DIGITAL WORLD COMMUNICATION AND TRANSLATION

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The introduction of digital computers, information and communication technologies (ICTs), and the Internet/Web has broadened the scope of communication globally in ways unprecedented in human history. The "digital world" implies more than the technical and instrumental aspects and usage of technology; it equally involves our tangible human social engagement and interface with the tools and technologies themselves. The relevance of digital studies to translation studies, and vice versa, is substantial. Both fields intrinsically deal with language, information, and communication and are inextricably linked to technology. After a brief introduction, the article highlights first the essential informational and communicational foundation of technology development that intertwined with histories of translation technology. The convergence of these multiple histories has led to today's 24/7 digital infrastructure. It then considers the social and cultural facets of the digital world, presenting research areas in digital studies that can be explored in relation to translation studies. While the existing analytical and critical approaches to researching translation can arguably be extended and transposed to include elements of the contemporary digital context, there are also compelling and legitimate reasons for contextualizing translation within the broader, global communication universe, positioning it wholly within the digital sphere.

Keywords*: digital, translation, technology, Internet, communication.*

1. Introduction

The interdisciplinarity of translation studies has taken many forms and turns since the field's spin-off from linguistics during the latter half of the 20th century, with the connecting and putting into relation of ideas and concepts across disciplinary boundaries yielding insightful perceptions. Fundamentally, translation is a unique kind of communication that assumes a priori cultural knowledge and a cognitive space of at least two languages. The identifying marker of what actually constitutes a translation by any given social group or community can potentially fall at any one of many different and varying points on a continuum of linguistic interaction between languages. The growth and expansion of translation studies set in motion a fruitful investigation of more than one translation history, namely the exploration of concepts, norms, practices, and practitioners of translation as they are understood within diverse linguistic and cultural traditions and histories around the world.

The introduction of computers, information and communication technologies (ICTs), and the Internet has broadened the scope of communication in ways unprecedented in human history, affecting translation as well. The

World Wide Web, released to the public in August 1991, has steadily admitted into its social net and conversational space approximately 60 % of the world's population. The nearly thirty-year history of the Web, until very recently, has been almost systematically narrated through Anglo-American eyes and voices. While this perspective does reflect a certain development and evolution of predominant multinational corporations, it does not fully recognize and convey the multiple local historical trajectories forged in other linguistic, cultural contexts. Perhaps more importantly, these gaps in the digital world narrative underrate the value and power of translation (although not necessarily multilingualism), rendering many of its interventions invisible. Translation and localization intermingle with single-language production within communicational spaces, and are not always easily discernible. While digital information and communication are increasingly universally global, they are also particularly and uniquely local.

The relevance of digital studies — an interdisciplinary field that has developed and matured notably over the past decade — to translation studies, and vice versa, is considerable. Both domains intrinsically deal with information and communication, using culturally informed language as a vehicle. In our contemporary era, both fields are also inextricably linked to technologies, which have transformed the ways information is conceptualized, produced, communicated, circulated, and consumed. While existing analytical and critical approaches to researching translation can arguably be extended and transposed to include elements of the digital context, there are also compelling and legitimate reasons for contextualizing and positioning translation wholly within the digital sphere. This article begins by highlighting the essential informational and communicational foundation of technology development that inevitably intertwined with the histories of translation technology. Like all areas related to information and communication (e. g. journalism), the transition from pre-digital to digital has entailed a transition from printed text and conventional forms of mass media to a 24/7 digital infrastructure. The "digital world" implies more than the technical and instrumental aspects and usage of technology, however; it equally involves our concrete human social engagement and interface with these tools and technologies, in an increasingly dynamic relationship that is symbiotic, dialectical, dialogical. The article then considers the social and cultural facets of the digital world, presenting some areas of research in digital studies with relevance to translation studies. While the ubiquity of today's digital communication (translation included) feels seamless, it is the resulting convergence of diverse historical paths of critical technologies.

2. Technology as a bridge concept-practice between translation and digital studies

2.1. Computing and information technologies

The digital world we experience and know today has its roots in mid-20th century computing technologies, conceptualized and developed on a foundation of binary mathematics and logic, that is to say with information able to be encoded, controlled, and transmitted in binary form on the basis

of the symbols 0 and 1. The evolution of these technologies is due to many converging factors and processes. They involve theoretical contexts (e.g. Alan Turing's 1936 paper on the "computing machine"; Norman Wiener's 1948 book *Cybernetics*; John von Neumann's "stored program in memory" concept in the late 1940s; etc.), electronic and microelectronic technologies and engineering, and information processing methods and models which then found their application in machines and systems designed to carry out complex calculations and textual word-processing. The growth of these machines and systems was inspired, encouraged, and supported by governmental agencies, scientists, researchers, and various commercial entities, and the subject of small- and large-scale projects. Early U.S. initiatives include ENIAC, UNIVAC, and the IBM 701 (Ceruzzi 2012). In Soviet Russia, the work of scientists Anatoly Kitov, Aleksei Lyapunov, and Sergei Sobolev contributed to ushering in cybernetics. Their article "The Main Features of Cybernetics", published in 1955 in the journal *Voprosi Filosophii* [Problems of Philosophy], was "at once an introduction, a reclamation, and a creative translation of Wiener's *Cybernetics*", and created a cybernetic terminology, in part by "retooling Wiener's conceptual vocabulary into a Soviet language of science" (Peters 2016b, 36; see also Malinovsky 2010). These origins, and the ongoing intertwined histories of hardware and software development underpin the history of the digital, manifest today in the recognition of its materiality and in material-centered approaches to interaction design (Wiberg 2018). Highlights of the early period of computing and information processing include the transition from mainframe computers to personal computers (PCs), the creation of machine and high-level languages for programming purposes, and the steady rise in computation capacity and velocity (Ceruzzi 2012; Malinovsky 2010; Peters 2016a; Price et al. 2013). These keystone points undergird the base of digital information technology. As the means to produce informational documentation proliferated, managing its production, modification, storage, and transmission became paramount (Buckland 2017). Goals also shifted abroad, with corporations like IBM broadening their areas of interest and influence to include foreign objectives. Destined for users in other languages, informational documentation was delegated and outsourced to others for multilingual translation, practices which would result in the "industrialization" of professional processes of modern translation production.

2.2. Early machine translation (MT) and computer-assisted translation (CAT) technologies

The digital age, and most notably the past few years, has witnessed an upsurge in the public use of MT (Google Translate, MS/Bing Translator, Yandex Translate, iFLYTEK Translator). The first half of the 20th century set the historical stage for these technologies as well. Like the history of computing and information technologies, the history of computational language processing and translation has its roots in earlier ideas and initiatives. In the 1930s interwar period, Georges Artsrouni and Petr Petrovitch Smirnov-Trojanskij filed patent applications for machines which, respectively, could encode,

store, search, and find words in different languages, and code and select words for interlingual translation (Poibeau 2017, 45—47). In 1949, Warren Weaver wrote his persuasive "Translation" memorandum proposing the use of computers to translate (Hutchins 2000; Poibeau 2017). The post-World War II and Cold War periods supported intense research on MT, particularly in methods of rule-based systems (RBMT). The 1966 release of the ALPAC [Automatic Language Processing Advisory Committee) Report, which cast doubt on the feasibility of fully automated high-quality MT (FAHQMT) and recommended research be applied to develop computer-assisted translation (CAT) tools, caused a notable drop in U.S. funding for MT research. It continued in other countries such as Canada and France, and in China, Japan, Soviet Union, and the early EU. During the 1980s, the volume of electronic documentation in source and target translation languages increased, inspiring research on text alignment (bitext, parallel corpora). The growing corpus of aligned multilingual documentation in turn served to develop and improve methods for example-based machine translation (EBMT) and for CAT-tool alignment, translation memory (TM), and terminology management technologies (Quah 2006). This body of research, and the ongoing large corporate documentation processes of multinational companies (IBM, Microsoft, Adobe, etc.), dovetailed with the emerging history of localization. Localization technologies included not only CAT functionalities but also the capacity to technically adjust software program source code files, in order to adapt user interface (UI), help files, manuals, and culturally-specific items like units of measurement and language scripts for non-native usage. By the early 1990s, commercialized CAT software (e.g. IBM Translation Manager, TRADOS MultiTerm / Translator's Workbench) was routinely used by technical translators commissioned as outsourced expertise by either direct clients or specialized language service providers (LSPs) for translation. CAT and localization software tools were thus subsumed within the digital technology landscape.

2.3. Networking and (tele)communication technologies

Computing and information technologies, and their concurrent first-generation translation technologies, constitute the first critical layer of the foundation of the future digital world. The second, and indeed decisive, layer comprises networking and (tele)communication technologies. From the 1960s to 1980s, DOS- and command-based computing and computers were mostly confined to military and academic programmers, specialists, and researchers sharing information openly among themselves. In the U.S., the implementation of networking technologies to link four university nodes of computers for communication purposes first came through the DARPA-sponsored ARPANET. Launched in 1969, it functioned according to a packet-switching, distributed computing logic that respected a standard protocol known as the Transmission Control Protocol/Internet Protocol (TCP/IP). This communication technology became the telecommunications backbone of the global Internet. While this technical core is part of today's internationally shared history of the Internet, many individual histories of network and Internet development beyond the U.S. and some European countries remain

unwritten, with studies in local languages not yet translated (Goggin and McLelland 2017). For instance, Peters puts forth that in 1959 Anatoly Kitov of Soviet Russia was likely the first "to propose a national computer network for civilian communication anywhere": EASU (*Ekonomicheskaya avtomatizirovannaya systema upravleniya*) [Economic Automatic Management Systems] (2016b, 90, 86; see Strukov 2014; Konradova and Schmidt 2014). Other projects were also proposed, such as OGAS (*Obschya-Gosudarstvennaya Avtomatizirovanaya Sistema*) [Nation-wide Automated Economics Control System] by Viktor Mikhailovich Glushkov.

A critical and rapid sequence of innovations in the West during the 1990s, however, set in motion the pattern of information and communication technology convergences that continues to this day. Four main areas are worth emphasizing: the orientation of technology towards users; the launch of the WWW; the promotion of standards and protocols; and the continuing capacity enhancement of ICT infrastructure. The act of replacing earlier command codes by a more user-friendly graphical user interface (GUI) in computer operating systems thrust computing into the broader user domain. The 1991 launch of the WWW by Tim Berners-Lee and CERN researchers transitioned this interface technology to the Internet, initiating market competition around Web browser, search engine, and online platform development. The Web environment introduced two main open protocols: HyperText Mark-up Language (HTML) and HyperText Transfer Protocol (HTTP). Together they constitute the technical mainstay by which users hyperlink and access uniquely identified digital resources (URI/URL) online among networked computers. Initiatives for a more uniform character encoding of the world's language scripts were also underway. Crucial both for the computational representation of natural language in binary code and for its compatible, interoperable, cross-platform processing and communication among different software applications and devices, it materialized in a first release of Unicode in 1991. Microsoft's launch of the first Unicode-enabled Office suite of applications in the year 2000 effectively ushered in a new period of networked communication that was both global and multilingual.

The bandwidth needed to transmit volumes of data through wired and wireless communication networks have increased exponentially, with digital access shifting from phone dial-up to DSL, cable, cell phone, satellite, and fiber connections. WiFi- and cellular- enabled mobile devices led to personal user flexibility and 24/7 real-time access to the always online Internet. These technologies enable and facilitate users' experience of the WWW, empowering them to create, share, modify, circulate, purchase, and sell content of all types. With the turn to Web 2.0 during the mid-2000s, online digital sites and platforms have become the primary source of information and communication. Successive Web technologies have transformed the digital milieu from static to dynamic, from the mere posting of digitized pages to a massive production of user-generated content (UGC) dependent on automated database and Cloud technologies. The pivotal turn to social networking and social media platforms has opened up a wide vista of possibilities for users: peer-to-peer file (text, video, audio, image) sharing, remix and mashup creation, self-publishing, collaborative networking, data aggregation and syndi-

cation, content curation, metadata tagging, archiving, geolocation, third-party application interfacing, streaming, and tools for producing podcasts, blogs and microblogs. Digital technology users of all types (individuals, businesses, governments, institutions, organizations) now network and communicate through the Internet. An ideology of openness (open source; open access) guides a significant portion of development (Russell 2014). Software — everything from utility apps to games — is in a continual state of flux, propelled by constant feedback loops between content creators and users. Globally, all of these digital technologies thrive in multiple language iterations and environments.

2.4. CAT, localization, and their convergence with MT technologies

Logically, if informational and user-generated content were now overwhelmingly digital, then translation technologies had to follow suit in order to be able to process this content. Like ICT and computing histories, the development and use of specialized CAT and localization tools (and subtitling) were initially constrained to narrow spheres of expertise: software programmers, language engineers, and technical translators. The historical trajectory of digital translation technologies can be usefully envisioned through 'generational' phases (Folaron, forthcoming 2019), particularly through the lens of localization history (Folaron 2006).

The first phase corresponds to the translation and localization of computer software programs. CAT tools are used to create and update terminology and TM databases, the latter relying in part on segmentation algorithms and techniques from earlier MT research. Localization tools apply additional algorithms able to separate a program's source code from its translatable text strings, and to decompile and recompile the program ('convert' between binary and high-level code) to verify functionality in translated, localized versions. Translation management systems (TMS) automate certain procedures of multilingual translation and localization project processes in the workflow, including those of linguistic and technical quality control. Given that a percentage of SL content is repeated in subsequent versions and updates, terms and phrases are kept as uniform as possible so as not to confuse end-users. Over time, and as the number of required target languages has risen, best practices for internationalization and globalization have been integrated into these workflows. (see also Dunne and Dunne 2011)

The second phase focuses on translation of material online for the Web. CAT and localization tool functionalities were expanded in order to handle website UI and content. They include not only the processing of HTML and other types of tagged content but also that of scripting languages inserted in the mark-up languages by Web programmers. The additional technology functionalities separate this Web 'code' from translatable segments so that translators will not delete the tags or cascading style sheet (CSS) and other presentation information needed for successful display of content on the Web. As in the case of general ICTs, the exchange and handling of content-data and its accessibility across diverse platforms and systems without corruption is aided by certain protocols and standards. Within the translation

digital environment, the termbase exchange (TBX), translation memory exchange (TMX), and XML localization interchange file format (XLIFF) protocols provide formats in which to save and share translation and localization data and metadata. As such, translator-users working with different tools can work and share collaboratively. From a cultural perspective, localization for the Web likewise technically adapts certain features: images, icons, currency and payment portals for e-commerce, customized news feeds, and many other dynamic processes.

The third phase follows the turn to Web 2.0, namely the translation and localization of social networking sites and platforms, Web-enabled mobile device apps and games, and the content generated from a number of programs, devices, and online portals and spaces used by consumer-users today. Many traditional CAT and localization functionalities have now merged into more comprehensive digital workspaces that are interactive, collaborative, and able to support an increasing number of world languages. In addition to existing commercial proprietary and open software, leading Internet technology companies like Google have introduced their own online portals and systems for translation. Digital ICTs and translation technologies are currently transitioning into another phase. The recent advances in deep learning and the voluminous data generated online in many languages have allowed MT researchers and developers to refine statistical and neural MT (SMT and NMT) methods and commercialize them through new programs and devices. Not only do LSPs and translation technology companies integrate them into translation management workflows; translators and the public at large use them as well. Automated translation output, including that of apps in real time, is informally or formally post-edited for different degrees of quality or accepted as is for communication purposes. Voice technology research is also underway, as seen by the initiatives to develop voice user interface (VUI) and to give translation capability to virtual digital assistants such as Amazon's Alexa.

3. Translation in concept and practice within a globalizing digital world

3.1. Defining the contemporary digital — concept and practice/s

The perfuse integration of digital technologies in society is undeniable. Moreover, use of the word "digital" in the media and in academic literature as a qualifier for "society" or "culture" implies the deeper connection of a socio-technical state or condition. Benjamin Peters argues for an enriched notion of the word "digital", one that moves beyond the strictly technical and computational realms to embrace the digitally social, in terms of a signifying system that can be interpreted symbolically, indexically, and referentially (2016a, 94). The social and cultural negotiation of meaning within digitally complex structures of communication is similarly highlighted in Felix Stalder's concept of the "digital condition", exemplary by its features of referentiality, communality, and algorithmicity (2018, 3). And as Vincent Miller points out, the material digitality of media has created a fundamentally different communication paradigm when compared to print and broadcast

media; through its binary numerical representation and form (0, 1), digital content (textual, audio, visual) is always inherently programmable, alterable, and subject to algorithmic manipulation by users for production, distribution, and consumption in ICT networks (2011, 15). As long advocated by Lev Manovich, these structural qualities are the reason why software itself, as an intrinsically mediating interface, must be factored into analyses of representation, communication, simulation, decision-making, memory, vision, writing, interaction, and control: it is "a layer that permeates all areas of contemporary societies" (2013, 15). The conflation of technical *and* social networks and digital (im)materiality yield the global digital networks of today. These networks are both global and local. As Manuel Castells observes, the effects of the processes occurring in this dominant digital social structure of global networks are ultimately felt in some way by all, and mirror or echo the social and cultural power dynamics in place (2004, 22). Still, as Adrian Athique asserts, even while "binary computing is the central technology defining social organization and personal interaction in the world today", human-centered problems, concerns, and solutions remain at the core of this technological innovation (2013, 263).

3.2. Digital studies and its approaches

One point of departure for conceptualizing a digital communication framework (translation an integral part) is by way of the principle of "Internet governance", defined by the World Summit on the Information Society (WSIS) as follows:

Internet governance is the development and application by governments, the private sector, and civil society, in their respective roles, of shared principles, norms, rules, decision-making procedures, and programmes that shape the evolution and use of the Internet. (Kurbalija 2016, 5)

The range of multiple stakeholders in the Internet spans a wide variety of actors, from the International Telecommunications Union (ITU), Internet Corporation for Assigned Names and Numbers (ICANN), World Trade Organization (WTO), and World Wide Web Consortium (W3C) to Internet Bandwidth Providers (IBPs), Internet Service Providers (ISPs), and users. These actors, and more, all contribute to the convergences, reconfigurations and power dynamics of the thousands of networks (private, local, regional, national, international) that appear and operate within spheres of communication worldwide. The centrality and trans-territorial aspect of this originally decentralized digital infrastructure (a combination of physical hardware, logical standards and protocols, software applications, UGC, and data) in human social interactions has led to a diverse array of analyses. These analyses interrogate the conceptual underpinnings and practices of accessibility, interoperability, digital rights and policies, privacy, security, and the regulation and ownership of data created through digital platforms, all in relation to digital identity and subjectivity, digital authorship, and digital citizenship (Hintz et al. 2019; Kurbalija 2016).

The humanities and social sciences at large, and from differing perspectives, have for centuries probed the existential, ontological, and epistemolog-

ical dimensions of human nature and the human condition, and these in relation to social organization and regulation, cultural production, commercial enterprise, and the notion of rights inscribed in political polities. The gradual penetration and embeddedness of computers, ICTs, Internet, and AI within these relations have engendered their digital dimensions, for instance as digital cultures of connectivity (van Dijck 2013), characterized as collaborative and participatory (Barney et al. 2016; Jenkins et al. 2016). Observations of communities of practice have led researchers to reconfigure disciplinary approaches and to embark on a more profound quest of understanding the subtler nuances of human-machine and machine-machine relations and symbiotic partnerships (e.g. robots). Via philosophy, Luciano Floridi posits human identity itself as one intrinsically informational, formulating a notion of humans as "inforgs" (2014, 96, 6). Through a cultural lens, Vito Campanelli speaks of "machinic subjectivity", one composed of human and machinical / technological components connected to and dependent on digital networks, with networking emerging as a cultural practice that multiplies a human subject's identities and roles (2010, 226). Here, decentralizing forces of heterogeneity compete with centralizing forces of homogeneity with repercussions on linguistic and cultural expression, creating a new vocabulary of Web aesthetics grounded in such increasingly routinized expressions as copy-paste and remix (2010, 21). Manovich, remarking on aesthetic diversity in the expanding context of automated and sophisticated AI practices, proposes a taxonomy of "cultural AI" whose production entails:

- *Selecting* content from larger collections (search, discovery, curation, recommendations, and filtering […])
- *Targeting* content (e.g. one-to-one marketing, behavioral targeting, market segmentation)
- *Assistance* in creation/editing of new content (…AI as 'participation' in content creation)
- *Fully autonomous* creation (e.g., AI writing news articles […], creating visualizations from datasets, designing websites, generating email responses, etc.) (2018, loc 80—81)

These reflections, coupled with the pursuit to understand and know the dynamics and tensions between human and machine-generated intelligences, technologies, and their ensuing forms, are a vital link to exploring the nuances that revolve around informational and communicational practices in the digital world today. The absorption of these practices within spheres conceived by social media relations has guided many in the social sciences to reconceptualize research procedures and reformulate tools and techniques in relation to their disciplinary subjects of inquiry (Ackland 2013). Two such examples are the emergence of digital sociologies (Daniels et al. 2017) and digital geographies (Ash et al. 2019). The digitization, digital creation, and coding of content have likewise sparked the need for digital tools and techniques apt for data mining, statistical analysis, visualization, ethnography (Gold and Klein 2016), and for computer-assisted textual and interpretation analysis (Rockwell and Sinclair 2016) in the digital humanities. Nearly every conceivable domain of study or practice is grappling with the

impact and effects of digital ICTs and the Internet: politics and government; health and social welfare; finance; economics and commerce; law and jurisprudence; education; academia; activism and human rights (see Schreibman et al. 2016; Chadwick and Howard 2009; Kroker and Kroker 2013; Gottlieb 2018; Ziccardi 2013). The quickly approaching Next Internet and "post-Internet society", with their more tightly integrated, converging technologies in the form of deep learning algorithms, the Internet of Things (IoT), inter-Cloud interoperability, big data analytics, and robotics (Mosco 2017) will bring other challenges and issues of accountability as users and devices move across not only the data thresholds between human and machine-generated content, but also those of languages and cultures.

3.3. Translation practices and communication in a digital world

The brief overview of translation and localization technologies provided earlier is indicative of the extent to which translation practices too have evolved in sync with the evolution of the digital world — technologically, technically, socially, and culturally. Hand-in-hand with mainstream technologies, translation technologies (including MT) are reconfiguring translation practices from within an expanding pool and wide diversity of actors, begging the question of who translates what, where, how, and why. Three broad dynamics among users are perceptible. In one, the computing, information, communication, content management, and Web-based collaborative technologies used by the general public are adopted and adapted by professionals in the translation sector for use as well. In another, more purpose-oriented technologies are specifically conceptualized and designed for professional translation work: CAT, localization, translation management, MT, and subtitling tools. In yet another, the concepts and designs for professional translation tools are repurposed for and adopted by the general public wishing to translate, organize, and carry out their own translation and localization projects, whether for low-resource languages, humanitarian causes, activism, or non-profit sectors (Folaron 2013). The initial contacts and encounters between translation and the digital world took shape within a restricted nucleus of language and technology expertise: early MT researchers and the industry stakeholders applying and superimposing the emerging digital technologies and associated production workflows onto traditional processes of human translation. Paradoxically, translation, experts, and the general public in the digital world now seem to have converged. And while target users of translated content may once have been an abstraction to the actors organizing translation and localization production cycles, they are now often concrete digital consumer-users interacting with and reacting to content producers, with community and crowdsourced participants involved as well. Indeed, many projects organized and managed by volunteers and communities have inverted the more traditional and established corporate paradigms. Moreover, analogous to other domains, professional and non-professional users alike involved in translation activities profit from Web 2.0 features; they transmit, exchange, and consult information with ease via portals, video and audio channels, webinars, blogs, digital publications, online

help, chatbot or live agent customer support, remote access technical assistance, knowledge bases, specific communities, etc. As the Internet user base expands, initiatives for social inclusion and accessibility for disabilities too have acquired more value. Translation activity has not only been subsumed in the digital world; it plays an active role in its formation, through the many voices and needs of its users.

3.4. Translation studies in digital context

Academic digital studies and translation studies share important points in common. They are interdisciplinary, with their affiliated research in the humanities and social sciences having grown "organically" out of already existing disciplines. They both share an intersectional relationship with technologies and communication. Like all disciplines, the positioning of the Internet/Web and ICTs as an integral component of research inquiry provokes the daunting question of how to scientifically investigate a complex socio-technical infrastructure whose technologies and effects so rapidly change. For digital studies (or Internet studies, Web studies, network studies) and similarly minded research organizations (Web Science Trust, Oxford Internet Institute, Berkman Klein Center for Internet & Society, Internet Interdisciplinary Institute), the approach is one of a network-principled, symbiotic relationship between the Web as structurally technical (with input from computer sciences, engineering, mathematics, data sciences, networking, artificial intelligence) and social (with input from communication and media studies, sociology, anthropology, economics, politics, law, philosophy, history, literary and cultural studies) (see Brügger and Milligan 2019).

For translation studies, approaches to the digital aspects of translation practices have been especially prolific in the research areas of audiovisual and multimedia translation, localization (software, Web, mobile apps, games), accessibility for disabilities, CAT tools, education and training, and in terminology, online interpreting, and corpus-, cognitive-, and process-oriented domains. Given the recent convergences in the industry and market, it is important to note the existing large body of research on MT, even though it has not played a major role traditionally in translation studies. Similar to other disciplines, the early literature (professional and academic) on translation in relation to ICTs and the Internet predominantly focuses on the instrumentality of the new technologies, i.e. with attention as to how they can best be used and incorporated within existing disciplinary objectives and methodologies. Over the past several years, digitally-focused work in translation studies has been gradually widening to embrace topics and issues that are of similar import and concern to digital studies. For instance, there is emphasis on user perspectives, usability, user-centered design, user preferences and priorities, reception and experience, ergonomics, and assessments of quality.

Digital aspects of translation practices have also been introduced within existing translation studies frameworks and paradigms. They include, for example, skopos-oriented approaches, descriptive translation studies re-

search, historical traditions (Sin-Wai 2015), genre and critical discourse analyses, translation and localization strategies, retranslation and reception, tool evaluation, and quality metrics. Equally present are sociologically oriented approaches to translation that analyze professional and non-professional social networks, participatory culture, interactivity, and crowdsourcing and collaborative practices (Jiménez-Crespo 2017). Social network analysis is used to quantitatively, qualitatively, and statistically measure diverse types of social relationships and structures through network and graph theories, for example, translator networks and digital publishing networks. Translated and localized UGC in open content online encyclopedias like Wikipedia, or on discussion lists and social media sites (see Desjardins 2017), are analyzed as well. Other works explore power dynamics (Baumgarten and Cornellà-Detrell 2019) and issues of trust, responsibility, ethics, and translation activity from the perspectives of theory (Pym 2004), digitality (Cronin 2013; Folaron 2010; Folaron 2012), post-industrial, techno-capitalism (Baumgarten and Cornellà-Detrell 2017), globalization (Cronin 2003), and sustainability (Cronin 2016).

Other areas of translation studies research reflect promising potential for linkages with digital studies research. One example regards the actions of stakeholders such as government, business, and civil society groups and individuals. Here, studies focus on translation, localization, and technology in relation to diverse types of policies and censorship (regulatory, social, political), the promotion of open Internet standards as a global, commonly-shared "public good" (Sandrini and García-González 2015), the use of digital media for political or social dissent and activism, and specific areas of human rights such as accessibility, vital information provision, and crisis intervention (Federici 2016). Studies also explore translation in terms of intellectual property law, digital rights, public copyright licenses (Creative Commons), and translated or localized content and metadata in relation to translator rights.

Another example of a relevant research area underscores the motivation for Internet diversity and global inclusivity. In this case, attempts to bridge the "digital divide" are not only technical and technological but also in line with aspirations for a fairer representation of linguistically and culturally diverse social groups, especially for low-resource, less-translated, and sign languages. International uniform character encoding (Unicode) for scripts and languages, user accessibility for transliteration, and the creation of international top-level domain names (IDN-enabled TLDs) are key technical issues. In this regard, localization activity is also critical, whether in the public (governmental, non-profit, NGO) or commercial private domain (see Dunne 2006; Esser et al. 2016; Jiménez-Crespo 2013; O'Hagan and Mangiron 2013; Roturier 2015), with its emphasis on linguistic, cultural, and technical quality adaptation to meet user needs.

Finally, a basic assumption in the digital context is the constant need for users of all kinds to retrain and self-learn. Digital education and training therefore play an important role in research, particularly on how Internet and ICTs (through social media, video-sharing platforms, VoIP, online recording) are used to teach and learn about translation, localization, interpre-

ting, and translation technology practices. Translators-as-users of technology also constitutes a critical research focus. Corpus-based (concept-mapping, terminology, specialized discourse, etc.) and cognitive approaches study not only the challenges posed by digital technologies but also the translator's cognitive space and human-machine interface (Kenny 2017; Jakobsen and Mesa-Lao 2017). Translators and users of translations are implicated in issues of quality with regard to MT output and post-editing as well (O'Brien et al. 2014), with a growing body of research focusing on how MT is used on the public Web.

4. Conclusion

Digital studies and translation studies research are potentially a complementary and natural fit. As sketched out above, many themes and issues are already held in common. They serve as potential bridges for engaging more dynamically with each other. There are distinct advantages for a more sustained encounter between them. For instance, almost all digital studies research is monolingually-focused (see Goggin and McLelland 2009; Gorham et al. 2014); a translation perspective could provide a distinct critical lens through which to consider all digital relations. Taking into account the translational layers of computing, ICT, and Internet-mediated communication would only enrich analyses of the multilingual digital world. By the same token, translation studies could benefit from the different methodologies being tested, tried, and used to research digital information and communication. The deterrents in digital research are multiple. Among them, the technological evolution and co-evolution of social and cultural practices are rapid; continual investment in new technologies is expensive; digital contexts and user practices are not easily defined and managed; huge data sets problematize "quality" and "value"; data types are complex; and researcher expectations do not necessarily coincide with practical realities (Price et al. 2013, 473—475). It is clear that in order for all disciplines to advance with digital research, collaboration on methods and resources across disciplinary lines and the inclusion of skills such as data mining, analytics, visualization, and statistics, need to occur. The development of sound and reliable research practices across linguistically and culturally diverse digital contexts becomes a basis on which to participate in the evolving digital world and respond to pressing questions. How do search engines and algorithms everywhere mediate user access to information and policy-making? What legal and ethical frameworks or guidelines can be created to deal with potential over-reliance on AI (see Broad 2018), machine learning, and commercialized digitally-mediated activities? What accountability should translation have, particularly if it is generated automatically by machine? How can we measure and share data more effectively? In what ways can we contribute to a fairer representation of digital citizenship? In order to participate in these global discussions on digitality, now and in the future, translation studies must position itself wholly within the digital sphere.

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КОММУНИКАЦИЯ В ЦИФРОВОМ МИРЕ И ПЕРЕВОД

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Цифровизация, внедрение новых информационных и коммуникационных технологий (ИКТ) и распространение Интернета раздвинули рамки традиционной коммуникации. Новый цифровой мир более не основан исключительно на техничном, утилитарном подходе к использованию технологий; он требует иных форм социального взаимодействия, которое также включает отношения между человеком и технологией. Сегодня цифровые исследования являются актуальным направлением теории перевода. Переводоведение, в свою очередь, также вносит вклад в развитие цифровых исследований. Оба направления неразрывно связаны с изучением языка, информации и коммуникации на основе технологий. В статье освещаются основные этапы развития ИКТ и

этапы развития и использования технологии в переводе. Конвергенция технологий привела к формированию современной цифровой инфраструктуры. В статье охарактеризованы социальные и культурные аспекты цифровизации, а также основные направления цифровых исследований, которые могут получить развитие в теории перевода. Современные аналитические и критические методы исследований процесса перевода инкорпорируют отдельные элементы современного цифрового контекста. Однако существуют веские причины полагать, что перевод может быть полностью контекстуализирован в более широком глобальном коммуникационном пространстве – цифровой среде.

Ключевые слова: *цифровой, перевод, технология, Интернет, коммуникация.*

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