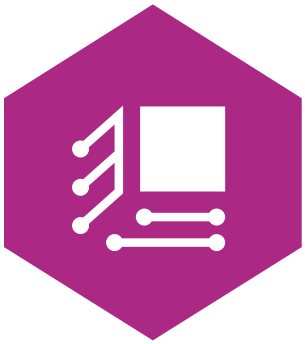

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Migrants' Use of Technologies: An Overview of Research Objects in the Field

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Abstract: Today's technologies have contributed strongly to the diversity and intensity of international migration, such that they may be considered an inherent aspect of migration. Migrants' use of technologies has received increasing attention from researchers. Moreover, because the current research on technology use by migrants comprises a variety of research objects, it is difficult to gain an overall understanding of the field. Based on a literature review, this article proposes an overview of the field of technologies and migration as a "mapping" of the main research objects examined in this field.

Keywords: Migrants, Technology, Research Object, Immigration

Introduction

International migration has steadily increased to become a significant trend in Western societies (Massey et al. 1993), stirring scientific interest. Currently, an estimated 215 million people are on the move (World Bank 2011), for an 11% rise in permanent immigration on average from 2002 to 2007 (Organization for Economic Cooperation and Development, OECD 2010). According to a United Nations (UN) estimate, the number of migrants was 154 million in 1990, 175 million in 2000, and 232 million in 2013 (UN 2013).

Aside from the steady rise in the numbers, contemporary international migration is also characterized by its diverse natures, forms, and trends (King 2012): 1) with respect to the country of destination, the shift from the traditional South–North direction to a South–South direction; 2) with respect to the migration process, the increasing trend toward onward migration and transit migration as alternatives to settled migration; and 3) the resultant polymorphous forms of migration that may combine national and international, temporary and permanent, or voluntary and forced migration. Consequently, the migrant profile has become more heterogeneous than ever before in terms of individual, cultural, social, and economic features (Caidi, Allard and Quirke 2010), including such new forms such as tourism migrants, highly skilled migrants, international student migrants, and more (King 2012). Fortunati, Pertierra and Vincent (2013) argues that this diversity can also be observed in the variety of migrants' plans, desires, and motivations for inclusion in the host society. In light of these research findings and advances, the borders between the migrant categories have become increasingly overlapped and blurred, and populations that are barely comparable risk being lumped together once again into an all-purpose category called "migrant," despite their widely disparate characteristics.

A third major shift in the migration pattern is technologization. It is well recognized that technologies have had a strong impact on migration trends (Codagnone and Kluzer 2011; Hamel 2009; Ros et al. 2007), to the point where certain authors consider technologies as a "new ecosystem in a migrant's life" (Fortunati et al. 2013), with impacts on the social, cultural, economic, political, and even religious spheres. Of all the available technologies, the Internet is far and away the most suitable for the migrant's purposes. It provides a space that mirrors the migratory situation, which is "transnational, interactive, and decentralized" (Georgiou 2002). As essential features of migration, technologies have also influenced our conception of migrants. According to Diminescu (2008), migrants have traditionally been perceived as uprooted individuals who must overcome a series of breaks with the past, which Sayad (1999) calls a "double absence." However, the new image of migrants is that of connected individuals; "connected

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migrant" (Diminescu 2008), whose mobilities are parts of one and the same movement. Several other terms have emerged in the literature to describe this change in the way we understand migrants in the digital age. For instance, Licoppe (2004) talks about a "connected presence" referring to the way in which geographically dispersed members of a family maintain ties with each other. Proulx (2008) uses the image of the "connected nomad," echoing the idea of connected mobility, and Hepp, Bozdag and Suna (2012) speak of the "mediatized migrant," whereby the migrant is connected to a larger media environment. These new and convergent perceptions of the migrant are made possible by technologies, which allow us to develop an "inclusive cosmopolitan point of view 'both here and there,' rather than an exclusive vision based on 'either… or'" (free translation, Nedelcu 2009). In the literature, migrants' use of technologies has steadily gained attention, and the advent of the Internet in the 1990s has generated a new research stream (Mattelart 2009). Rigoni (2010) denotes year 2000 as the pivotal time when studies on migrants' use of technologies began to proliferate in earnest, as migrants began acquiring technologies en masse, and particularly digital media, in order to communicate through the Internet (e.g., blogs, wikis, social networking sites, webzines, Internet radio, and Internet TV).

This study aims to contribute to a mapping of the migration and technologies research by describing and organizing the research objects considered in the literature. By "research objects" we mean real objects that have been problematized by researchers so that they may be examined in a scientific manner (Davallon 2004). In order to convert a real object into a research object, researchers must make choices and adopt perspectives on how the object is understood and organized. It is precisely this organization—which the researchers use as they conduct their research—that we address in this article. In other words, the objective of this article is to contribute to the understanding of the main research objects that have been constructed by researchers in the field of migration and technologies and to propose an organization that is both representative and useful. Accordingly, we conducted a literature review and used a descriptive approach to organize the identified research objects. We then added a participatory step involving experts in the field (see Methodology section). The result is a descriptive framework, the main contribution of which is to provide an overview of research objects in the field of migration and technologies.

Conceptual Framework

Before turning to the research objects, we begin by explaining how we understand the uses of technologies by migrants. Our theoretical comprehension of technology use by migrants is based on two concepts that appear to be central to the field of migration and technologies: mobility and the network.

Contemporary mobility

The field of migration can be considered at various scales, from narrow to broad. For example, Willis (2010) reminds us that daily travel, such as commuting and travelling to school, must be considered mobility, even though it receives less attention than migration. At the same time, migration within a country, which tends to be underrepresented in the empirical migration research, falls entirely within the field of migration (United Nations Development Programme, UNDP 2009), and apparently, within the field of international migration as well: "The internal/domestic migrant does not have to cross an international boundary, and movement back and forth to the place of origin might be easier, but often other dynamics of the move are quite similar" (Hiller and Franz 2004, 735). The contemporary conception of mobility appears to be based on the argument that all individuals are mobile, albeit in different ways, irrespective of their status (Willis 2010).

While recognizing the diversity and continuum of contemporary mobility, this article focuses on the sort of mobility that involves changing one's country of residence. In this perspective, the migrant is usually an immigrant. The migrant embodies the notion of ongoing mobility, whereas the immigrant embodies the notion of settling into a society other than the source society: "Unlike

the immigrant, who comes to stay, the migrant is usually thought of as someone in transit, who comes to work, travels across our territories and cities, and who goes back home or leaves for somewhere else" (Diminescu 2008, 556). Nevertheless, these are two facets of the same individual: the migrant, taken as a whole, whose trajectory can a priori include phases of mobility as well as settling. In other words, these phases can succeed each other and accumulate over a lifetime, depending on the individual trajectory. Moreover, as Diminescu (2008) contends, it would be inadvisable to distinguish between these types of migrants because each one can be characterized as a generic "mobile individual" under a fluid conception of migrant mobility.

The migrant network

The concept of network takes into account not only the migrants themselves, but also the dynamic relationships that they maintain within larger wholes (networks). Strictly speaking, a network is made up of a set of nodes that are interconnected by links. These links are continuously renewed through interactions between the individuals who are part of the network (Marin and Wellman 2011). Another feature of the network is the lack of clear delineation. Unlike the group, whose members are identified by enrolment or belonging, it is difficult to determine where a network begins and where it ends. The members of a group generally follow a common trajectory, whereas the members of a network tend to follow individual but interconnected trajectories.

The network concept can provide insight into the migration process because it allows combining two central aspects (Hily et al. 2004): 1) the multilayered contexts that characterize and give rise to migrant networks, which may differ in kind (political, economic, social, cultural) and scale (micro, meso, macro); and 2) the multidirectional interactions of migrants within these networks. Given that the network combines these multiple contexts and interactions, it is a relatively complete unit providing a rich set of variables that could potentially influence individual migration trajectories. In the sociology of migration, the network is considered one of the strongest explanatory factors for migration, and it is therefore a central concept (King 2012). Accordingly, previous migrants, current migrants, and non-migrants in both source and host countries are connected by numerous links related to family, friendship, or common origin (Massey et al. 1993). These links increase the probability of migrating insofar as they can reduce the risks and costs associated with migration and increase the expected benefits for the migrants. The migrant network constitutes a form of transnational social capital on which the migrant depends for finding a job in the host country (Massey et al. 1993), getting information, making contacts, obtaining financial support, and so on (King 2012). Moreover, technologies are particularly favorable for maintaining, strengthening, and expanding this migrant network, and in particular the Internet, which is itself a network (Georgiou 2002).

The network concept has the advantage of pushing certain conceptual boundaries in our understanding of migratory phenomena, such as the establishment of a dichotomy between the diaspora and the local population in the host society, creating separate quasi-autonomous and independent entities (Aksoy and Robins 2001). This vision of the diaspora as a community that is attached to the source society at the expense of the host society is certainly representative of a portion of the reality, but it does not account for interactions between migrants and the local population. On this point, the network concept is relevant in that it encompasses the diaspora networks as well as the migrant–local population networks. Thus, it precludes the dichotomy between the diaspora and the local population, yet allows considering their respective networks.

The concepts of mobility and the network are central to our descriptive framework of migrants' use of technologies (Figure 1). Note that these two concepts, by their nature, do not require a technology component. However, it is apparent that technologies constitute a significant characteristic of the contemporary evolution of these concepts within a reciprocally influential relationship.

Methodology

We drew our portrait of the research objects in the field of migration and technologies based on a literature review using the methodology proposed by Gall (2005) and Fraenkel and Wallen (2003). We began by formulating a research question for the literature review: "What research objects have been considered in the field of migration and technologies?" We then determined key words: technologies + migrants/migration + uses. We searched for key word combinations in general online databases (e.g., Google, Google Scholar) and specialized websites on this issue (e.g., "State of the art" section of the TIC-Migrations research group website). We initially used abstracts to select documents to ensure relevance to the research question, and we subsequently focused on content relevance and quality. We then read the documents and proceeded to a network document search to enrich the literature review. Accordingly, we selectively searched for documents that were cited in the retrieved documents and were relevant to the research question. In order to support our proposal, we focused on migrants' use of information and communication technologies (ICT), leaving aside the more economic, political, religious, and other uses of technology for the time being. We subsequently organized the retrieved documents according to the research objects that they addressed in order to obtain an initial version of the descriptive framework, presented below.

We then consulted experts in the field in order to improve the document search. Inspired by the Public Peer-Review and Interactive Public Discussion developed by Copernicus Publications, we built a list of eight researchers with expertise, based on their publications, in one or more areas of the descriptive framework on migrants' use of technologies. An email was sent to each researcher inviting them to comment on the descriptive framework via an online platform created by the authors for this purpose. This platform included a presentation of the framework and an assessment form containing questions such as "What aspects of the framework could be improved?"; "How?"; "Are some important aspects of migration and technologies missing?"; and "Where could they be situated in the framework?" Of the eight researchers targeted, six agreed to participate. Their comments were then either accepted in order to improve the framework or rejected with an accompanying justification. This innovative methodological step aimed to mutualize the scientific expertise on our study objective.

Results

We now present our descriptive framework, in both general terms and specific terms for each aspect. It is worth mentioning some preemptive warnings concerning the purpose and scope of this descriptive framework. First, it is not meant to be theoretical. In other words, the aim is not to theoretically elucidate the field of migration and technologies. More descriptive in scope, it represents an attempt to contribute to the understanding of the research objects that are currently considered in the field of migration and technologies and to propose an organization that is both representative and practical. Moreover, in order to support our proposal, we focused the literature view on 1) the traditional perspective of international migration, where the direction of movement is from countries in the South to those in the North; and 2) migrants' "social" use of technologies, for information and communication purposes (i.e., ICT), leaving aside more economic (e.g., e-banking, Nitsure 2003), political (e.g., Nedelcu 2009), and other uses for the time being. Furthermore, we opted not to distinguish between the types of technologies considered (e.g., cell phone, laptop), because rather than used in isolation, different technologies are combined to differing degrees in the migration experience. The "mediatized migrant" (Hepp et al. 2012) has evolved within a complex system of combined technologies (Fortunati et al. 2013), which precludes partitioning migrants' use of technologies into the use of specific devices.

General presentation of the descriptive framework

As shown in Figure 1, our literature review culminated in the development of a descriptive framework organized around two main themes according to a previously established distinction in the literature between technology use as a means of migration and as an object of migration (Collin 2012). The first theme represents the research objects related to technology use as a migration means. The research objects belonging to this theme include migrants' use of technologies to facilitate their migration, including the pre- and post-migration phases: technology use to prepare for migration in the pre-migration phase; and to maintain links with people back home and integrate into the host society in the post-migration phase. These two sub-themes are distinguished in Figure 1 in order to better delineate them, although they are considered cumulative and reciprocal (Codagnone et al. 2011; Proulx 2008). The second theme represents the research objects related to technology use by migrants as an object of migration. The research objects classified into this second theme include the ways that migrants appropriate technologies and their varying degrees of technological mastery. Here, two particular sub-themes emerge from the literature review: the evolution of technology use during the migration process, and the variations of migrants' use of technologies to connect with each other and with the host society. Although less explored than technology as a migration means (Theme 1), the relevance of technology as a migration object (Theme 2) lies in the fact that the relationships that migrants have with technologies necessarily influence their ability to use them for other purposes. In other words, a migrant would be more or less apt to use technologies to prepare for the migration, keep in touch with people back home, and integrate into the host society depending on the degree of appropriation and mastery of these technologies, or tech skills. Thus, technology as a migration means cannot be fully understood unless technology as a migration object is also taken into account. These two themes are therefore two sides of the same coin, and they make a complementary contribution to the field of migration and technologies.

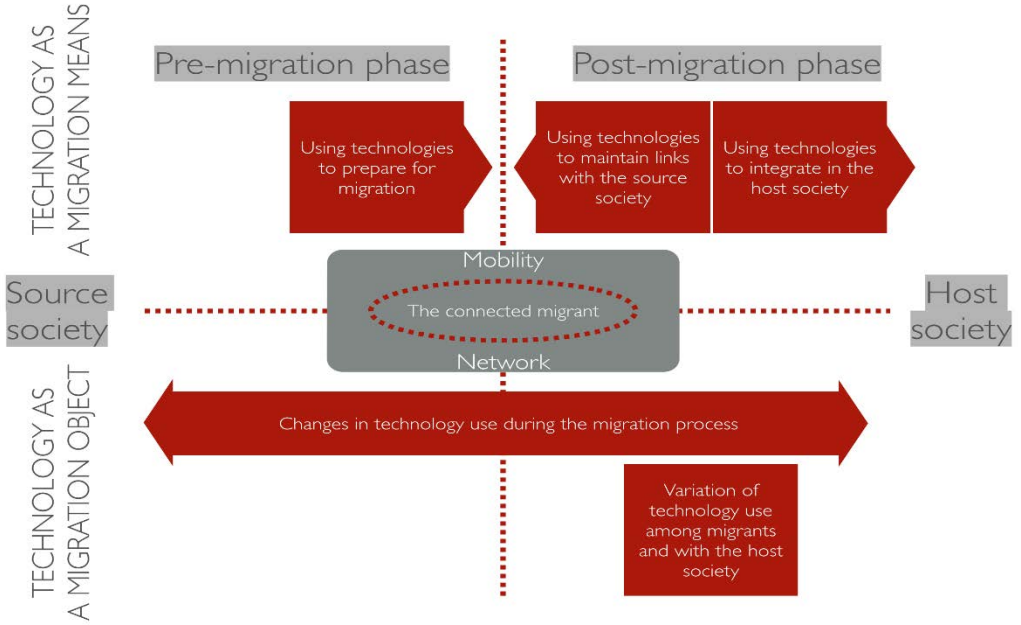

Figure 1: Descriptive framework of research objects in the field of migration and technologies

The organization of a descriptive framework of the two main themes and their sub-themes is not tantamount to an accurate representation of migrants' actual use of technologies. However, it allows ascribing useful distinctions in order to reach a broader understanding of the research

objects considered in the literature. We also propose that insight into migrants' use of technologies can gain from a more holistic comprehension.

From a theoretical perspective, the "connected migrant" (Diminescu 2008) (see Context section) appears to be a central figure in the reviewed studies, which explains why we have situated this individual at the center of the descriptive framework. As mentioned above (see Conceptual Framework section), we attribute this new conception of the migrant to two closely intertwined phenomena, the contemporary evolution of which has been strongly influenced by technologies: 1) ever-increasing mobility, and 2) the pivotal role of networks in supporting and strengthening migrants' ties. These two factors are featured in the descriptive framework alongside the concept of the connected migrant. Figure 1 presents our descriptive framework of the research objects considered in the field of migration and technologies.

The remainder of this article describes these research objects and provides illustrations from the empirical literature.

Theme 1 (Upper half of the figure): technology as a migration means

The upper half of Figure 1 includes migrants' use of technologies to prepare for migration, maintain links with the source society, and integrate into the host society. However, we first discuss the concepts of bonding social capital and bridging social capital, which in the literature refer to the crosscutting aspects of technology as a migration means.

Bonding social capital and bridging social capital: cross-cutting aspects of technology as a migration means.

Bridging social capital and bonding social capital are two aspects that have been frequently examined in relation to migration and technologies, although their acceptance is not universal. The two concepts are based on the idea of social capital, defined as "the sum of the resources, actual or virtual, that accrue to an individual or a group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition" (Bourdieu and Wacquant 1992). Applying this notion to the case of migrants, Putnam (2000) developed the ideas of bonding social capital and bridging social capital, which are very similar to the strong ties and weak ties in Granovetter's (1973) social network theory. In this distinction, strong ties refer to the relationships within a social network of small, well-defined groups (e.g., family, friends), which are usually more emotionally intense, intimate, and identity-based. Weak ties refer to relationships within a wider social network (i.e., in the sense of acquaintanceship), which are usually more instrumental. Although less committed than strong ties, weak ties nevertheless constitute essential social capital that enables individuals to gain access to resources that strong ties may not provide.

Given the proximity and the complementary explanation of bonding–bridging social capital and strong–weak ties, the literature on migration and technologies tends to compound them. On the one hand, bonding social capital and strong ties refer to technology uses that allow maintaining ties with family and friends, particularly those back home, as well as intensifying them (Proulx 2008). On the other hand, bridging social capital and weak ties are more often used to describe migrants' use of technologies to "open up new perspectives" (Proulx 2008, 158). These are typical uses by migrants to build and maintain ties with their diaspora or to integrate into the host society. Bonding social capital and bridging social capital can serve during both the pre-and post-migration phase, and in the post-migration phase, to remain in contact with the source society as well as to integrate into the host society. These are therefore crosscutting concepts in migrants' use of technology as a migration means.

In Theme 1, pre-migration technology uses prepare migrants for the migration process, whereas in the post-migration phase, it allows migrants to maintain ties with the source society and to integrate into the host society. We may now consider these sub-themes.

The role of technologies in preparing for migration

The top left part of the figure represents the pre-migration phase (Fig. 1, top left). It includes the various research objects drawn from the literature review and grouped under a common idea: migrants' use of technologies to prepare for migration. Thus, with respect to the source society, in the pre-migration phase, technologies offer two opportunities to future migrants, as noted in the reviewed studies.

The aspiration-increasing effect

First, because international mobility is on the rise, future migrants use technologies meaningfully to connect with other migrants in their family and in social networks (Guilmoto and Sandron 2001). According to Massey (1990), non-migrants and migrants from the same ethnic group are connected "through the bonds of kinship, friendship and shared community origin". Similarly, the aspiration to migrate is greater "when a prospective migrant has a personal tie to someone with prior experience in a particular destination area" (Massey et al. 1993). De Haas (2010) perceptively adds that inequalities, especially income inequalities, between migrants and non-migrants drive non-migrants to migrate in turn. Therefore, the inequalities between migrants and non-migrants—which are also created by the migration process itself—constitute an aspect to consider in the decision to migrate. Social network websites, emails, and international calling cards considerably strengthen interconnections within migrant networks (Ros 2010). This suggests that future migrants have preconceptions about migration, which are accurate and detailed to the extent that future migrants maintain contact with other migrants. In other words, technologies increase future migrants' awareness of migration opportunities through peer experiences, which de Haas (2010) calls the "aspiration-increasing effect."

The facilitating effect

Second, the reviewed studies note that technologies can also play a more instrumental role, by facilitating the migration process: once an individual opts for migration, technologies can be used for planning. For example, future migrants can use technologies to look for a job and an apartment, buy airplane tickets, and find out about the host society's culture and government (Caidi et al. 2010; Gonzalez Martinez 2010). The empirical study by Hiller and Franz (2004) is one of the rare studies, to our knowledge, to consider technology use from the standpoint of the future migrant. They observed that the future migrant "is essentially information-seeking and finds the computer enormously useful in obtaining information, making contacts and obtaining assistance and advice about the possible move" (Hiller and Franz 2004). From this perspective, it is likely that the conclusion drawn by Guilmoto and Sandron (2001) that "the decision to migrate […] is often made without precise knowledge of the living conditions and employment prospects in the destination area" would be less true today due to the impact of technologies, and even more so considering that tomorrow's migrants will use a greater variety of new technologies and media to access both formal information sources such as government websites and informal sources such as the blog sites of family and friends (Caidi et al. 2010; Fortunati et al. 2013).

The role of technologies in maintaining ties with the source society

In counterpart to the post-migration phase, the top right of the figure (Fig. 1, top right) represents migrants' use of technologies to maintain ties with the source society. According to the research objects identified in the literature review, migrants maintain these ties in two different ways: by staying in contact with members of the source society via communication technologies, and by consuming media that originate from the source society.

Communication with members of the source society

We begin with a reminder that, in their capacity as communication devices, technologies can be used for two main purposes (Cardon et al. 2005): 1) to enrich daily interactions by adding to face-to-face meetings, thereby "interlacing" contacts (well-illustrated by technology use by teenagers); and 2) to substitute for face-to-face interactions, especially when regular contact is no longer possible. Migrants' use of technologies to maintain ties with family and friends falls more into the second purpose category. As the potential of technologies continues to expand, social network websites, email, international calling cards, and Internet phone services (e.g., Skype) become tools that can compensate for the lost personal contacts that were available in the pre-migration phase (Ros 2010). On this topic, Licoppe (2002, 2004) distinguishes between two types of interactions that enable maintaining ties with distant family and friends. The first type, conversational interaction, occurs less frequently but allows lengthier interactions via synchronous technologies (e.g., telephone, Skype). The longer time lets speakers build a shared store of experience that strengthens the relationship, despite the separating distance. The second type, connected interaction, occurs via asynchronous channels (e.g., email, texting), allowing shorter but more frequent communications. The aim is less to share information than to maintain a presence. Migrants can combine the two interaction types and their associated technologies to manage their relationships and maintain close ties, particularly in the source society. Aside from this distinction, some authors have also observed that migrants use a variety of technologies depending on what sort of people they are connecting with in the source society. For example, two recent studies in newly arrived immigrant youth (Collin, Saffari and Kamta submitted; Gallant and Friche 2012) show that synchronous communication (using Skype or cell phones) is used more specifically to connect with family in the source country, whereas asynchronous technologies (social networking sites, email, chat) are used more for connecting with friends.

Consumption of source society media

Related to culture, migrants' media consumption in order to maintain ties with the source society is a second technology use identified in the literature. On this topic, Scopsi (2006) notes that media massification has helped migrants retain their identity even when they are far from home. The Internet has proven especially useful because it lets migrants follow the news back home and keep up with the cultural scene. Media consumption may be combined with—or substituted for—other more traditional media (e.g., newspapers, television), and for less cost. Therefore, online television shows, radio programs, informative webzines, blogs, and social networking sites are mushrooming as additional ways to retain membership in the source country's culture, and hence maintain one's ethnocultural identity (Caidi et al. 2010). Rigoni (2010) explains that the advent of web 2.0 (social networks, participatory tools such as blogs and wikis) in 2000 was a turning point in migrants' overall media use, particularly in order to connect with the source society.

The role of technologies in integrating into the host society

With respect to research objects that examine the host society in the post-migration phase, technologies can provide a means of inclusion. Like the information society (Castells 1998) in which they settle, migrants, and more broadly speaking migration, cannot be addressed without accounting for the technology dimension along with the traditionally studied professional, social, and economic dimensions.

Promoting the inclusion of migrants

In their empirical investigation of various virtual societies in ethnic minorities in Europe, Diminescu, Jacomy and Renault (2010) distinguish two types of technology initiatives designed to

promote the inclusion of migrants: 1) those initiated by the host country, particularly official public institutions, and apparently limited to a purely instrumental level (vertical inclusion: top-down); and 2) those based more on migrants' informal social networks (horizontal diffusion), which appeared to be relatively effective in promoting inclusion, and which migrants tend to use (Caidi et al. 2010; Dayton-Johnson et al. 2007). Haché et al. (2009), in a study of 29 European initiatives, provides some concrete examples of technology uses that facilitate the socioeconomic integration of migrants. These uses are classified under three main themes: education (e.g., learning the host language), labor and economic participation (e.g., training and job search), and civil society (e.g., social engagement).

Information search practices of migrants

Finding information is a key factor for migrant inclusion. It confers the power to make informed decisions in an unfamiliar environment (Caidi and Allard 2005; Caidi, Allard and Dechief 2008). Over time, and depending on the needs that must be met (Caidi et al. 2005; Papillon 2002), migrants must access certain types of vital information. Moreover, this information tends to be more individualized and diversified than collective. Savolainen (2008), in studies on everyday information practices, distinguishes between two types of information searches: "orienting information seeking" and "practical information seeking." The first type aims to manage daily life. It is used to make sense of the new environment, including its lifestyles, culture, religion, and politics, among others. The second type aims to resolve specific problems such as those related to language, employment, banking, health, and so on (Caidi et al. 2010). Caidi et al. (2010) also contend that in order to find useful information, migrants use a combination of four pathways: their social networks, ICT, ethnic media (mainly to maintain ties with the source society or to retain their ethnocultural identity), and formal sources (mentioned above in the paragraph on "promoting the inclusion of migrants"). Furthermore, even in the absence of a direct connection with the host society, migrants can get informal access to the information they need with the assistance of gatekeepers: resource persons in the network who can speak their language as well as the language of the host country, and who are usually tech-savvy. Informal networks as well as family and friends are the preferred sources of information, particularly for those who place great value on trust (Caidi et al. 2010). Thus, computers, the Internet, mobile phones, radio, and television are important sources of information for migrants. In cultural terms, they provide access to online news about the host country in languages other than the official languages of the host country.

Theme 2 (Lower half of the figure): technologies as a migration object

Mastering technologies is a prerequisite if migrants wish to fully integrate and actively participate in the host society (Codagnone et al. 2011). In other words, because technologies are increasingly present in Western societies, technological inclusion is as important as the social, political, and economic inclusion that are traditionally reported in the scientific literature (Kabbar and Crump 2006). Based on this support for the relevance of studies on technology as a migration object, the research objects can be classified into two complementary categories. Some of these relate to changes in migrants' use of technologies during the migration process. The issue is therefore to gain a broader understanding of whether and how migrants' use of technologies evolves from the pre- to post-migration phase. Other research objects relate more to variations in the migrants' use of technologies to connect with the host society. These studies have aimed to identify potential variations in technology use along with the associated factors, and have either explicitly or implicitly addressed the notion of the digital gap (see Hargittai and Hsieh 2013). In both cases, we should point out that the degree of technology appropriation by migrants prior to migration (i.e., when they are not yet migrants) would influence their later use of technologies once they migrate. Accordingly, the economic development (e.g., Chinn and Fairlie 2006; Hanafizadeh, Saghaei and Hanafizadeh 2009), rights and freedoms (e.g., Shirazi, Ngwenyama and Morawczynski 2008), and

cultural (Kharbeche 2006; Agboton 2006) and social climate (e.g., Tripp 2011; Benitez 2006) of the source society—factors that were neglected in the reviewed studies—should be considered in examinations of technology use as a migration object.

Changes in migrants' use of technologies along the migration process

Hiller and Franz (2004) aptly represent this research category, although they address national migration by Canadians. Using 350 interviews and an analysis of diasporic websites, these authors identified three phases of the migration process (pre-migrant, post-migrant, and settled migrant), in which four types of ICT (search tools, email, chat, and a bulletin board system) were used by migrants for different purposes. Concentrating on the post-migration phase, Komito and Bates (2011) adopted a similar perspective to follow 65 migrants to Ireland from the Philippines and Poland. They found that if ties were maintained with family and friends across time and space using "active" channels (Skype, email) and "regulatory" channels (social networking), the migrants visited fewer news websites from the source country than the host society over the first five years. Caidi et al. (2008) also found changes in migrants' ways of finding information. In the "survival" phase of the first weeks in the host society, migrants more often looked for practical information that they could use immediately, such as city directions and transport, free language classes, and the like. They searched for recreational activities only in later phases. A study by Collin, Kamta and Ndimubandi (submitted) in 236 elementary and high school students who had recently immigrated to the province of Quebec, Canada aimed to compare technology uses between the pre- and post-migration phases. It was found that in the pre-migration phase, the students already used technologies several times a week (4.5 technologies per week on average), but that these uses changed somewhat when they arrived in Quebec, mainly in the increased number of technology types (and in particular the Internet) per week (4.9 on average). In addition, Veenhof and Hogan (2008) reported that more migrants than Canadian citizens (55.9% versus 42.6%) used the Internet to connect with family and friends, echoing the conclusions by Codagnone et al. (2011) in Europe. These studies have offered many explanations for this pattern: the migrant population would be younger and better educated than the local population, and therefore more familiar with technologies. They would also have greater need for technologies, both to maintain ties with their source society and to integrate into the host society (see the corresponding sub-themes under Theme 1).

Variations in migrants' use of technologies to connect with each other and with the host society

Variations in migrants' use of technologies to connect with each other and with the host society appear to have received less attention in the field of migration and technologies. More precisely, they all address the theme of the digital gap, either explicitly or implicitly, although this theme is neither problematized nor examined. Thus, Caidi et al. (2010), in their review of the literature on migrants' information technology practices, discuss issues of information poverty (Chatman 1996) in relation to migration, and Vertovec (2009, 161) observes that transnational migrants' use of technologies is hindered by inequalities of access: "There are the haves and have-nots, the transnationally well-connected and the less connected". Furthermore, Ros et al. (2007) point out that technologies can be a double-edged sword: they can facilitate migrant inclusion or result in their exclusion, depending on technology skill levels. Aside from these findings, few studies have addressed the digital gap in migrant populations. This can be explained by the fact that the topic relates more to the sociology of uses than the sociology of migration as such. That said, the digital gap is not specific to migrant populations. However, it remains a relevant issue to explore in migration studies insofar as it would undoubtedly influence the quality of the migration experience as well as migrants' inclusion (Ros et al. 2007). Thus, the above-mentioned study by Collin, Kamta and Ndimubandi (submitted) shows that the number of technologies used by immigrant school

children is significantly explained by their school's degree of disadvantagement and their parents' professional status. Another study by Collin et al. (for publication in 2015) indicates that technology uses by Mexican and Guatemalan seasonal migrant workers varied depending on their education level and country of origin. More precisely, Mexican workers who had graduated with a high school or college diploma used a wider variety of technologies. If the use of technologies by migrants to connect with each other and with the host society has been understudied in the literature, the impacts on the quality of the migration experience and migrant inclusion have been—a fortiori—even less studied.

Conclusion and avenues for further research

The field of migration and technologies is highly complex, and it draws on a diversity of research objects. Our descriptive framework aims to contribute to the understanding of the main research objects that have been considered by researchers in the field of migration and technologies, and to propose an organization that is both representative and operational. For the sake of feasibility, we concentrated on the "social" uses of technologies by migrants, meaning information and communications technologies (ICT). Accordingly, we divided the research objects up into two complementary themes. The first theme included technology as a migration means, divided into three sub-themes: using technologies to prepare for migration; using technologies to maintain links with the source society, and using technologies to integrate into the host society. The second theme included technology as a migration object, divided into two sub-themes: the evolution of technology use during the migration process, and variations in technology use by migrants to connect with each other and with the host society. The first theme appears to have been received substantially more coverage in the literature compared to the second theme. In particular, the sub-theme using technologies to maintain links with the source society appears to have benefited from greater knowledge advances compared to the other sub-themes. We might also wonder whether researchers may have overconcentrated on this research object to the detriment of others, as Mattelart (2009) suggests: "Tending to concentrate on the connections that the Internet helps establish between migrants and their country of origin, studies on ICT and migration have barely examined how migrants balance the frequency of visits to the home country with visits to the country of residence (to name just one!)" (free translation). Furthermore, this overconcentration, which is based on the maintenance of the initial identity, may cause researchers to neglect the cultural and identity changes that act upon migrants once they enter the host society. In addition, upon completion of the literature review of the research objects in the field of migration and technologies, the work appears to be imbalanced. Some research objects have received much attention, whereas others have received too little, even though they are equally legitimate. This could probably be explained by the recentness of this research area and its unfinished structure. Hence, future studies would gain from adopting a more holistic view of migrants' use of technologies, possibly by combining a number of research objects instead of more narrowly focusing on just one or two. Longitudinal studies that incorporate pre- and post-migration phases would be particularly useful, as they would provide a broader perspective on migrants' use of technologies.

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