. Unfortunately, one group on Facebook declined to publish the survey post. Despite efforts to reach as many relevant respondents as possible, there remains a possibility that some stakeholders within the translation technology development community were unintentionally excluded from the study due to lack of awareness.

The invitation included a link to the survey and a cover letter, explaining the purpose of the study and providing context on the concepts of accessibility and translation technology (see appendix 1 for the complete questionnaire). The questionnaire was open for one week and was then extended for an additional week to increase the response rate. The survey was conducted in English, assuming it to be a common language among the respondents. However, this linguistic choice might have restricted the participation of those not proficient in English.

The questionnaire comprised a total of 27 questions, including two additional optional questions based on previous responses and an optional "Anything else you would like to add" question at the end. All other questions were mandatory.

For analytical purposes, the questions were categorised into four thematic sections. Although not explicitly stated to the respondents, the questions within each thematic section were presented on separate pages. Some questions were applicable for placement in multiple thematic sections.

The first section (questions 1–5) aimed to collect background information from the respondents. They were prompted to provide details regarding their tenure in the field of translation technology development, the type of company they worked for, their native language, the technology they were involved in developing, and their job title.

Sections two, three, and four were tailored to address the research questions. Sections two and three sought to explore how translation technology developers perceive accessibility, both generally (section two) and specifically within the context of translation technology (section three).

The second section (questions 6–11) began with an open-ended query inviting respondents to define accessibility in their own terms. Subsequent questions evaluated the importance of considering accessibility in technology development using a five-point Likert scale.

Respondents were also asked about their involvement with accessibility-related topics and projects, as well as whether they knew anyone benefiting from accessible technology. Question 11 was an additional query posed only if the respondent answered “yes” to question 10.

In the third section (questions 12–18), respondents were presented with seven statements assessing accessibility within the context of translation technology, encompassing its impacts and implementation, using a five-point Likert scale.

Section four (questions 19–27) sought to address the question which strategies translation technology developers employ to integrate accessibility in translation technology.

Initially, respondents were provided with a list of strategies for accessibility implementation based on the Web Accessibility Initiative (WAI) principles (Zahra 2023), from which they were asked to select all applicable options. Subsequently, three open-ended questions gathered information about challenges in developing accessible translation technology, responsible personnel for accessibility, and provided an optional field for further elaboration.

Three yes/no questions inquired about documented practices for implementing accessibility, the utilisation of established accessibility standards, and personnel responsible for accessibility. Additionally, an optional question arose if the respondent indicated using established standards, seeking information on which standards were employed.

3.1.3 Profile of survey respondents

A total of seven respondents participated in the study. Their careers in the field of translation technology development ranged from two to ten years, with a median of four years and an average of 5.4 years. Four respondents reported being employed by privately owned companies, two in the public sector, and one identified as a freelance developer. Among them, two worked in small or medium-sized companies, while one worked in a large company. Not all respondents provided information regarding the size of their workplace. The respondents represented seven different native languages: Hungarian, German, Czech, Swedish, Finnish, English, and French. The technologies they were involved in developing included a translation management system (TMS) (one respondent), computer-aided translation tools (CAT) and translation memory (TM) (two respondents), translation middleware (one respondent), a localisation platform (one respondent), machine translation (MT) (two respondents), and a post-editing application for smart phones (one respondent). The current

job titles of the respondents were: technical communication team lead, localisation engineer, founder and board member, chief technology officer (CTO), software engineer, associate professor, and programmer analyst.

Despite the small sample size, the diverse backgrounds of the respondents indicate a heterogeneous group, representing various facets of the development process. This diversity offers valuable insights for the study.

3.2 Methods of analysis: Combining quantitative and qualitative approaches

This section outlines the methods used to analyse the data collected from the online survey, employing a multimethod approach that integrates both quantitative and qualitative analysis techniques.

For the quantitative analysis, the analytical tools of the Webropol platform were utilised to calculate average and median scores. These results were then examined using descriptive statistics, without attempting to generalise beyond the sample.

For the qualitative data, an inductive approach was adopted to derive categories from the data and draw inferences. A thematic analysis was deemed most appropriate, given the concise nature of responses to open-ended questions. Individual words were selected as the unit of analysis, as responses to open-ended questions were direct, list-like answers to the given questions. These units were then coded, with a single response potentially encompassing multiple codes, as different themes could emerge within one response.

The next section presents the results of the analysis.

4 Findings and discussion: Accessibility in translation technology development

This section presents and discusses the results of the data analysis.

After presenting the quantitative and qualitative results, the findings are interpreted and discussed in relation to previous research to answer the research questions:

1. How do translation technology developers perceive accessibility within the broader context of technology development and specifically within translation technology?
2. What strategies do these developers employ to integrate accessibility into their technologies?
3. What organisational practices characterise technology development?

4.1 Results of quantitative and qualitative analysis: Thematic insights on accessibility in translation technology development

The results of the quantitative and qualitative analysis are presented in this chapter, divided into three thematic sections of the survey. First, the analysis of the set of questions regarding general perceptions of accessibility among translation technology developers, then their perceptions of accessibility in the context of translation technology, and finally, the strategies for implementing accessibility into translation technology.

4.1.1 General accessibility perceptions

The first set of questions aimed to explore the general perceptions of accessibility among translation technology developers and their personal experiences with accessibility, without specifically addressing translation technology. One question (question 7) utilised a five-point Likert scale, while the remaining questions were structured as yes/no inquiries.

Table 1 Summary of general accessibility perceptions

Question	N	Average	Median	Yes	No
7. In your opinion, how important is it to take accessibility into consideration in the development of technology? (1 unimportant–5 very important)	7	3.9	4	-	-
8. Are you following accessibility-related topics in the field of technology development? (yes/no)	7	-	-	3	4

9. Have you been involved in accessibility-related projects? (yes/no)	7	-	-	3	4
10. Do you personally know someone who benefits from accessible technology? (yes/no)	7	-	-	5	2

Table 1 summarises the respondents' perceptions of the general accessibility based on the survey data.

Regarding the importance of accessibility in technology development (question 7), the majority of respondents rated it highly, with an average score of 3.9 and a median score of 4. This indicates a strong consensus on the significance of incorporating accessibility considerations in technology development. In response to question 8, which asked whether respondents follow accessibility-related topics in technology development, three respondents answered 'yes' and four answered 'no', suggesting that approximately half of the respondents follow accessibility developments. Similarly, for question 9, which asked if respondents had been involved in accessibility-related projects, the responses reflected those for following accessibility-related topics, with three answering 'yes' and four answering 'no'. This parallel suggests a positive correlation between being informed about accessibility and active participation in related projects. Lastly, when asked if they personally knew someone who benefits from accessible technology (question 10), five out of seven respondents affirmed this. These five respondents provided additional details in an optional follow-up question, describing how the persons they know benefit from accessible technology. Two themes emerged from their responses: the ability to work more efficiently and better usability for people with disabilities.

When respondents were asked to define accessibility in their own words, only a small number (two out of seven) indicated that accessibility is primarily a method to ensure usability for people with disabilities. The majority (five out of seven) viewed accessibility from a universal design perspective, encompassing all users with or without disabilities, although these respondents also explicitly addressed the importance for persons with disabilities.

In summary, the data reveal a strong acknowledgement of the importance of accessibility in technology development among respondents, a moderate level of engagement with accessibility-related topics and projects, and a significant personal connection to beneficiaries of accessible technology.

These findings align with those of Putnam et al. (2012, 93), who reported that the majority of user experience and human-computer interaction professionals consider accessibility important. Furthermore, Putnam et al. (2012) found a correlation between respondents' personal attributes and experiences and their positive view on the importance and implementation of accessibility, a trend that is evident in the current study as well. Additionally, Rodriguez Vazquez and O'Brien (2017, n.p.) observed that attitudes towards accessibility in the localisation industry are generally positive, despite a low level of awareness and consideration.

The respondents' definitions of accessibility resemble those provided by leading standardisation bodies, particularly the WAI, which was also the preferred definition among the respondents in Yesilada et al. (2012, n.p.). These reflections suggest that the perceptions of translation technology developers are similar to those of web developers studied in previous research.

The next section of the survey explores accessibility perceptions among translation technology developers specifically within the context of translation technology.

4.1.2 Perceptions of accessibility in translation technology

This section analyses respondents' perceptions regarding the implementation of accessibility in translation technology. Respondents rated their agreement with various statements on a five-point Likert scale. Table 2 below summarises the responses.

Table 2 Summary of perceptions of accessibility in translation technology

Question	N	Average	Median
12. Implementing accessibility into our product is difficult. (1 disagree–5 agree)	7	3.1	3.0
13. Accessibility improves the overall usability of the product. (1 disagree–5 agree)	7	4.1	4
14. Accessibility increases product sales. (1 disagree–5 agree)	7	3.0	3
15. Accessibility has a positive impact on the company's image. (1 disagree–5 agree)	7	4.6	5
16. Improving accessibility is an important part of our product development. (1 disagree–5 agree)	7	3.0	3
17. We do not have enough resources for the design and implementation of accessibility. (1 disagree–5 agree)	7	3.6	4
18. There is not enough demand for accessible translation technology for the development to be feasible. (1 disagree–5 agree)	7	3.4	3

Table 2 provides an overview of the respondents' perceptions of accessibility in translation technology, summarising average and median ratings for each question. Respondents' views on the difficulty of implementing accessibility in the product (question 12) show moderate consensus, with an average score of 3.1 and a median of 3. This suggests that while some find it challenging, others do not see it as a significant obstacle.

In contrast, there was strong agreement that accessibility enhances the overall usability of the product (question 13), reflected in the high average score of 4.1 and a median of 4. This underscores the perceived value of accessibility in improving user experience. However, opinions were divided on whether accessibility increases product sales (question 14), with both the average and median scores standing at 3, indicating that some respondents see potential for increased sales, while others do not perceive a direct economic benefit. However, the perception that accessibility positively influences the company's image (question 15) received strong support, with an average of 4.6 and a median of 5, suggesting that respondents generally recognise its reputational advantages, which could have an indirect effect on sales and customer loyalty.

When it comes to the importance of accessibility in product development (question 16), responses were mixed, with an average and median score of 3, indicating differing views or uncertainties about its priority. Resource constraints (question 17) emerged as a significant issue, with an average score of 3.6 and a median of 4, highlighting that while some respondents feel these limitations strongly, others may not view them as critical barriers to accessibility considerations. The demand for accessible translation technology (question 18) was also a point of uncertainty, with an average of 3.4 and a median of 3. This variation in responses suggests that respondents have differing perspectives on the market need, potentially due to challenges in accurately identifying and quantifying the user base for accessible solutions.

Overall, the results indicate that accessibility is valued for enhancing usability and positively impacting the company's image, yet there remains uncertainty regarding its direct economic benefits and demand. These findings underscore the need for greater awareness and more comprehensive strategies to address accessibility in translation technology.

These findings are consistent with prior research (e.g., Rodriguez Vazquez and O'Brien 2017, Rodriguez Vazquez and Mileto 2016, Refaat 2021), which highlights the limited emphasis on accessibility within translation technology development. Furthermore, the identified

challenges, such as resource constraints and the perceived complexity of implementing accessibility, underscore persistent barriers that must be addressed to advance more inclusive technology solutions.

4.1.3 Strategies and practices for implementing accessibility in translation technology

In the final part of the survey, respondents were asked about their strategies and practices for implementing accessibility in translation technology, with options based on the WAI accessibility principles. Table 3 summarises the strategies employed by respondents.

Table 3 Summary of strategies for implementing accessibility in translation technology

Strategy	N
Menus and prompts are designed using established standards to ensure compatibility with assistive technology.	4
The technology provides multiple ways for users to accomplish tasks, offering flexibility.	4
Information is conveyed in multiple ways, not solely relying on, for example, colour-coding.	4
The technology integrates principles of universal design or design for all, making it usable for a wide range of people with different abilities and disabilities.	3
All functions of the technology can be accessed using either a mouse, keyboard, or a combination of both.	3
User-tests are conducted to ensure accessibility in practical usage.	3
The technology is compatible with standard assistive technology, such as screen-readers and Braille displays.	2
Users can modify the user interface to suit their needs and preferences (e.g., change font size and colour).	2
Accessibility experts are consulted during the development process.	2
The accessibility of the technology is tested using accessibility evaluation tools.	2
None of the above	2
The technology includes features specifically designed for users with disabilities.	1

The most frequently adopted strategies were designing menus and prompts with established standards for assistive technology compatibility, providing multiple ways to accomplish tasks, and conveying information in multiple formats, each selected by four respondents. These strategies show a common approach to enhancing accessibility by ensuring usability for persons with diverse needs and preferences. Following closely, three respondents reported

conducting user tests to ensure practical accessibility, allowing access to all functions via mouse, keyboard, or a combination of both, and applying universal design principles to accommodate a wide range of abilities. These choices reflect an awareness of the importance of a flexible and universally accessible design, benefitting not only users with disabilities but improving the overall user experience.

Interestingly, only two respondents indicated compatibility with standard assistive technologies, like screen readers and Braille displays. Although more respondents (four) indicated designing compatible menus and prompts, this selective compatibility suggests a partial approach, which may limit the product's accessibility for users dependent on assistive technologies.

Allowing user interface customisation, such as adjusting font size and colour, was also selected by two respondents, which can greatly benefit especially partially sighted users. However, this feature alone may not fully meet the needs of users reliant on assistive technologies, indicating room for more inclusive solutions.

The survey further shows that while three respondents conduct user tests, only two consult accessibility experts or use accessibility evaluation tools. This indicates that while some validation occurs, the integration of expert insights and systematic evaluations could be enhanced. Accessibility experts offer specialised knowledge that ensures accessibility features meet necessary standards, and evaluation tools provide a structured approach to identifying accessibility barriers.

Only one respondent indicated including features specifically designed for users with disabilities, pointing to a gap in targeted design for accessibility. Features such as text-to-speech or high-contrast modes are critical for an inclusive user experience. Relying mainly on universal design, while beneficial, may not address the specific needs of all users with disabilities.

Notably, two respondents selected "none of the above", indicating that a portion of respondents may not currently engage in any of the listed accessibility practices. This might reflect perceived difficulties or resource constraints, such as time, cost, or the expertise needed for implementing accessibility.

In summary, the results suggest a varied approach to accessibility in translation technology. While some developers employ multiple strategies, others lack comprehensive practices.

These findings highlight a need for greater awareness and integration of accessibility principles throughout development. Collaboration with accessibility experts and systematic use of specialised evaluation tools could further enhance accessibility, allowing translation technologies to meet the diverse needs of all users. The relatively low adoption of certain strategies, such as compatibility with assistive technology and expert consultation, underscores important areas for improvement.

Table 4 Summary of organisational practices for accessibility in translation technology

Question	N	Average	Median	Yes	No	I don't know
22. Does your organisation have documented practices how to implement accessibility into translation technology? (yes/no)	7	-	-	0	6	1
23. When developing translation technology, do you follow established accessibility standards? (yes/no)	7	-	-	3	3	1
25. Does your team include persons who are responsible for accessibility? (yes/no)	7	-	-	2	5	0
26. How important do you consider user-feedback regarding accessibility? (1 unimportant–5 important)	7	4.7	5	-	-	-

Table 4 presents data on organisational practices for implementing accessibility in translation technology, covering four key areas: documented practices, adherence to accessibility standards, team roles related to accessibility, and the importance of user feedback. The analysis highlights several insights into accessibility implementation practices in translation technology.

Firstly, when asked about having documented practices for accessibility, none of the respondents reported formal documentation. Six respondents stated their organisation lacked such practices, while one was unsure. This absence of documentation may contribute to inconsistencies in how accessibility is approached across teams and projects, leading to a fragmented integration of accessibility practices.

The responses regarding adherence to accessibility standards were more varied. Three respondents reported following established standards, three did not, and one was uncertain. This variation could indicate different interpretations of what constitutes "established standards" or varying levels of commitment to accessibility across organisations. The

inconsistent adherence suggests that while some organisations prioritize accessibility, others may lack a clear or unified approach to implementing these standards.

When examining the inclusion of personnel responsible for accessibility, responses were again divided. Only two respondents indicated having dedicated accessibility roles within their teams, with five noting the absence of such roles. This lack of dedicated expertise likely hampers accessibility efforts, as accessibility may be treated as an afterthought rather than an integral part of the development process. Without specific roles or responsibilities, accessibility risks being inconsistently implemented across products.

On a positive note, the importance of user feedback on accessibility was universally recognised, with a high average score of 4.7 on a five-point Likert scale. This consensus reflects an awareness of the critical role of end-user insights in shaping accessible technology. The shift towards valuing user feedback contrasts with previous findings by Rodriguez Vazquez and Mileto (2016), who reported that visually impaired translators had difficulty engaging with developers. The increased emphasis on user feedback suggests a positive shift in the industry's responsiveness to accessibility concerns.

Respondents identified key challenges in developing accessible translation technology. three respondents mentioned time and workforce limitations, while two noted challenges related to development platforms and third-party environment constraints. Other difficulties included a lack of information and challenges in achieving full accessibility, with certain components of the technology remaining inaccessible. These responses echo the earlier observation that menus and prompts may be accessible while other features are not.

Responsibility for ensuring accessibility was divided among respondents. Three believed that product managers should hold primary responsibility, while another three cited user interface designers and developers. Two respondents highlighted the importance of user testing and suggested that end-users inform developers about accessibility needs. One respondent argued for shared responsibility across all roles in the development process, from product managers and developers to end-users. These varied responses indicate that accessibility should be a shared responsibility, integrated at all stages of development, with product managers ideally leading accessibility initiatives.

Some respondents mentioned specific standards, with references to the WCAG and W3C standards. One respondent did not specify any standards, perhaps reflecting uncertainty about

what constitutes an “established standard”. Additionally, challenges related to subcontracting were mentioned, as subcontractors may lack influence over accessibility standards in third-party environments. Legal frameworks, such as the Accessible Canada Act, were cited by one respondent as an impetus for prioritising accessibility, suggesting that regulatory requirements could drive accessibility adoption.

Overall, the results indicate a growing awareness of the importance of accessibility, yet organisational practices are inconsistent and often lack a systematic approach. The reliance on individual developers to follow standards, combined with the lack of formal documentation and dedicated roles, shows that accessibility is not fully embedded in organisational practices. This fragmented approach leads to inconsistent outcomes, where some features are accessible but others are not, as noted by Refaat (2021) and Rodriguez Vazquez, Fitzpatrick, and O’Brien (2018). The strong emphasis on user feedback is encouraging, reflecting a trend towards user-centred development. However, constraints related to resources and authority, particularly in third-party projects, remain significant barriers, as highlighted by Rodriguez Vazquez and O’Brien (2017).

In conclusion, while accessibility awareness is increasing, a comprehensive and systematic approach to accessibility in translation technology remains limited. The findings point to the need for organisations to establish clear documentation, dedicate accessibility roles, and integrate accessibility from the outset. Enhanced collaboration with accessibility experts, consistent user feedback, and adherence to standards could help overcome the challenges of designing fully accessible, rather tan partially accessible, products.

5 Conclusions: Towards a more inclusive landscape

The aim of this research was to explore the accessibility perceptions of translation technology developers and the strategies they use to integrate accessibility into their technologies. This comprehensive approach aimed to provide a detailed overview of the current landscape of accessible translation technology, addressing the following research questions:

1. How do translation technology developers perceive accessibility within the broader context of technology development and specifically within translation technology?
2. What strategies do these developers employ to integrate accessibility into their technologies?
3. What organisational practices characterise translation technology development?

Data were collected through an online survey directed at translation technology development professionals and analysed using both quantitative and qualitative methods. These methods provided valuable insights into the current state of accessibility awareness and implementation in the translation technology field, identifying barriers and offering ideas for more efficient implementation of accessibility features.

The results suggest that translation technology developers generally perceive accessibility positively. Many are actively engaged in accessibility-related activities, with a majority of respondents also reporting personal connections with persons who benefit from accessible technology. This positive perception is crucial, as it indicates a foundational willingness among developers to consider and prioritise accessibility. Such attitudes are essential for fostering an inclusive technological environment where the needs of all users, including those with disabilities, are addressed.

Beyond enhancing inclusivity for visually impaired translators, accessibility is seen as improving overall usability and contributing to a positive company image. Developers employ several strategies to integrate accessibility, including adhering to established standards, using universal design principles, and conducting user tests. These strategies help ensure that the technologies are not only accessible but also user-friendly and effective for a diverse user base.

However, perceptions regarding the importance of accessibility in the development process, its impact on product sales, and the market demand for accessible translation technology

varied significantly among respondents. Some developers view accessibility as a crucial element that enhances product quality and marketability, while others see it as secondary, often due to perceived or actual resource constraints and limited organisational support. These challenges highlight the need for more targeted training and resources to help developers better understand and implement accessibility features. Current organisational practices for integrating accessibility are inconsistent, with responsibility often falling to individual developers. This ad-hoc approach can lead to variability in the accessibility of different products and features within the same organisation.

A strong desire for increased collaboration, especially with end-users, emerged as a key finding. Developers expressed the need for more structured and ongoing engagement with users with disabilities to ensure their products meet real-world needs and expectations. The results also indicated the need for involvement of accessibility experts in the development process, as well as more systematic, documented practices and a holistic approach to accessibility. Suggested practices include establishing dedicated accessibility teams, conducting regular accessibility audits, and integrating accessibility goals into the broader product development lifecycle.

Based on current accessibility initiatives by leading translation technology companies, such as Trados and MemoQ, and the positive findings of this study, the outlook for a more accessible translation technology landscape appears promising. Companies that have successfully integrated accessibility into their products often serve as models for the industry, demonstrating that accessibility can be a competitive advantage and a driver of innovation.

The major limitation of this study is the small sample size and the lack of previous research on accessibility perceptions among translation technology developers. These limitations emphasise the need for further research to validate and expand upon the findings of this study. Despite these limitations, the study suggests that translation technology developers share similar perceptions of accessibility with web developers studied in previous research. This alignment indicates that accessibility-related challenges and opportunities are not unique to translation technology but are part of broader trends in the technology industry.

Gaining deeper insights into accessibility perceptions and practices through methods such as interviews could broaden understanding of this topic. Specific areas for future research could include examining the role of organisational policies in promoting accessibility, investigating

the impact of accessibility training for developers, and studying the long-term effects of integrated accessibility features on user satisfaction and inclusivity.

In conclusion, while significant progress has been made in promoting accessibility in translation technology, there remains considerable room for improvement. By addressing identified challenges and fostering a more systematic and collaborative approach, the translation technology industry can make substantial strides towards greater inclusivity and usability for all users.

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Appendices

Appendix 1 The questionnaire

ACCESSIBILITY IN TRANSLATION TECHNOLOGY DEVELOPMENT

Welcome to the Accessibility in Translation Technology Development questionnaire!

This study, which is part of my MA thesis, explores accessibility perceptions among translation technology developers and their accessibility implementation strategies.

Accessibility here refers to usability for users with visual disabilities, employing assistive technologies like screen-readers and Braille displays.

Answering the questionnaire will take approximately 15 minutes.
Participation is completely voluntary and can be cancelled at any time.
Responses are entirely anonymous, used for research purposes only, and no connection can be made between answers and a participant's identity. By submitting your answers at the end, you agree to share the data with the researchers to carry out the survey and analyse the data.

Background Information

1. How long have you worked in the field of translation technology development? *

Less than a year
1 year
2 years
3 years
4 years
5 years
6 years
7 years
8 years
9 years
More than 10 years

2. What kind of company do you work for? (e.g., size, domain, public/private) *

3. What is your native language?

4. Describe the technology you are developing.

Accessibility in General

The following questions are about accessibility of technology in general. Please elaborate freely in the text fields or select the appropriate response on the scale provided.

6. In your own words, how would you define accessibility? *

7. In your opinion, how important is it to take accessibility into consideration in the development of technology? *
1 Unimportant – 5 Very important

8. Are you following accessibility related topics in the field of technology development? *

Yes – No

9. Have you been involved in accessibility-related projects? *

Yes – No

10. Do you know someone who benefits from accessible technology? *

Yes – No

11. If yes, describe how they benefit from it?

Accessibility in translation technology development

Below are a series of statements regarding accessibility in the context of translation technology. Please indicate the extent to which you agree or disagree with each statement by selecting the appropriate response on the scale provided.

12. Implementing accessibility into our product is difficult. *

1 Disagree – 5 Agree

13. Accessibility improves the overall usability of the product. *

1 Disagree – 5 Agree

14. Accessibility increases product sales. *

1 Disagree – 5 Agree

15. Accessibility has a positive impact on the company's image. *

1 Disagree – 5 Agree

16. Improving accessibility is an important part of our product development. *

1 Disagree – 5 Agree

17. We do not have enough resources for the design and implementation of accessibility. *

1 Disagree – 5 Agree

18. There is not enough demand for accessible translation technology for the development to be feasible. *

1 Disagree – 5 Agree

Implementing accessibility into translation technology

The following questions are designed to find out if accessibility is being considered during the development of translation technology, and if it is, to understand how it is being done. Please elaborate in the text fields or select the appropriate response(s)from the scale provided.

19. Please indicate the ways accessibility is being implemented into the translation technology you are developing. *

The technology integrates principles of universal design or design for all, making it usable for a wide range of people with different abilities and disabilities.

The technology is compatible with standard assistive technology, such as screen readers and Braille displays.

The technology includes features specifically designed for users with disabilities.

Menus and prompts are designed using established standards to ensure compatibility with assistive technology.

All functions of the technology can be accessed using either a mouse, keyboard, or a combination of both.

The technology provides multiple ways for users to accomplish tasks, offering flexibility.

Information is conveyed in multiple ways, not solely relying on, for example, colour-coding.

Users can modify the user interface to suit their needs and preferences (e.g., change font size and colour).

User-tests are conducted to ensure accessibility in practical usage.

Accessibility experts are consulted during the development process.

The accessibility of technology is tested using accessibility evaluation tools.

None of the above.

20. What do you find the most challenging in developing accessible translation technology? *

21. Who do you think should be responsible for ensuring the accessibility of translation technology? *

22. Does your organisation have documented practices how to implement accessibility into translation technology? *

Yes – No – I don’t know

23. When developing translation technology, do you follow established accessibility standards? *

Yes – No – I don’t know

24. If yes, which one(s)?

25. Does your team include persons who are responsible for accessibility? *

Yes – No – I don’t know

26. How important do you consider user-feedback regarding accessibility? *

1 Unimportant – 5 Important

27. Anything else you would like to add?

Appendix 2 Finnish summary

Kohti inklusiivista käännösteknologiaa: käännösteknologioiden kehittäjien saavutettavuuskäsityksiä ja -käytäntöjä

Johdanto

Teknologinen kehitys ja maailman digitalisoituminen on avannut näkövammaisille aiemmin suljettuja ovia. Näkövammaisten tietotekniset apuvälineet mahdollistavat entistä itsenäisemmän opiskelun, työskentelyn ja henkilökohtaisten asioiden hoitamisen. Toisaalta teknologiat ja digitaaliset palvelut, joiden kehittämisessä ei ole huomioitu saavutettavuutta, voivat muodostua ylitsepääsemättömiksi esteiksi. Tämä ilmiö on läsnä myös kääntämisessä, joka on viime vuosikymmeninä muuttunut yhä teknologisoituneemmaksi. Näkövammaisille kääntäjille tämä teknologinen kehitys on ollut mahdollisuus työskennellä tasavertaisesti näkevien kollegoiden rinnalla, mutta ei-saavutettava teknologia voi yhtä lailla asettaa heidät epäedulliseen asemaan työnhaussa (Rodriguez Vázquez ja Mileto 2016). Monet kielipalveluyritykset ja käännöstoimistot edellyttävät kääntäjiltä tietyn käännösohjelman käyttöä, ja näiden ohjelmien saavutettavuudessa on usein vakavia puutteita tai ne eivät ole lainkaan käytettävissä näkövammaisten apuvälineillä (Refaat 2021). Viimeaikainen tutkimus on kuitenkin luonut toivoa valoisammasta tulevaisuudesta, sillä saavutettavuuden integroiminen selainpohjaisiin käännösohjelmiin on helpompaa kuin työpöytäohjelmiin (Rodriguez Vázquez, Fitzpatrick ja O'Brien 2018).

Aiemmassa käännösteknologioiden saavutettavuuden tutkimuksessa painopiste on ollut näkövammaisten käyttäjien käsityksissä ja kokemuksissa sekä teknologioiden teknisissä ominaisuuksissa. Sen sijaan käännösteknologioiden kehittäjien näkökulma on jäänyt vaille huomiota. Tämän tutkimuksen tarkoituksena on täydentää aiempaa käännösteknologian saavutettavuutta koskevaa tutkimusta tuomalla esiin myös teknologioiden kehittäjien käsityksiä saavutettavuudesta. Käännösteknologioiden kehittäjien käsitysten ja käytäntöjen tutkiminen on tärkeää, jotta käännösteknologioita voitaisiin kehittää inklusiivisemmiksi ja vastaamaan erilaisten käyttäjien tarpeisiin.

Tässä tutkimuksessa selvitetään käännösteknologioiden kehittäjien saavutettavuuskäsityksiä ja -käytäntöjä. Tarkoituksena on vastata seuraaviin kysymyksiin:

1. Millaisia käsityksiä käännösteknologioiden kehittäjillä on teknologioiden saavutettavuudesta yleisesti ja erityisesti käännösteknologian kontekstissa?
2. Millaisia strategioita käännösteknologioiden kehittäjät käyttävät toteuttaakseen saavutettavuusratkaisuja kehittämissään teknologioissa?
3. Millaiset organisatoriset käytännöt ohjaavat saavutettavuuden toteuttamista käännösteknologioiden kehittämisessä?

Keskeisiä käsitteitä

Tämän tutkimuksen keskeisiä käsitteitä ovat saavutettavuus, avustavat teknologiat, käytettävyys sekä design for all -suunnittelu. Nämä käsitteet ovat tiiviisti sidoksissa toisiinsa, mutta niillä kullakin on omat erityispiirteensä, joita käsitellään seuraavaksi.

Saavutettavuus on keskeinen tekijä sosiaalisessa inklusiivisuudessa. Se on erityisen tärkeää näkövammaisille, mutta se hyödyttää myös muita käyttäjäryhmiä ja parantaa digitaalisten tuotteiden ja palveluiden yleistä käytettävyyttä, mikä luo yrityksille uusia kasvumahdollisuuksia.

Saavutettavuudella ei ole yksiselitteistä määritelmää, mutta aiemman tutkimuksen perusteella digitaalisten palveluiden kehittäjien ja organisaatioiden keskuudessa suosituimpia ovat laajalle levinneiden ja vakiintuneiden standardien määritelmät, kuten Web Accessibility Initiative (WAI) sekä Yhdysvaltojen Rehabilitation Act -lain Section 508 (Yesilada et al. 2012). Tässä tutkimuksessa saavutettavuus määritellään WAI:n mukaisesti verkkosivujen, työkalujen ja teknologioiden suunnitteluksi siten, että ne ovat helppoja käyttää myös vammaisille. Tämä määritelmä ottaa huomioon erilaiset vammaisryhmät, kuten aistivammaiset ja fyysisesti vammaiset, sekä lisäksi ei-vammaiset ihmisryhmät, jotka kärsivät tilapäisistä haasteista -, kuten erilaisiin laitteisiin tai hitaaseen internetyhteyteen liittyvistä ongelmista.

Avustavat teknologiat ovat tuotteita, järjestelmiä ja palveluja, jotka helpottavat vammaisen henkilön toimintaa eri osa-alueilla, kuten kognitiossa, viestinnässä, kuulemisessa, liikkumisessa, itsestä huolehtimisessa ja näkemisessä (WHO 2024). Näkövammaisten tärkeimpiä avustavia teknologioita ovat ruudunlukuohjelmat sekä pistekirjoitusnäytöt, jotka muuttavat visuaalisen sisällön puhuttuun ja kosketeltavaan muotoon. Jotta ruudunlukuohjelmat ja pistekirjoitusnäytöt pystyvät muuntamaan sisältöä näkövammaiselle

saavutettavaksi, sisällön tulee olla rakenteeltaan ja koodikieleltään sellaisessa muodossa, mitä avustava teknologia pystyy käsittelemään(Kearney-Volpe ja Hurst 2021).

Käytettävyys on käsitteenä lähellä saavutettavuutta, mutta siinä missä saavutettavuus hyödyttää erityisesti vammaisia käyttäjiä, käytettävyys korostaa tuotteen tai palvelun kaikkien käyttäjien kokemuksia, erityisesti käytön helppoutta ja käyttäjätyytyväisyyttä. ISO9241-11 -standardin mukaan käytettävyys tarkoittaa sitä, kuinka hyvin käyttäjä pystyy saavuttamaan tavoitteensa tehokkaasti, tarkoituksenmukaisesti ja tyydyttävästi käyttäessään tiettyä järjestelmää, tuotetta tai palvelua.

Vaikka Käytettävyys on saavutettavuuden osa-alue, hyvä käytettävyys ei takaa saavutettavuutta. Esimerkiksi visuaalisesti miellyttävä sisältö voi olla näkövammaisille käyttäjille saavuttamaton, ellei saavutettavuutta ole erityisesti huomioitu. Saavutettavuuden huomioiminen käännösteknologioissa on erittäin tärkeää näkövammaisten kääntäjien kannalta. Heikko saavutettavuus voi estää heitä saavuttamasta tavoitteitaan tehokkaasti, tarkoituksenmukaisesti ja tyydyttävästi käännöstyössä.

Design for all -suunnittelu, tai universaali suunnittelu, pyrkii luomaan ympäristöjä, tuotteita, palveluja, kulttuuria ja tietoa, jotka ovat kaikkien saavutettavissa ja käytettävissä ilman erityisiä mukautuksia tai erikoissuunnittelua (European Institute for Design and Disability (EID) ja Centre for Excellence in Universal Design). Molemmat käsitteet keskittyvät siihen, että digitaaliset sisällöt ovat kaikkien käytettävissä riippumatta käyttäjän henkilökohtaisista ominaisuuksista tai elämäntilanteesta. Näitä käsitteitä on kuitenkin kritisoitu niiden laajuuden ja epämääräisyyden vuoksi (Barnes 2011).

Saavutettavuusohjeistukset ja lainsäädäntö

Digitaalisen sisällön tuottamista ohjaavat erilaiset ohjeistukset ja lait, jotka velvoittavat ensisijaisesti julkista sektoria , mutta vaikuttavat myös, vähintään välillisesti, yksityisiin toimijoihin.

Tunnetuin saavutettavuusohjeistus on Web Content Accessibility Guidelines (WCAG), erityisesti sen viimeisimmät versiot 2.1 ja 2.2. Sen suositukset koskevat erilaisia laitteita ja käsittävät kaikki vammaisryhmät, mukaan lukien ei-vammaiset, jotka kohtaavat tilapäisiä vaikeuksia. Ohjeistus sisältää myös saavutettavuuden arviointiin tarkoitettuja työkaluja, jotka helpottavat kehittäjien työtä. WCAG koostuu useasta eri tasosta, joita ovat muun muassa yleiset ohjeet, testattavat onnistumiskriteerit, esimerkit, linkit ja koodit. Kehittäjiä kehotetaan

huomioimaan ohjeistuksen kaikki tasot, vaikka ohjeistuksessa samanaikaisesti tiedostetaan , että universaalin saavutettavuuden aikaansaaminen ei välttämättä ole mahdollista. Kehittäjiä rohkaistaankin myös määrittelemään tarkka kohderyhmä, jolle sisältöä kehitetään.

Lainsäädännön osalta tämä tutkimus keskittyy Euroopan unionin alueeseen sekä Pohjois-Amerikkaan, koska saavutettavuutta koskeva lainsäädäntö voi olla hyvin vaihtelevaa eri puolilla maailmaa.

Euroopan unionissa saavutettavuutta ohjaa pääasiassa EU:n esteettömyysdirektiivi 2016/2102. Se kattaa laaja-alaisesti eri tuotteet ja palvelut, mukaan lukien tietokoneet ja ohjelmistot, mutta ei varsinaisesti esteettömyyttä tai saavutettavuutta työllisyyden näkökulmasta. Julkisista hankinnoista annettu Direktiivi 2014/24/EU velvoittaa kuitenkin julkisista hankinnoista vastaavat viranomaiset huomioimaan saavutettavuusvaatimukset. Lisäksi Direktiivi velvoittaa toimijoita seuraamaan ja raportoimaan saavutettavuuden toteutumista sekä julkaisemaan julkaisemaansa sisältöä koskevan saavutettavuusselosteen.

Pohjois-Amerikassa merkittävimmät saavutettavuutta ohjaavat lait ovat Yhdysvaltojen Rehabilitation Actin Section 508 ja Kanadan Accessible Canada Act (ACA). Samoin kuin EU:ssa, nämä lait velvoittavat julkisia toimijoita varmistamaan käyttämiensä tuotteiden ja palveluiden saavutettavuuden sekä suurelle yleisölle että julkisen sektorin työntekijöille. Myös Yhdysvaltain ja Kanadan saavutettavuuslainsäädännössä velvoitetaan toimijoita seuraamaan ja raportoimaan säännöllisesti saavutettavuuden toteutumista.

Aineisto ja menetelmät

Tutkimuksen aineisto kerättiin Webropolilla toteutetulla verkkokyselyllä, joka sisälsi sekä avoimia että suljettuja kysymyksiä. Kysely toteutettiin anonyymisti, eikä yksittäisiä vastauksia ja vastaajia voinut yhdistää toisiinsa. Linkki kyselyyn lähetettiin käännösteknologioiden parissa työskenteleville tahoille, joita pyydettiin jakamaan sitä edelleen eteenpäin. Kysely lähetettiin yhteensä viiteentoista käännösteknologiayritykseen. Lisäksi kyselylinkki julkaistiin käännösaiheisilla foorumeilla Facebookissa ja LinkedInissä. Kysely oli englanninkielinen ja se oli avoinna yhteensä kaksi viikkoa. Kyselyä testattiin ennen sen lähettämistä varsinaisille vastaanottajille. Pilotointiin osallistui viisi käännösalan ammattilaista ja opiskelijaa, jotka antoivat tärkeää palautetta kyselyn rakenteesta ja kysymysten muotoilusta.

Kyselyssä oli yhteensä 27 kysymystä, jotka oli jaoteltu taustatietoihin sekä kolmeen eri teemaan.

Ensimmäinen osio käsitteli vastaajien taustatietoja. Toisessa, kolmannessa ja neljännessä osiossa keskityttiin tutkimuskysymysten kannalta keskeisiin teemoihin. Toisessa osiossa vastaajilta kysyttiin heidän käsityksiään saavutettavuudesta yleisesti, kun taas kolmannessa osiossa kysymykset koskivat heidän käsityksiään käännösteknologian saavutettavuudesta. Neljännessä osiossa vastaajilta tiedusteltiin, millaisia strategioita ja organisatorisia käytäntöjä heillä oli saavutettavuuden integroimiseksi osaksi käännösteknologiaa.

Näin rakennetulla kyselyllä pyrittiin saamaan kattava ja monipuolinen kuva käännösteknologioiden kehittäjien saavutettavuuskäsityksistä ja -käytännöistä. Kyselyn avoimet kysymykset mahdollistivat syvällisemmän ja yksityiskohtaisemman tiedonkeruun, kun taas suljetut kysymykset tarjosivat selkeän ja helposti analysoitavan aineiston määrällistä tarkastelua varten.

Tulokset ja johtopäätökset

Kyselyn perusteella saatiin arvokasta tietoa käännösteknologioiden kehittäjien saavutettavuuskäsityksistä ja -käytännöistä. Kyselyyn vastasi seitsemän käännösteknologioiden parissa työskentelevää henkilöä, joiden taustat erosivat toisistaan työuran pituuden, toimenkuvan, kehitettävän teknologian, äidinkielen ja organisaation tyypin suhteen.

Kerätty aineisto analysoitiin Webropolin analyysityökaluilla. kvantitatiivisesta aineistosta laskettiin keskiarvo ja mediaani, ja kvalitatiivinen aineisto analysoitiin teemoittelun avulla. Teemoittelu toteutettiin induktiivisesti ryhmittelemällä aineistosta nousseita sanoja teemoiksi. Tuloksia tulkittaessa niitä verrattiin aiempiin saavutettavuuskäsityksiä koskeviin tutkimustuloksiin.

Yleiset saavutettavuuskäsitykset

Kysely osoitti, että käännösteknologioiden kehittäjät pitävät saavutettavuutta erittäin tärkeänä osana teknologioiden kehitystä. Lähes puolet vastaajista ilmoitti seuraavansa aktiivisesti saavutettavuuteen liittyvää keskustelua ja osallistuvansa saavutettavuuteen liittyviin projekteihin. Tämä heijastaa saavutettavuustietouden ja aktiivisen osallistumisen välillä olevaa luonnollista yhteyttä. Suurin osa vastaajista tunsi myös henkilökohtaisesti jonkun, joka

hyötyy saavutettavuudesta, mikä aiemman tutkimuksen mukaan tukee positiivisten saavutettavuuskäsitysten kehittymistä (Putnam et al. 2012).

Vastaajia pyydettiin myös vapaasti määrittelemään saavutettavuus. Vastaajien vapaamuotoiset määritelmät vastasivat suurelta osin vakiintuneita standardeja, erityisesti WAI:n määritelmää, joka on myös aiemmissa aihetta käsittelevissä tutkimuksissa ollut suosituin saavutettavuuden määritelmistä (Yesilada et al. 2012). Tämä osoittaa, että saavutettavuuden peruskäsitteet ovat laajalti hyväksyttyjä käännösteknologioiden kehittäjien keskuudessa.

Saavutettavuuden merkitys käännösteknologian kehityksessä

Käännösteknologioiden kehittäjät uskovat saavutettavuuden parantavan teknologioiden käytettävyyttä ja luovan positiivisen mielikuvan yrityksestä. Kuitenkaan vastaajat eivät ole yksimielisiä saavutettavuuden vaikutuksista myynnin edistämiseen tai saavutettavien käännösteknologioiden kysynnän määrästä.

Kehittäjät kokevat saavutettavuuden toteuttamisen vaihtelevasti, osa kokee sen sisällyttämisen haasteellisena, kun taas osa ei pidä sitä kovin haasteellisena. Useimmat vastaajat mainitsevat riittämättömät resurssit merkittävänä esteenä saavutettavuuden integroimiselle, erityisesti ajankäyttöön, työvoimaan ja tietoon liittyvät haasteet. Organisaatioissa ei myöskään ole vakiintuneita kirjallisia käytäntöjä saavutettavuuden varmistamiseksi. Nämä tulokset vastaavat aiempien tutkimusten antamaa kuvaa, jonka mukaan vaikuttaa siltä, ettei saavutettavuus ole keskeinen tekijä käännösteknologioita kehitettäessä (Rodriguez Vazquez ja O'Brien 2017, Rodriguez Vazquez ja Mileto 2016, Refaat 2021).

Kyselyn viimeisessä osiossa vastaajat valitsivat WAI:n saavutettavuuden perusperiaatteisiin perustuvasta listasta strategioita, joita he käyttävät kehitystyössään varmistaakseen käännösteknologian saavutettavuuden. Yleisimmät saavutettavuutta edistävät strategiat käännösteknologioiden kehityksessä liittyvät vakiintuneiden suositusten, kuten WCAG, noudattamiseen, monimuotoisten käyttötapojen tukemiseen ja käyttäjätestaukseen. Vastaajat eivät kuitenkaan yhtä laajasti käytä asiantuntijakonsultaatioita tai automaattisia työkaluja saavutettavuuden arvioimiseksi. Vaikka yli puolet vastaajista kertoi varmistavansa, että teknologian valikot ja kehotteet ovat saavutettavia, vain pieni osa kertoi varmistavansa koko teknologian saavutettavuuden avustavia teknologioita käyttäville. Samoin vähemmistö vastaajista ilmoitti, että käyttäjä voi halutessaan muokata käyttöjärjestelmää, esimerkiksi muuttamalla kirjaisinkokoa ja -väriä.

Vain yksi vastaaja ilmaisi, että heidän kehittämässään teknologiassa on erityisesti vammaisille käyttäjille suunnattuja ominaisuuksia. Kaksi vastaajista ilmaisi, etteivät he käytä mitään mainituista strategioista saavutettavuuden edistämiseksi.

Viimeisessä osiossa selvitettiin myös mahdollisia organisatorisia käytäntöjä saavutettavuuden edistämiseksi. Vastausten perusteella organisaatioiden käytännöt saavutettavuuden tukemiseksi vaihtelevat, eivätkä useimmat organisaatiot ole määritelleet selkeitä vastuuhenkilöitä tai prosesseja saavutettavuuden varmistamiseksi. Suurin osa vastaajista piti käyttäjiltä saatavaa saavutettavuuspalautetta erittäin tärkeänä, mikä osoittaa aiempaa myönteisempää suhtautumista. Esimerkiksi Rodriguez Vazquezin ja Mileton (2016) näkövammaisille kääntäjille suunnatun kyselytutkimuksen tulosten mukaan monet näkövammaiset olivat kokeneet saavutettavuuspalautteisiinsa saamansa vastaukset negatiivisina.

Kysyttäessä vastaajilta kenen heidän mielestään pitäisi olla pääasiallisessa vastuussa käännösteknologian saavutettavuudesta, vastaukset jakaantuivat tuotepäällikön sekä käyttöjärjestelmäinsinöörien ja kehittäjien kesken. Osa vastaajista piti myös loppukäyttäjien palautetta keskeisenä, ja yhden vastaajan mielestä vastuu saavutettavuudesta pitäisi jakaa kaikkien siihen osallistuvien kesken aina tuotepäälliköistä loppukäyttäjiin. Kyselyn lopussa olevassa vapaassa lisätietokentässä osa vastaajista kertoi vapaasti kokemuksistaan. Yksi vastaajista kertoi hankaluuksista työskenneltäessä alihankkijana kolmannelle osapuolelle, jolloin mahdollisuus vaikuttaa saavutettavuuteen on vähäinen. Toinen vastaaja mainitsi Kanadan saavutettavuutta koskevan lainsäädännön saaneen aikaan sen, että käännösteknologian saavutettavuutta alettiin parantamaan. Tämä johtunee lainsäädännön julkisen sektorin hankintoja koskevista saavutettavuusvaatimuksista.

Tutkimuksen perusteella käännösteknologioiden kehittäjien käsitykset saavutettavuudesta ja sen positiivisista vaikutuksista ovat myönteisiä. He uskovat saavutettavuuden paitsi edistävän inklusiivisuutta myös parantavan teknologioiden käytettävyyttä ja yrityksestä syntyvää mielikuvaa.

Vaikka kehittäjät käyttävät monenlaisia saavutettavuutta edistäviä strategioita työssään, ilmenee saavutettavuuden käytännön toteutuksessa kuitenkin monia ongelmia, jotka vaativat ratkaisuja. Ensinnäkin kehittäjät tarvitsevat selkeästi määritellyt resurssit saavutettavuuden edistämiseksi, kuten koulutusta, saavutettavuusasiantuntijan apua ja selkeät toimintatavat.

Tällä hetkellä saavutettavuuden integroiminen käännösteknologiaan vaikuttaa lepäävän pääasiassa yksittäisten kehittäjien ja loppukäyttäjien harteilla.

Tämän tutkimuksen keskeisiä rajoitteita olivat sen pieni otanta sekä aiemman aihetta käsittelevän tutkimuksen puute. Tästä huolimatta saadut tulokset luovat pohjan jatkotutkimukselle. Aihetta voisi syventää esimerkiksi haastattelututkimuksella, jolloin aiheesta voitaisiin saada syvällisempää tietoa. Jatkotutkimuksessa voisi esimerkiksi selvittää, millaisia käytäntöjä organisaatioilla on saavutettavuuden edistämiseksi, millaisia vaikutuksia kehittäjille suunnatulla saavutettavuuskoulutuksella on tai miten saavutettavuus vaikuttaa käyttäjätyytyväisyyteen ja inklusiivisuuteen pitkällä aikavälillä.