

Introduction: Telework in the 21st century – an evolutionary perspective

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1. INTRODUCTION

In the summer of 2013 Yahoo's Chief Executive Officer (CEO), Marissa Mayer, gave a public interview at the Twelfth Annual Templeton Lecture for Economic Liberty and Constitution¹ where she explained why the company decided to abandon its popular 'work from home' policy:

I had heard from lots of people all over the company, who said 'Hey, the fact that our team is distributed, or the fact that we sometimes have to stop and coordinate with someone from home, causes drag. And so we said that, as a general principle . . . , we want people in the office.

Mayer follows this statement later with another related point on the topic:

By the way, it has also gotten taken to sort of hyperbole, in terms of, like, 'Wait! Are you not even allowed to type an e-mail when you are not in the office?' – No, obviously we all do that, we all work from home all the time. But during normal business hours, generally, we want people to be there.

These two statements describe very succinctly the inner ambiguity of a fast-growing multidimensional phenomenon. The idea of performing work from home with the help of information and communication technologies (ICTs) originated in the US State of California in the mid-1970s (Nilles 1975) and was promoted by California-based companies such as Yahoo in the 1980s under the term telecommuting, which later came to be known as telework. Three decades later, markets have become flooded with cheaper, smaller and increasingly connected devices, so-named new ICTs such as smartphones and tablet computers, accompanied by a vast dispersion of the Internet and the World Wide Web. These devices are now enabling employees to stay connected to their colleagues from any place at any time. Yet, conceptually the two forms of work, telework as described in the first statement, and the use of new ICTs as described in the second, are typically

not studied or debated in relation to each other. The definition of work from home thus becomes blurred and confusing. Mayer's comments also highlight the changing roles of telework and the use of new ICTs. In recent years, traditional telework has faced stagnation (Hjorthol 2006) or even decline (Brenke 2014), while the spread of new ICTs has accelerated, especially in emerging economies (for example, ITU 2014). Furthermore, there is a need to understand the effects of both traditional telework and work with new ICTs on, for example, on both working life and productivity.

The aim of this volume is to synthesize the analyses of experts from Argentina, Brazil, India, Japan, the United States, and ten countries from the European Union (Belgium, Finland, France, Germany, Hungary, Italy, the Netherlands, Spain, Sweden and the United Kingdom²) regarding telework – how it has developed, its various forms and its effects – in their respective countries. These experts were asked to identify, compile and analyse existing information from country-level datasets, research studies and other sources in their countries. For this purpose, telework was broadly defined as using ICTs, such as smartphones, tablets, laptops and/or desktop computers, to perform work from outside the employer's premises. The experts' country reports reviewed and analysed large-scale surveys and company case studies regarding the incidence of telework, as well as its effects on hours of work and work schedules, individual and organizational performance, work–life balance, and occupational health and well-being. These country reports also included information on policy responses by governments, workers' and employers' organizations, and private companies regarding the use of telework. All of this information was collected, carefully compiled and summarized for this volume.

To study telework in the context of new ICTs, we need both a broad understanding of the phenomenon's history and a solid conceptual basis that embraces a wide range of potential research approaches and dimensions on this topic. The next section of this introductory chapter focuses on literature about telework and ICTs from its origins in the 1970s up to the most recent publications. The findings of this analysis then lead to the creation of a conceptual framework of telework in section 3. Section 4 reviews the effects of telework using new ICTs on working conditions, productivity and related issues. The methodology and main data sources used by the country experts to analyse telework and its effects in their respective countries are reviewed in section 5. Section 6 concludes.

2. THE THREE GENERATIONS OF TELEWORK

The conceptual separation of telework and new ICTs that was mentioned in the introductory section is mirrored in the vast amount of scholarly work on these topics. First, many scholars describe telework as a predecessor or an early form of work with ICTs (for example Bailey and Kurland 2002). Highly flexible cloud-based work³ accessible through smartphones and tablets from almost anywhere on the planet makes telework in the terms of its original understanding sound old fashioned. It is associated with stationary computers, fixed telephones and fax machines – nothing like the devices used by the ‘digital nomads’ of today and tomorrow (Makimoto and Manners 1997). The concept of telework is thus either considered to be antiquated (Anderson et al. 2007; Towers et al. 2006) or not even taken into account (Bittman et al. 2009; Cascio 2000; Golden and Geisler 2007; Heijstra and Rafnsdottir 2010; Jones et al. 2008; Tu et al. 2005; Wajcman et al. 2008).

In a second way, telework is inserted in a typological order with other work arrangements. Here the emphasis is less on history and more on variety. Telework is perceived as one of many coexisting modes of work such as traditional office work, mobile work or virtual work (Di Martino and Wirth 1990; Golden and Fromen 2011; Golden et al. 2008; Hill et al. 2001, 2003, 2010; Kurland and Bailey 1999) or as one type of many flexible work schedules together with part-time work, flexi-time⁴ and others (Kossek and Michel 2011; Stavrou 2005; Stavrou and Kilaniotis 2010). Either way, historically or typologically, scholars tend to describe telework separately from the use of new ICTs. As we discuss in more detail in section 3, these approaches tend to neglect the definitional potential of telework and limit the possibilities of studying its development over time.

In contrast to the perceptions of telework outlined above, Craipeau (2010) offers a more flexible approach. She describes telework as undergoing an evolutionary process. According to Craipeau, ICTs and their advancement are the main contributors to this development. They enable the transformation of what we generally perceive as office work. Personal computers and telephones initiated the relocation of one part of traditional office work away from the employer’s premises and closer to the employees’ homes. With the dispersion of mobile devices such as laptops and mobile phones, this part lost its stationary grounds and entered places such as trains, subways and cafés. The dispersion of Internet access then virtualized work and made it accessible on smaller and more powerful devices such as smartphones and tablets. This part of office work is what Craipeau calls *télétravail*. Building on Craipeau’s evolutionary perspective, we develop our own chronicle of telework’s evolution over three generations: home office, mobile office and virtual office.

2.1 The First Generation of Telework: The Home Office

The term telework can be traced back to Jack Nilles's analysis of the growing information industry in the US state of California and of what the author calls the telecommuting network (Nilles 1975). As the term indicates, the main focus lies on the use of telecommunications for the reduction of commuting time, which was and remains a major issue in the United States, especially in large metropolitan areas such as Los Angeles. The workplace was relocated entirely or partially away from the employer's premises and close to or into the employee's home to avoid the costly and long hours of commuting from home to work and vice versa. New technologies – namely, the coupling of computers and telecommunication tools – enabled such forms of decentralization. The largest scales of cost reduction were created for the growing information industry, owing to its heavy reliance on work in front of computer screens and monitors: 'We anticipate increased use of telecommunications by information industry organizations, particularly of teleconferences supplemented by periodic face-to-face meetings' (Nilles 1975, p. 1143).

In later publications, Nilles (1988) subordinates the term telecommuting to the more general term telework, in order to include all types of work-related activities away from the employer's premises that are supported by ICTs. Here again it is the advancement of technology that transforms the mode of work. Teleconferences, electronic mail and the fast dispersion of the Internet and the World Wide Web began to crowd out traditional means of correspondence in the late 1980s and early 1990s, and enlarged the set of cost-reduction possibilities for organizations (Wellman et al. 1996). In the vein of this chronicle, it thus makes sense to mention the evolution from the term telecommuting to the term telework, despite the two terms mostly being treated as synonyms by contemporary scholars.⁵

Nilles's conceptual and visionary work on what we call first-generation telework in this review inspired many other authors, scientists and politicians to glorify its seemingly infinite possibilities. In the chapter 'the electronic cottage' of Alvin Toffler's *The Third Wave* (1980), these hopes and dreams are densely formulated in a luminous manner: 'the new production system could shift literally millions of jobs out of the factories and offices into . . . where they came from originally: the home' (Toffler 1980, p. 210).

For Toffler, the potential of telework expanded far beyond the mere reduction of commuting time and costs. The author's predictions included greater community stability, a decline in pollution, flourishing new industries and entirely new family structures. All these hopeful visions were nourished by many early studies that underpinned the rising success of telework in these areas (Clutterbuck 1985; Curson 1986; Daniels 1987; Kraut

1989; Nilles 1988; Olson 1982). As a result, telework increased slowly but steadily. First, new organizational telework forms such as satellite centres emerged (Di Martino and Wirth 1990; Handy and Mokhtarian 1995). Then work away from the employer's premises became more sophisticated, causing telework to evolve and spread out to other industries and countries (Haddon and Lewis 1994). Finally, academic debate caught up with the rising new mode of work, and its advantages and disadvantages were discussed across many disciplines (Bailey and Kurland 2002; Cascio 2000; Di Martino and Wirth 1990; Duxbury and Neufeld 1999; Duxbury et al. 1998; Fritz et al. 1994; Haddon and Lewis 1994; Handy and Mokhtarian 1995; Kurland and Bailey 1999; Mokhtarian 1998; Wellman et al. 1996; Zedeck 1992).

Following the evolution of telework, legal regulations on its use were first put into place by the state of California, the birthplace of Jack Nilles's pioneering studies. The California Government Code section 14201 signed in 1990 reflects the nature of these early years. It encourages each state agency to 'review its work operations to determine where in its organization telecommuting can be of practical benefit'. Similar statutes and directives exist today in several other US states.⁶

The literature on first-generation telework is clearly concentrated on one mode of work: the home office.⁷ Workplaces in or close to the employees' homes are remote, cheap and ecological, but also stationary. This does not come as a surprise. Computers and telephones at that time, thus first-generation ICTs, were not yet capable of mobilising employees while working. Moreover, these studies have clear sectoral and geographical limits. Before telework spread to other industries, states and countries, the main objects of study were the 1970s' and 1980s' information industries on the West Coast of the United States. In this region, jobs were flexible, commuting costs high and access to ICTs already prevalent enough to create an inspiring new production system. The first government regulations followed these early developments and promoted telework in the public sector.

2.2 The Second Generation of Telework: The Mobile Office

It is difficult to separate out the first from the second generation of telework, the mobile office. Changes were incremental and took place on different stages across organizations, industries and countries. The first and second generations of telework are separated by technological advancements. As Alvin Toffler predicted, ICTs evolved very quickly. Smaller and lighter wireless devices, such as laptops, notebooks and mobile phones, enabled employees to work not just from home, but from almost anywhere they could or had to work. However, research on telework

remained limited. Even towards the very end of the 20th century, and thus at a time when these ICTs were already powerful and cheap enough to replace many stationary workplaces, scholars still focused on the classic form of telework as home-based full-time or part-time employment (Handy and Mokhtarian 1995; Kitamura et al. 1990; Mokhtarian 1998). In one of the first cautious essays on the subject, Di Martino and Wirth (1990) extended the menu of telework options to mobile work, without developing this concept in detail. Others followed with similar short, superficial and often anecdotal pieces (Kurland and Bailey 1999). At this point the image of an evolution of telework driven by the development of ICTs seems interrupted. In a short time ICTs were getting smaller, lighter and wireless, but still the perception of telework seemed to remain rooted in its home-based, stationary grounds.

Nevertheless, the argument for an ICT-driven evolution from the first generation of telework to the second can be made by considering two different but connected developments. First, it is important to mention that telework was constantly evolving towards a flexible work arrangement with, and not as a total substitute to, traditional office work (Duxbury and Neufeld 1999; Duxbury et al. 2006; Hartman et al. 1992; Kurland and Bailey 1999; Venkatesh and Vitalari 1992). Second, the mobile office was located in a different sectoral and organizational context than the home office. From its early beginnings in the 1970s and 1980s, the home office was promoted for clerical workers across industries, while the mobile office tended to be mainly employed by managers and professionals in marketing and finance (Kurland and Bailey 1999, p. 56). Scholars who focused on traditional teleworkers thus overlooked the mobile office as a growing alternative mode of work. Yet, with more and more occasional telework arrangements, these workers were separated from teleworking professionals merely by the types of ICTs they applied. With more technological advancements towards cheaper and more powerful electronic devices, both groups made use of the same new form of work (Bailey and Kurland 2002).

At this time the legal setting for telework changed dramatically. Government regulations were expanded from the mere promotion of the new mode of work to a more balanced perspective. Policymakers increasingly responded to the wide spread of telework and controversial debates around working time regulations, working conditions and occupational safety and health. An important example of this development is the European Framework Agreement on Telework of 2002. This social partner agreement stipulates how telework is defined⁸ and that teleworkers are to enjoy the same working standards as their colleagues at the employer's premises.

The second generation of telework was not accompanied by a coherent new research body as the first generation had been, but instead by a new attitude towards working. The mobile office broke with the classic bipolar spatial structure of work. Increasingly scholars had to admit that work could be done at the employers' premises, at home and also at various locations in between. Work now became detached from place: it could be performed 'here, there, anywhere and anytime' (Kurland and Bailey 1999, p.53). Government regulations reflect this development. They respond to the changing work environments and their conditions. From this time, it needed only the fast-growing dispersion of the Internet and World Wide Web access to take telework to its third generation, the virtual office.

2.3 The Third Generation of Telework: The Virtual Office

There was something important that Alvin Toffler could not foresee in his visionary book *The Third Wave*: the Internet and its effect on the use of ICTs. Toffler saw all workplaces of the information society relocated from the employer's premises to employees' homes, and at the beginning of the 1980s this seemed to be a promising guess. However, towards the turn of the 21st century it became clear that the author's vision had to be adjusted. In *Digital Nomad* (1997), Makimoto and Manners predicted that the work of the future would be neither here nor there, but instead constantly on the move. Access to the Internet via radio links and the shrinking of transistors would, according to Makimoto and Manners, inevitably fuse information technologies and communications technologies together and generate the 'industry's ideal product': 'The industry's ideal product will be both more and less than a laptop computer. It will do more communicating and less computing. And it will be much smaller and lighter than today's laptops' (Makimoto and Manners 1997, p.30).

Makimoto and Manners's prediction came true. Smartphones and other similar products changed the use of technology so fundamentally that they allow us to describe the third generation of telework in terms of new types of ICTs, or 'new ICTs'. During the previous generation, work was becoming mobile but all information still had to be carried around all the time and information technology could be kept conceptually separate from communications technology. In this new generation of ICTs, information is stored in clouds and networks and only needs a tiny device to be accessed. This ultimately changes our perception of telework. Checking e-mails, recent trades, messages and news can all be done instantaneously in the palm of the hand. This enables work away from the employer's premises within a miniscule time frame.

The clearer these changes seem in retrospective, the less clear they are with regard to empirical data. Virtualized offices have been growing ever since the World Wide Web was created by Tim Berners-Lee at the European Organization for Nuclear Research in 1989. Early work on virtual offices or virtual workplaces thus focused more on computer-supported cooperative work (CSCW) and less on the shrinking and empowerment of ICTs (Cascio 2000; Igbaria and Tan 1998; Orlikowski and Barley 2001; Wellman et al. 1996). The first empirical studies that clearly pinpoint the value of new ICTs for the virtual office are based on surveys conducted within the industry that fed this evolution since the very beginning: the information industry (Hill et al. 2001, 2003). Here the virtual office, accessible through portable devices, is described as an ‘emerging work form’ (Hill et al. 2001, p. 51), but not yet conceptualized in a coherent way. The major interest in new ICTs as a tool for work away from the employer’s premises came into play with a broad and still ongoing discussion about work intensification (Chesley 2005; Dery et al. 2014; Duxbury et al. 2006; Green 2002, 2004; Green and McIntosh 2001; Mahler 2012; Richardson and Benbunan-Fich 2011; Towers et al. 2006; Tu et al. 2005; Van Yperen et al. 2014). This debate is focused on the reorganization of work towards mostly informal work arrangements outside regular working hours. The character of the virtual office, mainly accessibility anywhere at any time, lies at the heart of this debate.

New ICTs enabled the mobile virtual connection of workers and, as in the previous generations, it is precisely this technological advancement that triggered the further evolution of telework. Telework evolved constantly over three decades from the crude initial desire to reduce commuting costs to the mobilization of office work and, finally, virtualization to a whole new mode of work. It has grown into almost every possible aspect of life, and now has become omnipresent. An evolution-based view of telework leads us to acknowledge that every current debate about the effects of ICT use for paid work away from the employer’s premises is implicitly or explicitly a debate about telework in one form or another. This, in turn, creates the need to discuss the enigmatic diversity of definitions of this phenomenon that are spread across the literature and to put them into a coherent perspective.

3. NEW TECHNOLOGIES, NEW CONCEPTS?

Literature on new ICTs and telework is dealing with a rapidly changing technological environment; effects discussed in one publication are often outdated and inapplicable in another. This review therefore focuses mainly on literature during roughly the past decade. This time period is

characterized by an explosive dispersion of neologisms, definitions and concepts all struggling to cope with the many advantages and drawbacks of telework and work with new ICTs. This proliferation profoundly hampers comparability among studies, a problem that has always accompanied research on work with ICTs. In times when scholars more commonly used the term telework, different definitions led to confusion and to a large variation of results. As noted by Kraut (1989), and more recently by Bailey and Kurland (2002), different studies reported different shares of employees who telework regularly simply because they worked with different definitions of the term. Hence, to identify different forms of telework currently, it is necessary to consider a basic categorization which allows us to classify and compare definitions.

At the beginning of research on telework, scholars were concerned with three key elements: technology, location and organization (see, for example, Beer 1985; Di Martino and Wirth 1990). We can use these three elements to create a categorization of the whole spectrum of changes in telework up to the latest developments. Technology is the driving force behind the evolutionary process of telework, rapidly developing from old to new ICTs. This development extended workplaces from the traditional office at the employer's premises to employees' homes and then places such as cars and train stations, and now to almost any place we can imagine. Something similar can be said for the organization of work. Initially, telework was meant to be a total substitute for traditional office work. Over time, however, it was increasingly employed on a partial basis, with employees only taking a few days a month for telework parallel to their main work at the employer's premises. Currently, with the technological possibilities of instantaneous teleworking, more occasional forms have been added to the menu of options.

This categorization helps us to identify basic patterns among the chaotic diffusion of new terms and definitions, and leads us to a choice of the specific definition that best suits our purpose of synthesizing the literature on this topic. Studies focused on telework and/or work with new ICTs are discussed in regard to their terms (section 3.1) and attributes (section 3.2). The results of these discussions are the building blocks for a conceptual framework of telework (section 3.3), which in turn provides a truly novel vantage point from which to view the country-specific analyses that follow and illustrate how telework is being practiced today.

3.1 Terms

As was explained in section 2, the fast-shrinking and powerful new ICTs have led to the emergence of new studies that are to a large extent detached

from the origins of Jack Nilles's early work on the first generation of telework in the 1970s and 1980s. This detachment is reflected by the many neologisms that have been created in sharp contrast to the term 'telework'. A first example was Makimoto and Manners's digital nomad. This term is frequently repeated in public and academic discourse, since it pinpoints the turn from old to new ICTs. It has inspired the creation of a wide range of other neologisms, such as e-nomad (Parent-Thirion et al. 2012), job 2.0 (Williams 2010), new ways of work (new WoW) (Popma 2013), workscapes (Felstead et al. 2005), work-extending technologies (Duxbury et al. 2006), location independent living (LIP living),⁹ e-work (Lister et al. 2009), and so on. In these terms we can already identify the three key conceptual elements of telework. Technology is reflected by the term digital, the prefix 'e-' and the upgrade indicator 2.0. The location of workplaces is described with terms such as nomadism, location independency, and so on. New forms of work organization are given with the new ways, the '-scapes' and work extensions.

One could argue that the terms telework and telecommuting have lost their importance because they only emphasized 'tele', the Greek prefix for 'far', and thus the location element. To conclude that this is the only reason why these terms are now often avoided would, however, be incomplete. Research on work with new ICTs is still in its infancy, and most probably has been influenced by the *Zeitgeist* of the 21st century. Contemporary scholars, together with authors of popular books, bloggers and journalists, may hesitate to use the term telework simply because it does not seem to resonate with a 21st-century perception of technology.

3.2 Attributes

Terms by themselves do not give complete information. It is in combination with attributes that a definition is constituted. In the case of ICT-based work, these attributes mostly follow the focus of the term to the extent that they cover the same key elements. For example, in their report for the fifth wave of the European Working Conditions Survey, Parent-Thirion and her colleagues followed the focus of Makimoto and Manners (1997) on nomadism with their definition of 'e-nomads': 'individuals who use ICT at least sometimes and do not have their employer's premises (or their own premises if self-employed) as their main place of work, or, if they do, they have worked in another location in the three months prior to the survey' (Parent-Thirion et al. 2012, p.95). These attributes reflect the focus of the term: location and technology.

A different view of the subject is to extend the perspective from a focus only on flexible workplaces to flexible working time arrangements, and

thus to work organization as well. As Duxbury et al. (2006) conclude, in their study of Canadian knowledge workers, new ICTs are often used as work-extending technologies (WETs). Not only is the traditional workplace altered by the new technologies, but so are standard working time policies, work schedules and, consequentially, work–life balance. The main issue from a conceptual perspective is the consideration of working time as, perhaps not the main, but another crucial aspect of the use of new ICTs for work. In a similar vein, Popma (2013) reviews the literature on New WoW, which the author defines briefly as ‘place- and time-independent working’ (Popma 2013, p. 5). The attributes in these approaches also cover the key element of work organization. However, this comes with a cost. Both terms and attributes are broadened in comparison with other definitions to make them fit the breadth of the phenomenon. This leads to less precise and less informative definitions.

A very frequently applied definition that covers all three of these key elements is that used in the European Framework Agreement on Telework of 2002: ‘Telework is a form of organising and/or performing work, using information technology, in the context of an employment contract/relationship, where work, which could also be performed at the employer’s premises, is carried out away from those premises on a regular basis’ (European Framework Agreement on Telework 2002, p. 15). In this definition, location is included as work away from the employer’s premises. Work organization is mentioned explicitly, and specified with telework being carried out away from those premises on a regular basis. In addition, the attribute of technology is covered by information technology. Given the breadth of such a definition, with it telework can be defined across all three generations.

In effect, and in contrast to many other definitions, the European Framework Agreement on Telework definition can potentially cover the third generation of telework as well. New ICTs, especially smartphones, enable employees to check their e-mails and receive telephone calls on a regular basis, away from the employer’s premises. Currently, work with new ICTs has reached an extent whereby it can be considered a separate form of work. Hence, working occasionally with new ICTs away from the employer’s premises does not imply that telework is carried out on an ad hoc basis, but rather as an integral part of a regular work pattern. A typical example is the checking of e-mails on the smartphone as one’s first morning task (Maier et al. 2010).

Another important characteristic of the above definition is its precision for the kind of work that is performed. Telework is often confused with similar-sounding work arrangements. For example, some authors treat industrial *homework* as a predecessor of telework (see, for example,

Kaufman-Scarborough 2006). In this setting production is undertaken at home, often in the form of an independent business and not based on an employment contract. Similar confusion can be created if work is outsourced or offshored with the help of ICTs,¹⁰ which is commonly known as remote work. Here employees perform work remotely from their customers and not remotely from the employer's premises (Messenger and Ghosheh 2010).

The definition in the European Framework Agreement on Telework covers all the forms of telework that have emerged over the past four decades. Even if the term telework itself does not resonate with the perception of current technologies, it is still worth retaining. It stipulates a crucial element that still characterizes the new work arrangements: the location. With a small alteration, the addition of communications technology, telework can be defined in terms of all three key elements without descending into vagueness.

A clarification seems necessary at this stage. This volume is focused on telework, which is a broader, more encompassing concept than telecommuting – although these two terms are often, mistakenly, used interchangeably. In their seminal article providing a meta-analysis of telecommuting and its effects, Allen et al. (2015) draw a clear distinction between telework and telecommuting. They define telework as follows:

The term telework is generally used to connote a broader form of telecommuting that involves working from a variety of alternative locations outside of the central office (including full-time work from home but not necessarily limited to home-based work) and includes work from home-based businesses, telecenters, and call centers, and even work within an organization's central office between individuals who are interacting through the use of technology. (Allen et al. 2015, pp.42–3)

In contrast, the same authors define telecommuting as follows:

Telecommuting is a work practice that involves members of an organization substituting a portion of their typical work hours (ranging from a few hours per week to nearly full-time) to work away from a central workplace – typically principally from home – using technology to interact with others as needed to conduct work tasks. (Allen et al. 2015, p.44)

This is a very important distinction for understanding the current volume. In particular, this volume provides for a very broad definition of telework, which is, work performed with ICTs from outside the employer's premises.

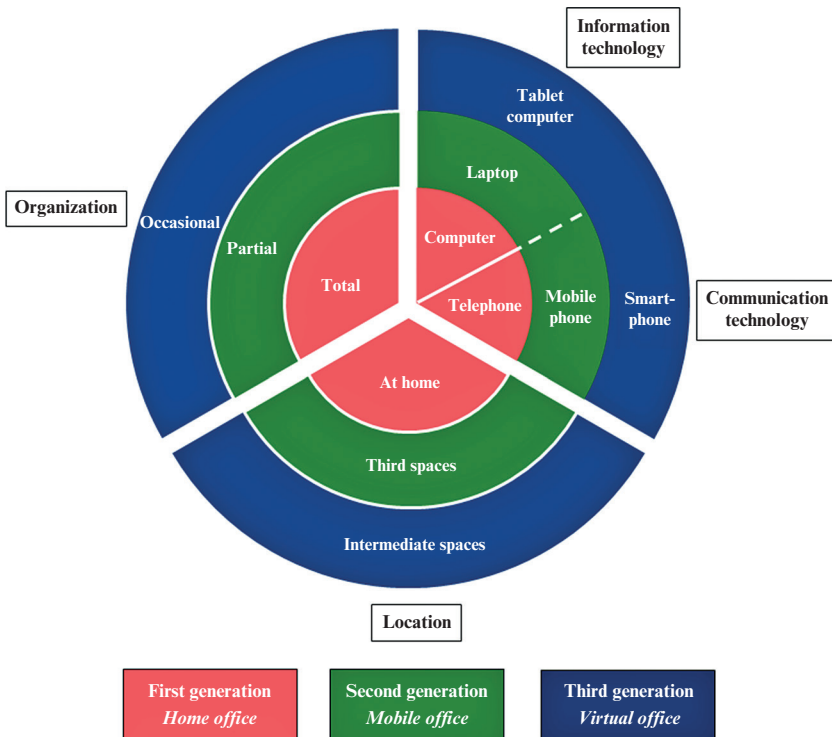
This broad definition covers telework that supplements, as well as substitutes for, work in the office (purely substitutional telework is telecommuting). As we will see in the next section, this definition also

includes mobile forms of telework, which ‘involve working from a variety of alternative locations outside of the central office’ rather than working ‘principally from home’ (see also ILO and Eurofound 2017).

3.3 Conceptual Framework

Based on this evolutionary perspective on telework and the discussions of terms and attributes in the preceding subsections, a conceptual framework of telework can be created that encompasses the entire evolution of telework from the 1970s to date. The framework with its segmentation into the three generations of telework (home office, mobile office and virtual office) and the three key elements (technology, location and organization) is illustrated in Figure I.1 and discussed in the following paragraphs.

As Figure I.1 illustrates, our conceptual framework covers studies



Source: Messenger and Gschwind (2016).

Figure I.1 Conceptual framework of telework

on the latest developments, namely, work with new ICTs away from the employer's premises, together with those that capture more traditional, still-existing forms of telework. The first generation constitutes the core of the framework split into the three key elements – technology, location and organization. It is the model of telework as it was pictured by Jack Nilles in the 1970s: use of fixed computers and telephones, thus stationary old ICTs, at or close to the employee's home as a total substitute for traditional office work. Studies rarely deal exclusively with this form of telework, mainly owing to a relatively scarce use of telework as a person's total and thus only work arrangement.¹¹ However, some operational definitions include telework as the main employment (see, for example, Parent-Thirion et al. 2012). In these cases it comes down to a determination of whether or not telework is *de facto* used as a full replacement for traditional office work.

The second generation of telework is layered around the core described above: partial telework with mobile old ICTs, such as laptops and mobile phones, in third spaces. Partial in this case means that a share of working hours at the employer's premises is replaced by telework. In addition, the term indicates that work can be arranged more flexibly, including working hours in the evenings and on weekends. These observations are mirrored in the measurement of partial telework as a share of working time. Characteristic locations of the second generation are spaces such as vehicles, cafés, airports, train stations and the client's premises – any place where work can be done regularly with the help of ICTs and which is neither the employee's home nor the employer's premises. For the purpose of efficient discussion, we call these locations third spaces.

In the third generation of telework, new ICTs such as smartphones and tablet computers enable occasional telework in intermediate spaces as well. It is important to keep intermediate spaces conceptually separate from third spaces, the location of the second generation. Intermediate spaces lie in between the employer's premises, third spaces and the employees' homes (for example, elevators, parking lots and, even, the sidewalk). They are made available for work activities by the special features of new ICTs – the fusion of information technology and communications technology, and the remote access to information. Intermediate spaces complete the coverage of workplaces made available by ICTs to almost anywhere one can imagine. The typical mode of organization in this case is occasional telework. As for other forms, this term also describes organization beyond the mere amount of time that is spent teleworking. Such occasional telework is a less formal and less regulated work arrangement than the others. It is mostly measured in frequency (for example, 'How often do you . . .?'), rather than as a share of working time (for example: 'How much of your regular working time do you . . .?'). Typical forms of occasional telework, such as

responding to telephone calls or e-mails from colleagues or supervisors, are also less of a voluntary arrangement set up by the employee themselves.¹² They also tend to supplement, rather than substitute for, work in the office.

The evolution of telework serves as the conceptual backbone that helps us to categorize and compare the many forms of telework that currently exist. However, to apply our framework to the most recent studies and developments, we need to acknowledge the blurred boundaries between the segments of technology, and thus between old and new ICTs, in reality. Old ICTs, especially stationary computers, now share many of their features with ICTs of the latest generation, such as Internet connections and the fusion of information and communications technology. Furthermore, new ICTs are now powerful enough to fulfil highly complex tasks, a characteristic which was once unique to stationary computers. The blurring of boundaries between technologies is illustrated in Figure I.1. The segments of technology overlap and the separation between information technology and communications technology fades away towards the outer circles, and finally disappears completely.

The hybrid character of technology leads, among other factors, to a whole new set of possible combinations with segments across the key elements and the generations of telework. Powerful smartphones and tablets, for example, are now also used for partial telework at home and in third spaces (Yun et al. 2012), and stationary computers (personal computers – PCs) are also used for occasional e-mail correspondence with colleagues, clients or supervisors (see, for example, Chesley 2010). Furthermore, and quite intuitively, new ICTs can be used anywhere and not only in intermediate spaces (see, for example, Bittman et al. 2009), and partial telework occurs to an even larger extent at home than in third spaces (Pfisterer et al. 2013). Such combinations are an integral part of the evolution of telework. New technologies, and consequentially new forms of telework, did not fully replace the old forms of telework, but instead changed and complemented them. Hence, much like with any other generation-based conceptualization, we need to interpret the different circles of our framework as a typical, rather than an exclusive, combination of segments. Thus, in our model, 21st-century telework is simply the use of ICTs to perform work from anywhere away from the employer's premises.

The review of the literature on direct and indirect effects of telework in the next section is therefore guided by a discussion of telework forms as flexible combinations of these different segments informed by a generation-based perspective.

4. DIRECT AND INDIRECT EFFECTS OF TELEWORK AND THE ROLE OF NEW ICTS

With the discussion of telework and its evolution over three generations, we capture an intense and diverse debate on the advantages and disadvantages of telework which emerged in the 1990s and is still prominent today, albeit using different terms and definitions.¹³ The main themes of this debate can guide us to structure our review of contemporary literature on the effects of telework as follows: working hours and work schedules (section 4.1); work–life balance (section 4.2); occupational safety and health (section 4.3); and individual and organizational performance, including job satisfaction (section 4.4).

4.1 Working Hours and Work Schedules

In the early days, Jack Nilles described telecommuting and telework as total substitutes for traditional office work. This picture, however, is only characteristic for the first and, with limits, the second generation of telework enabled by old ICTs. New ICTs, in contrast, are accompanied by partial and occasional work arrangements, entering third spaces and intermediate spaces as well. Scholars are thus increasingly concerned with telework as a supplement to, instead of a substitute for, traditional office work. Central to this concern is the scholarly work of Linda Duxbury and her colleagues on work-extending technology in the Canadian public sector (Duxbury and Neufeld 1999; Duxbury et al. 1998, 2006, 2014). Their results for the effect of partial telework on working time uncover a pattern across personal characteristics and occupations: male professionals and managers who telework from home report the longest working hours. Technical staff emerge with the longest hours for telework in third spaces. These findings are supported by other studies with similar approaches (Hill et al. 2010; Kelliher and Anderson 2010, 2008; Lambert et al. 2008; Noonan and Glass 2012). In contrast, the causal direction is not always as clear: owing to the design of most studies, it is difficult to say whether working time supplements regular working hours through telework or whether employees with long working hours also happen to be teleworkers.

It is important to identify the extent to which teleworking hours are supplemental hours in order to study its effects on work schedules. This occurs, for example, with the concepts of technology-assisted supplemental work (Fenner and Renn 2010) or non-traditional telework (Golden 2012), and with surveys which specifically ask for this form of telework. In a representative US survey, 45 percent of the group of employees who use ICTs for work report that they sometimes telework from home at nights

and on weekends (Madden and Jones 2009). According to a Finnish study, 54 percent of the partial telework in Finland is overtime work without compensation (Ojala 2011). The degree of formality of supplemental telework is important in this case. In another US survey, 78 percent of the respondents say that their supplemental telework is not based on a formal agreement and 21 percent report that they do not get paid for this kind of work (Song 2009). These results are largely supported by surveys and studies in other countries as well (Fenner and Renn 2010; Golden 2012; Natti et al. 2011; Towers et al. 2006; Troup and Rose 2012). Another very important aspect is the gender dimension of partial telework. According to the results of an in-depth analysis in the United Kingdom, women and men tend to telework to the same extent, yet women are more likely to telework as part of their normal work schedule – that is, telework substitutes for work in the office (substitutional telework). Men, in contrast, tend to telework more in addition to their normal work schedule – that is, telework is more likely to supplement work in the office (supplemental telework) (Atkinson and Hall 2009).

Necessary for the analysis of partial telework is its coexistence with other work arrangements. Many studies do not single out the effect of telework, but instead look at the combined effects of different forms of flexible work schedules, including telework.¹⁴ Such work arrangements tend to reduce the ‘face time’ of workers in their workplaces, either by creating spatial distance between employees and their colleagues/supervisors or by reducing the core hours of work spent jointly at the same workplace (Kelliher and Anderson 2010, p. 97). The effects on individual working time, however, are quite different. In particular, schedules with flexibility in time tend to be related to shorter working hours and thus tend to offset the extended hours effects created by telework (Golden and Wiens-Tuers 2006; Lambert et al. 2008). This is particularly important, since such flexible work schedules are often introduced alongside telework (Golden et al. 2008; Hill et al. 2010; Stavrou 2005; Stavrou and Kilaniotis 2010).

Studies on occasional telework deal almost exclusively with working time outside of regular business hours, and thus with an alteration of regular work schedules. Such work-related contacts in evenings are, however, a marginal phenomenon according to two Australian surveys (Bittman et al. 2009; Wajcman et al. 2008). Respondents were asked to send in logs of their mobile phones to allow studying the use of these devices in the form of a time-use survey. The results indicate that work-related contacts dropped to practically zero after regular business hours. However, it is difficult to generalize such findings. Many case studies show differences created by individual characteristics, such as ambition (Olson-Buchanan and Boswell 2006), self-control (Duxbury et al. 2014) and the personal need for certain

work routines (Van Yperen et al. 2014), but also the expectations of supervisors (Mahler 2012), and the type of electronic device used (Richardson and Benbunan-Fich 2011), are of high importance. Depending on the combination of these conditions, working hours can increase to a large extent. In the study by Madden and Jones (2009), 70 percent of those who use new ICTs for work-related tasks report that they regularly use them for occasional telework in the evening.

There are limits to the comparability of these and other similar studies on telework and working time owing to diverging measurement approaches. However, they indicate that working hours are mostly extended through partial telework at home or in third spaces. The effects of occasional telework in this context depend greatly on individual characteristics and the work environment, but also on the measurement of working time itself. Therefore, it is necessary for any study to consider the potential effect of telework on working hours. Working time recurs as a moderating variable in most of the studies of the other effects of telework reviewed in the following sections.

4.2 Work–Life Balance

By far the broadest and most intensive discussion about the effects of new ICTs and telework is led by scholars who focus on detecting the determinants of work–life balance (WLB). Telework is often employed as a means to balance paid work with personal life,¹⁵ and many studies support its usefulness for that purpose. In their meta-analysis Gajendran and Harrison (2007) find that partial telework has its advantages and disadvantages, but that employees in the included studies report, on average, an overall positive impression about its effects on their WLB. Large surveys in organizations (Maruyama et al. 2009; Robèrt and Börjesson 2006), among national populations (Allen et al. 2013; Pfisterer et al. 2013) and across different Organisation for Economic Co-operation and Development (OECD) countries (Hill et al. 2010) support these mainly positive effects of partial telework on WLB. However, providing practical advice to employees, supervisors or policymakers based on these results is difficult, since they do not uncover the specific advantages and disadvantages of telework regarding the balance between paid work and personal life.

More in-depth analyses reveal a large variation across the different segments of our conceptual framework. Partial telework at home, for example, is often described as beneficial since it facilitates childcare (Allen et al. 2013; Gajendran and Harrison 2007; Maruyama et al. 2009; Pfisterer et al. 2013; Robèrt and Börjesson 2006; Towers et al. 2006). Even though teleworking parents do not necessarily spend more time with their children

(Troup and Rose 2012), they still manage to balance the ‘borders and bridges’ (Kreiner et al., 2009) between paid work and family responsibilities. Alternatively, some studies report extremely negative experiences with telework, owing to conflicting responsibilities between paid work and personal life (Allen et al., 2013; Olson-Buchanan and Boswell 2006) and an increase in stress, especially for parents who are partial teleworkers in third spaces (Morganson et al., 2010). Here the use of partial telework as a supplement to, rather than substitute for, traditional office work comes into play (see section 4.1).

Largely diverging results for the effects of telework on WLB are even more common for occasional telework, especially if it involves heavy reliance on communications technology. Wajcman et al. (2008) and Bittman et al. (2009) report very low rates of spillover from paid work to personal life with occasional telework, but Chesley (2005) finds that the use of mobile phones – and thus most likely occasional telework – instead of laptop computers leads to a significant decrease in family satisfaction. Such contradictory deterministic findings, however, seem to be the exception rather than the rule. Most studies identify an internal ambiguity of occasional telework. It certainly increases autonomy and the possibility to take care of and stay in contact with family and friends; however, employees struggle with a clear separation between paid work and personal life, and thus also experience some reported decrease in WLB (Boswell and Olson-Buchanan 2007; Duxbury et al. 2014; Fenner and Renn 2010; Gallhofer et al. 2011; Heijstra and Rafnsdottir 2010; Ladner 2008; Yun et al. 2012). This ambiguity is also reflected in a discrepancy between perceived and used workplace flexibility. Individual perceptions of telework as a successful tool explain more of the variation in WLB effects than actual teleworking hours (Heijstra and Rafnsdottir 2010; Hilbrecht et al. 2008; Jones et al. 2008). Such findings can help to explain the contradictory effects of telework on WLB in general. They are not necessarily positive or negative in a deterministic sense, but instead ambiguous.

Occasional telework takes this ambiguity to the extreme. It is mostly employed with the help of small, powerful communications devices such as smartphones, which blur work–life boundaries to a large extent and impede clear deterministic conclusions. Owing to this ambiguity, scholars have increasingly changed their approach to the scrutiny of this topic and now ask how, and not if, telework can be useful for individuals to balance paid work and personal life (Duxbury et al. 2014). Key to successful WLB with the help of new ICTs and telework is an optimal strategy for work–life management (Kreiner et al. 2009) or boundary management (Duxbury et al. 2014). It is thus important to find an appropriate individual combination between the segmentation of paid work and personal life despite

telework, and the integration of paid work into personal life with the help of telework.¹⁶

Detecting the effects of telework on WLB is a very difficult task. This becomes even clearer as soon as we begin to dissect telework into the different conceptual combinations of our theoretical framework. The effect of telework on WLB is ambiguous for partial, and even more so for occasional, telework. An adequate interpretation and summary of individual choices needs to reflect these ambiguous findings. Employees are typically aware of the many drawbacks of telework and accept them for the sake of the benefits that it provides. Thus, they do not telework because it has mainly positive effects, but rather because it facilitates certain work lifestyle choices (Gallhofer et al. 2011).

4.3 Occupational Safety and Health (OSH)

Studies on occupational safety and health (OSH) and the use of new ICTs are almost exclusively focused on their implications for mental health,¹⁷ which is closely related to the discussions on working time (section 4.1) and on WLB (section 4.3). The findings of these studies can be attributed to one or both of two mediating factors: role ambiguity and lack of rest and recovery.¹⁸ Partial telework blurs the boundaries between paid work and personal life. Integration of work into areas of personal life can lead to a higher amount of autonomy and higher work and life satisfaction, but also to a confrontation between family and work roles. For example, results from a survey in a large US company reveal that partial teleworkers experience positive effects when switching from work to family roles and vice versa; hence they report a lower intensity of role stress. However, they equally feel that the confrontation of the two roles leads to an increased uncertainty about the ability to fulfil each role up to the expected level, which is called role ambiguity (Sardeshmukh et al. 2012). This role ambiguity increases fatigue, and consequentially the risk of burnout. Sardeshmukh et al. find that, overall, neither the positive effects of lowered role stress nor a reduction of working time is able to counterbalance these effects on role ambiguity. Of high importance in this context are the results of Jones et al. (2008) and their survey among workers in Singapore, which was briefly mentioned in the previous subsection. Their findings underline the negative effects of partial telework on mental health. However, they also indicate that it is not actual, but rather perceived workplace flexibility that leads to such effects. Hence, employees might see problems in fulfilling their family and work-related roles, not necessarily because they actually work more outside of their employer's premises, but because the mere possibility of teleworking increases their perception of role ambiguity.

Studies of the effects of occasional telework on mental health are closely focused on rest and recovery. With analyses based on the fourth European Working Conditions Survey (EWCS), in 2005, Arlinghaus and Nachreiner (2013) find that being irregularly contacted by the employer (occasional telework) increases self-reported health impairments and sickness absences more than regular work in the evenings or on weekends away from the employer's premises (partial telework). The mechanism underlying such negative health effects is a chronic lack of rest and recovery from work (Geurts and Sonnentag 2006). This occurs because new ICTs fill up the spaces and times that would normally be used for recovery, either at the workplace (internal recovery) or outside of work (external recovery). Occasional telework is thus more specifically problematic for external recovery: It creates a mode of constant activation which does not allow sufficient rest, as it can be done at any time in any location – at home, in third spaces and, even, in intermediate spaces. Lower levels of rest and recovery, and consequentially higher levels of fatigue, increase the risk of burnout for occasional teleworkers, as shown by a study on intensive smartphone use among Dutch employees (Derks and Bakker 2014). As indicated above, these theorized and measured effects are not necessarily limited to the use of telework. As Thomée et al. (2011) show with their study on smartphone use among young adults in Sweden, new ICTs in general increase constant connectivity, sleep disturbance, depression and the risk of burnout. However, the periods of recovery from work are shortened, particularly by occasional telework.

Thus, telework affects mental health in two ways: it increases role ambiguity and decreases recovery from work. Both of these mediating factors can lead to a higher level of fatigue and thus increase the risk of burnout. Negative effects appear to be poorly compensated by lower role stress and greater autonomy. Such findings are especially important in the case of occasional telework. This situation leaves no room for recovery from work and thus creates a feeling of constant availability, even if actual work-related contacts away from the employer's premises remain low.

4.4 Individual and Organizational Performance

In reference to the framework offered by Kowalski and Swanson (2005) we can identify two levels of performance in relation to telework: individual and organizational. A key to the success of telework is its effect on the first level, the performance of individual employees. Scholars report mainly positive supervisor ratings for partial teleworkers in case studies (Kossek et al. 2006), large surveys (Pfisterer et al. 2013; Stavrou 2005) and meta-analyses (Gajendran and Harrison 2007; Kelly et al. 2008). However,

increasingly they also uncover problems with the causal linkage and the measurement of these effects.

Studied independently from the use of ICTs, work away from the employer's premises tends to impede the performance of individuals and their work groups; the further and the more frequently employees work away from their colleagues, the less they share knowledge among each other (Taskin and Bridoux 2010) and the less their performance is rated positively by their supervisors (Golden et al. 2008). Such negative effects can be counterbalanced either with advanced communication technologies and tools (see, for example, Golden et al. 2008) or with a managerial approach to ICT use that puts more emphasis on information sharing than on work monitoring (see, for example, Lautsch et al. 2009). In contrast, management can also be the source of a biased selection of employees, because telework is never offered equally to all workers (Mahler 2012). Studies thus struggle to hold constant the pre-existing performance differences between teleworkers and their colleagues. Hence, the causal link between telework and individual job performance is not as clear as might be supposed by the studies cited above. Individual performance depends greatly on managerial discretion, teleworker autonomy, and the balance between communication and location that is inherent to all forms of telework. These results do not necessarily question the positive effects of partial telework on individual performance, but they put them into perspective.

Scholarship on occasional telework and its effects on individual job performance is still in its infancy. However, recent studies indicate that occasional telework, especially when it is performed with smartphones, does not appear to have a significant positive effect on individual performance. This can be explained in many different ways. As Yun et al. (2012) argue based on their survey of South Korean workers, occasional telework increases the perceived workload, which in turn has a negative effect on individual performance.¹⁹ Based on the results of different surveys in New York, Chesley (2005, 2010) finds that, in contrast to laptop computers, smartphones do not increase performance, since they are often perceived as a device for handling personal rather than work-related issues. All of these findings are also mirrored in the study by Dery et al. (2014), which finds that occasional telework is employed in order to cope with an increased workload, but that it is directed mainly towards reconnection to family and friends while doing so, and not as a tool to directly increase job performance.

Job satisfaction is another factor that can affect individual performance. The effects of telework on job satisfaction vary widely across personal characteristics and across the different forms of telework. This blurred pattern leads to very unclear results for job satisfaction, especially in

large-scale surveys. According to Morganson et al. (2010), home-based teleworkers do not report higher or lower job satisfaction than their colleagues at the employer's premises. However, telework in third spaces seems to have a significant negative effect. In contrast, the evaluation of an Australian national survey on telework from home indicates significantly higher work satisfaction among teleworking women, but not among teleworking men, largely owing to having more temporal flexibility in balancing paid work and childcare (Troup and Rose 2012). In their meta-analysis on partial telework, Gajendran and Harrison (2007) find evidence for mainly positive effects of telework on job satisfaction, mediated by an increased perception of autonomy.

The discussion around telework and individual performance has already highlighted the importance of management. Telework's success or failure is a product of both individual performance and the competence of supervisors and managers to make use of this new way of working in the proper context. The balance between location and communication as a central managerial tool has already been mentioned. Furthermore, Golden and Fromen (2011) find that telework is more likely to enhance the performance of workers if it is also employed by managers themselves. Managers who partially work from places away from the employer's premises better understand when and why telework is employed by their subordinates, and occasional telework – even though it has a lot of downsides, too – enables contact with managers on a regular basis. Finally, Fenner and Renn (2010) find that the mere provision of electronic devices to employees does not increase individual job performance. To make occasional telework an effective tool, managers need to create a working climate that emphasizes the value of new ICTs as a tool for increasing work autonomy instead of work monitoring.

If implemented correctly in the proper context, telework can increase individual job performance, which in turn can aggregate to better outcomes at the organizational level. In an analysis of over 2000 organizations across the European Union (EU), Stavrou (2005) finds evidence for an overall positive effect of partial telework policies on performance when controlling for sector and number of employees. Organizations largely profit from such arrangements 'since they allow employees to work when it is most suitable for them regardless of time, day and location' (Stavrou 2005, p.938). However, the aggregation of improved individual performance is just one side of the outcome. In their meta-analysis Kelly et al. (2008) find that organizations also increase their attraction to high-skilled professionals, who are the main demanders of flexible work schedules. Furthermore, as was assumed by the first scholars of telework in the 1970s and 1980s, partial telework reduces costs for office space (Robèrt and Börjesson

2006). Employers can bolster these effects if they support telework policies with monetary incentives.

As with other levels of performance, there are also limits to these results. Neirotti et al. (2013) argue, based on one of the very few comparative studies of effects at the organizational level, that companies only profit from partial telework in third spaces²⁰ if they are (1) not capital intensive, (2) have a broad geographic scope, (3) rely on human capital and (4) have sufficiently adapted information technology systems. These findings do not apply to telework from home or occasional telework. However, many studies do not mention that their findings are only applicable to a fraction of organizations on a global scale. In contrast, Neirotti et al. (2013) show that organizations typically profit from telework only if their business model is tailored to support a specific combination of location, work organization and technology.

5. METHODOLOGY AND MAIN DATA SOURCES

This volume is based on country studies that were conducted in five countries – Argentina, Brazil, India, Japan and the United States – plus a chapter for the EU. The EU chapter focuses primarily on ten countries: Belgium, Finland, France, Germany, Hungary, Italy, the Netherlands, Spain, Sweden and the United Kingdom, although some evidence is presented for the EU-28 as a whole. All of the chapters were prepared by telework experts in the respective countries, with the exception of the EU chapter, which was prepared based on reports by national correspondents in each of the European countries and synthesized into a single chapter by telework experts with a pan-European perspective. All of the chapters were prepared in line with a standard expert questionnaire based on a common definition of telework in line with our conceptual model (presented in section 3.3. above). This common definition is as follows: the use of information and communications technologies (ICTs) to perform work outside of the employer's premises.

The standard expert questionnaire was used to structure and compile the available data regarding telework in each country. This questionnaire covers the following topics:

1. the incidence and the intensity (that is, the extent) of telework;
2. the effects of telework on working time (that is, hours of work and the organization of working time, that is, work schedules), WLB, occupational health and well-being, and individual and organizational performance; and

3. policy responses to telework at the national, sectoral, and company levels.

Unfortunately, the breadth and depth of the available data varies substantially across the countries, so the ability to operationalize the above definition of telework varies substantially as well. For some countries (for example, the EU member states) the entire definition can be covered, while for others (for example, Argentina and Brazil) available data is largely limited to home-based teleworkers.

Primary data sources in all of the country reports include large-scale surveys with individuals, households and companies. Additional information sources include in-depth interviews with experts and employers, white papers, laws and company policies on ICT-enabled work outside the employer's premises.

Surveys specifically focused on telework are the main data source for the report from Japan. Comprehensive data on telework is generated on a regular basis in Japan. Central state actors such as the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), the Ministry of Internal Affairs and Communication (MIC) and the Ministry of Health, Labour and Welfare (MHLW) promote and initiate independent research on telework to a large extent. Data sources for the country report from Japan include nationwide representative surveys with employers and employees specifically focused on the incidence of telework and its effects. Those referred to in this report are a company survey conducted by the MIC; a survey among the working-age population conducted by the MLIT; and a range of surveys with so-called *zaitaku*-workers²¹ conducted by the Japan Institute of Labour (JIL).

In Europe, a wide variety of different data sources were used in the compilation of the European national reports depending upon the specific country. In addition, the national reports were complemented with data from the sixth wave of the European Working Conditions Survey (EWCS), a representative survey that was carried out across the EU member states in 2015 by the European Foundation for the Improvement of Living and Working Conditions (Eurofound).

Nationwide surveys on work from home and the use of ICTs in a more general sense were the main source for the reports from Argentina and the United States. Official statistics on telework in the United States and Argentina can be found in sources which cover work from home and the use of ICTs separately and in a broad sense. Among those referred to in the report for the United States are the American Community Survey (ACS), the General Social Survey (GSS), the Federal Employment Viewpoint Survey (FEVS), the American Time Use Survey (ATUS) and the Gallup

Work & Education Poll. The only survey with a particular focus on telework was conducted by the market research company, IPSOS, with figures only jointly available for the United States and Canada. The primary data source for the report on telework in Argentina is a nationwide household survey on the use of ICTs conducted by the National Institute of Statistics and Censuses (NISC), Encuesta Nacional de Tecnologías de la Información y la Comunicación (ENTIC). Additional data stems from interviews with employees in four enterprises completed by the national expert and company-level data on formal telework arrangements collected by the Ministry of Labour.

However, only very limited pre-existing data regarding telework was available in Brazil and India. A lack of official statistics on the incidence or the effects of telework has been the key challenge for research on this topic in these two countries. The national experts in Brazil used proxies such as company-level data on work from home policies to estimate the incidence of telework in this country and synthesized the limited information available from existing studies regarding its effects. In the case of India, the national experts conducted an employee survey on telework themselves specifically for the purposes of this study. The lack of official statistics in these countries corresponds to a growing, but still comparatively low, attention to telework among politicians and relevant public authorities in these two countries.

6. CONCLUSION

New ICTs and devices, for example, smartphones and tablet computers, have revolutionized everyday work and life in the 21st century. On the one hand, they enable us to constantly connect with friends and family as well as with work colleagues and supervisors; on the other hand, paid work becomes increasingly intrusive into the times and spaces normally reserved for personal life. Crucial to this development is the detachment of work activities from traditional office spaces. Today's office work is largely supported by Internet connections, and can thus be undertaken from basically anywhere at any time. This new spatial independence dramatically changes the role of technology in the work environment, offering both new opportunities and new challenges. Scholars are increasingly concerned with the advantages and the disadvantages of new ICTs for aspects such as working time, WLB and OSH, as well as individual and organizational performance.

A close analysis of the relevant literature reveals that research on the detachment of work from the employer's premises and its effects actually

dates back to the previous century. To fully understand the effects of new ICTs, it is thus important to create a conceptual link between the early days of telecommuting/telework and how telework is practised today. Technological advancement is the motor of change in this context. It fostered the evolution of telework in separable stages or generations, which we call the home office, the mobile office, and the virtual office. Analysing the technological advancements from the 1970s to date sheds a new light on the old term telework. Current location-independent, technology-enabled ways of working – from the full-time employment of a mobile salesperson to the occasional work-related telephone call or e-mail from home – are all part of the same evolutionary process. Drawing upon this evolutionary perspective, the remainder of this volume explores the development, forms and effects of telework in countries from different regions around the world, including Argentina, Brazil, ten of the member states of the EU, India, Japan, and the United States.

NOTES

1. Conference video accessed 27 January 2015 at http://fora.tv/2013/05/07/Yahoo_CEO_Marissa_Mayer_Remaking_An_Internet_Giant.
2. As has been widely reported, the United Kingdom is now in the process of leaving the European Union (known as Brexit). However, they were part of EU at the time that the research for this report was carried out.
3. Cloud computing means that files and applications are stored in and shared by a network of computers and servers accessible through the Internet (Miller 2008).
4. Flexi-time means that employees have the discretion to vary the times they arrive and leave work, within established parameters, to meet their personal needs (Avery and Zabel 2000).
5. Telecommuting has become the most common term used by US scholars. Telework is mainly used in Europe and Asia (Andreev et al. 2010).
6. Arizona, Montana, Connecticut, Florida, North Carolina and Oregon (Goldman 2007).
7. It is important to mention that home office does not necessarily mean that people work at home. The focus here is on reduction of commuting time. In most cases companies simply decentralized their organizational structure, meaning that employees could work in satellite business centres closer to their homes (Nilles 1975, 1988).
8. For a discussion of this definition see section 3.2.
9. <http://locationindependent.com/about/> (accessed 15 July 2019).
10. As it is done, for example, with call centres (Messenger and Ghosheh 2010).
11. As mentioned in section 2.2, from the early 1990s on most studies reported that telework was used alongside traditional office work, and not as a total substitute to it. More recent studies support these findings (for example, Welz and Wolf 2010).
12. The conceptualization of partial and occasional telework beyond the mere amount of working time largely embraces the differentiation between formal and informal telework made by Kossek and Lautsch (2007). However, the focus remains on time since partial Telework also often lacks a formal agreement (Kelliher and Anderson 2008).
13. See subsections 2.2 and 2.3.
14. This umbrella term covers a large plethora of work arrangements. For an overview see Kossek and Michel (2011).

15. Depending on context, theoretical background and the common terminology of a discipline, personal life is conceptualized around different definitions, using terms such as home and family that largely overlap in their attributes.
16. The theory on the management of integration and segmentation of work–life boundaries as applied here in the context of telework has been established in work–life balance research by Clark (2000).
17. We could imagine that the physical health and safety standards in cars, on streets and at home differ greatly from those at the employer's premises. The discoveries in this field however, at least as it seems from the literature we could find, are still to be made.
18. The discussion is closely related to what many authors describe as techno-stress (Popma 2013; Riedl et al. 2012; Tarafdar et al. 2007, 2010). It is used as an umbrella term for all kinds of effects the use of new ICTs at the workplace can have on OSH, such as information overload, addiction to technology and so on. Here the specific effects on mental health do not explicitly arise from work outside of the employer's premises, but more broadly from the use of new ICTs at the workplace.
19. The effect of workload on performance is difficult to compare on a global scale. Studies in China for example indicate that a higher workload induced by occasional telework increases productivity (for example, Tu et al. 2005).
20. What the author actually refers to is on-demand non-occasional telework for contact with customers. This excludes telework from home.
21. *Zaitaku*-workers are not employed by any company, but work from home as self-employed freelancers. Their work does not strictly fit the definition of telework used in this chapter because they are not employees. However, some possible effects of such work on Internet-based platforms for working time, occupational health and well-being can be derived for *zaitaku*-workers based on existing studies identified by the Japanese expert, and this information is presented in Chapter 2, on Japan, in this volume.

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