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Who and where are the flexible workers? Exploring the current diffusion of telework in Sweden

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This study investigates the increased adoption of telework in Sweden between 2005 and 2012. It uses microlevel data from national surveys in order to ask where telework is being adopted and by whom. Results indicate that telework has become routine for over 20 per cent of all gainfully employed. Expansion is explained by a working life in transition: besides enabling information and communication technologies, factors associate with managers' trust and control; the character of jobs, work tasks and contracts in knowledge-based industries; and with individual and household work–life balance issues. Telework is connected to permanent employment in the advanced services sector, slowly diffusing into other sectors. It is increasingly performed in the home and is becoming more frequent. Individuals with families and children are overrepresented and among the fastest growing groups. Broadband access at home is an enabler. Larger urban regions strengthen their position in favour of teleworking.

Keywords: telework, home-based work, adoption, constraints, Sweden, information and communication technologies.

Introduction: telework—a dead issue?

Since the late 1970s, when computers and digital networks were broadly introduced in work and business, telework has recurrently been a 'hot' topic in research, policy and practice (Sturesson, 2003; Hynes, 2014). The technical ability of information and communication technologies (ICTs) to give fresh meaning to and promote various forms of remote work has continuously increased, as home computers, laptops, smart phones, tablets and broadband connections have spread to many groups in society. Jobs, work tasks and services are increasingly being virtualised, and are expected to become less tied to specific places and steadily more flexible and mobile (e.g. Felstead *et al*., 2005; Alexander *et al*., 2010). At the same time, the spatial separation between home and work, i.e. commuting distance, continues to increase (Gil Solá and Vilhelmson, 2012). In this dynamic context, telework has been expected to be advantageous for several reasons: to save time and improve the work–life balance of families, reduce physical transportation and urban congestion, cut pollution and energy use, save office

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space, create job opportunities, attract qualified workers and spark economic growth in remote regions (see e.g. Haddon and Lewis, 1994; Bailey and Kurland, 2002 for reviews). Such hopes are repeated as central themes in the visionary discourse on the digital society, as telework has been the subject of considerable expectations, policy efforts and research over the years (Sturesson, 2003; Hynes, 2014).

Yet, reality has confounded expectations. The actual adoption of telework proceeded slowly (Vilhelmson and Thulin, 2001; Welz and Wolf, 2010; Scott *et al*., 2012; Hynes, 2014), and this is largely explained in terms of human, social and organisational reasons—that is, fundamental constraints associated with the individual's need to meet other people face-to-face (e.g. Bergum, 2007; Rasmussen and Corbett, 2008). Telework has turned out to be another example of the 'technological deterministic fallacy' (Keirl, 2006), i.e. when a seemingly rational and cost-reducing technology does not diffuse as expected, sometimes even being rejected outright.

Nevertheless, there are reasons for revitalising knowledge of the development of telework, and of its enablers and constraints, in contemporary society. Recent developments in Sweden, for example, imply a growing acceptance of telework. After decades of slow growth, current estimates, based on nationally representative data, indicate that the number of regular teleworkers has more than doubled since 2005 and that teleworkers comprised a quarter of all gainfully employed as of 2013 (Vilhelmson and Thulin, 2001; Sturesson, 2003). The observed change brings many important issues to the fore, particularly concerning where and among whom telework is currently being adopted.

Accordingly, this study concentrates on the ongoing expansion of telework in Sweden. We here define telework as performing ordinary work during scheduled working hours at locations other than the regular workplace, for example, but not necessarily, from home sending work between locations via the Internet. Our aim is to investigate what characterises the work and workers associated with this increase in telework, what broad sectors of the economy are involved, and where, in what types of regions, telework has diffused. The paper is empirical and descriptive as we rely on repeated cross-sectional survey data, an approach justified by a general lack of studies capturing contemporary levels of change. We contribute to current knowledge by focusing on a situation in which, after a long period of slow early adoption, telework seems to be expanding in a phase of "early majority" adoption—using Rogers' (1962) classic conceptualisation of innovation diffusion stages. In this, Sweden serves as an indicative case because the ICT penetration of Swedish households is very high and industries inclined to distributed work (i.e. services) constitute much of the economy. Furthermore, we contribute by analysing representative microlevel data rarely used in analysing telework, which is more often examined using case-based and in-depth approaches. The theoretical question of 'why' growth has occurred is advanced in the concluding section bearing in mind the constrained explanatory potential of cross-sectional analysis.

We start by reviewing current research to establish a theoretical framework, incorporating factors previously found important in understanding the enablers and constrainers of telework adoption, factors that now might have to be reconsidered. We concentrate on teleworkers' personal characteristics, such as gender, age, education and family situation; current work practices as regards location, timing and ICT use; employment characteristics as regards employment sector and type of contract; and geographical setting as regards living region.

In the empirical examination, three socio–spatial questions are emphasised. First, what personal features characterise the growing ranks of teleworkers; for example, to what extent is teleworking associated with specific ages and family situations, work–life balance and a particular gender? Second, what kind of work and what branches of the economy are broadly involved; for example, has telework increased among flexible workers, well established in the regular labour market, or is it increasingly associated with unqualified services? Finally, and closely integrated with the previous issues, is the question of where this increase has actually

occurred: Is it in the urban, central parts of the economy or in the more rural and peripheral ones?

Defining the concept of 'telework' is crucial, because its fluidity has been subject to many interpretations (Sullivan, 2003; Garrett and Danziger, 2007). In this paper, we identify telework in terms of a practice of conducting ordinary work during scheduled working hours at locations other than the regular workplace. Teleworkers thus constitute a subset of all gainfully employed who have access to a stationary workplace located at a distance from home, a population we refer to as 'commuting-based workers'. Telework refers mostly to home-based teleworking often, but not necessarily, facilitated by ICTs.

Factors affecting telework adoption

Telework diffusion

Repeatedly high expectations that teleworking would expand have been bolstered by policy measures which have attempted to facilitate growth (e.g. Handy and Mokhtarian, 1996; Sturesson, 2003; Hynes, 2014). These expectations have prompted research into telework's enabling and constraining factors, as well as assessments of its anticipated effects, notably its consequences for commuting, physical travel and residential relocation (e.g. Andreev *et al.*, 2010), and its impacts on work relationships, job satisfaction (e.g. Gajendran and Harrison, 2007) and work–life balance (e.g. Hilbrecht *et al.*, 2013). However, the actual number of teleworkers has remained comparatively small, growing only slowly in most countries. This is confirmed by national surveys (e.g. concerning the USA and the EU) covering the period up to the middle of the last decade. In the EU, for example, teleworkers comprised 5% of all employees in 2000, and by 2005, the overall proportion had increased to 7% (Welz and Wolf, 2010). That a gap exists between visions and reality has been confirmed by various researchers (Hjorthol, 2006; Bergum, 2007; Rasmussen and Corbett, 2008; Pyöriä, 2011; Hynes, 2014; Van Lier *et al.*, 2014), with a recent review commenting that: 'Advancement in the capability of technology in conjunction with its decreasing costs were once believed to be the promotors of telework … However, optimistic predictions for the increase in remote work have been largely debunked' (Scott *et al.*, 2012: 1016).

Research into telework has been concerned with understanding and explaining why growth has been slow and the vision has failed (e.g. Bergum, 2007; Rasmussen and Corbett, 2008; Hynes, 2014). In particular, human, social and organisational reasons and arguments have been emphasised. Various elaborations on workers' needs to meet and interact face-to-face, work closely together in teams and exert control and be controlled are stressed. This seems to explain why seemingly rational and cost-reducing technologies—such as telework, teleconferencing, and video-conferencing—have not spread as anticipated, suggesting that telework is a 'dead' issue from both research and policy perspectives.

However, when viewing results of recent Swedish surveys in context, we find contrasting indications of increased growth. The occurrence of telework has more than doubled between 2005–2006 and 2012 (see Table 1). In 2012, almost a quarter of the Swedish population with commuting-based jobs regularly performed telework, compared with one-tenth in 2006 and one-twentieth in 1999. Indications of a recent rise are also observed in other countries, such as the USA (Lister and Harnish, 2011).

It is important to investigate how the observed increase can be understood and to revisit factors so far regarded as enabling and/or constraining telework adoption. Previous research has identified complexity and several factors at work. These factors can be related to four fundamental and defining reasons for telework emphasised in the literature (e.g. Bailey and Kurland, 2002; Haddon

Table 1: The occurrence of telework: workers by workplace location and telework in Sweden, 1997–2012

	1997	1999	2001	2004	2005/06	2011	2012
(A) Type of workplace location							
All gainfully employed, thousands	3997	3958	4295	4513	4535	4767	4629
Observed number, *n*	974	2712	2934	1698	14,897	8682	6983
Home-based workers (workplace: fixed location at home), %	5.4	4.8	5.2	3.9	5.8	5.3	5.3
Mobile workers (workplace: no fixed location/ flexible locations every day), %	4.9	6.0	5.0	4.8	7.0	8.8	8.1
Abroad, %	0.2	0.1	0.2	0.2	0.4	0.4	0.8
Commuting-based workers (workplace: fixed location separate from home), %	85.5	84.7	81.0	88.6	86.5	85.1	85.6
No answer/do not know, %	4.0	4.4	8.6	2.5	0.4	0.3	0.2
Total, %	100	100	100	100	100	100	100
(B) Telework[a]							
All teleworkers[b], thousands	237	188	227	480	498	826	910
Observed number, *n*	57	123	153	464	1689	1812	725
Share of all gainfully employed, %	5.9	4,8	5.3	10.6	11.0	17.3	19.7
Share of all commuting-based workers, %	6.9	5.6	6.6	12.0	12.7	20.3	23.0

Sources: The Swedish National Surveys of ICT Use 1997, 2004 and the Swedish National. Notes. Travel Surveys 1999, 2001, 2005–2006, 2011, 2012. Data processed by the authors.

[a]Telework is here defined to mean regular work done during the scheduled work time of day and at a location other than the ordinary, fixed workplace (i.e. a subset of commuting-based work).

[b]There are no statistically significant differences between the years 1997, 1999 and 2001 or between 2004 and 2005–2006.

and Brynin, 2005; Hjorthol, 2006; Garrett and Danziger, 2007; Scott *et al*., 2012), namely, *technology*, *location*, *contractual arrangements* between worker and employer and other work-related factors (e.g. timing) and *personal and household attributes*.

Work-related factors

A central observation is that work-related factors are the most influential when telework is adopted (Mokhtarian and Salomon, 1996; Bailey and Kurland, 2002; Kowalski and Swanson, 2005). These factors include manager willingness to permit and support work from home, levels of trust between managers and employees, self-perceived job suitability, workplace interaction needs and the availability of office space and equipment at home (Baruch, 2000; Yen, 2000; Kowalski and

Swanson, 2005; Taskin and Edwards, 2007). Scheduling flexibility and freedom from interruption when working at home are perceived as benefits, whereas professional and social isolation are drawbacks (Bailey and Kurland, 2002; Wilks and Billsberry, 2007; Golden *et al.*, 2008). In addition, as most employees who telework tend to do so infrequently, their primary organisational identity is unlikely to be that of 'teleworker'. This means, as emphasised by Bailey and Kurland (2002), that the conceptualisation of telework should shift away from a traditional one emphasising incentives and actions aimed at long-term work outside the office, to a more flexible understanding in which individuals, at various times, may work away from the office for longer or shorter periods. It is suggested that telework should generally be viewed as a *practice* that individuals occasionally employ, not as a full-time work arrangement. A further prime motivation for telework is seeking quiet time for tasks that require considerable thought and uninterrupted concentration, for example, when deadlines are approaching (Bailey and Kurland, 2002). They further suggest that technology—i.e. ICT access—is more of a facilitator of work performed remotely than a driver *per se*, as connectedness can sometimes be a problem if one wants to remain undisturbed. This calls for operational definitions of telework that do not necessarily depend on the use of ICTs to perform remote work.

Further detailing the role of work-related factors, Mokhtarian *et al.* (1998) observe that specific work tasks rather than general job characteristics affect individual decisions to adopt teleworking practices. This concerns, for example, individual control of work pace, desired levels of face-to-face interaction and self-perceived suitability (Bailey and Kurland, 2002). Overall, this means that intimate knowledge of specific jobs, rather than global categories, might best explain telework adoption. Still, it is reasonable to think that qualified knowledge workers, information workers, advanced services and marketing personnel, and research and development staff are in a position where such tasks are more common than in other groups on the labour market.

Ultimately, the decision to telework is essentially affected by management and its willingness to permit remote working (Bailey and Kurland, 2002; Felstead *et al.*, 2005). Much research dating back to the times of early telework adoption observed a situation in which management interest in telework was generally very low, constituting more of a minority interest (Tomaskovic-Devey and Risman, 1993; Harrington and Ruppel, 1999). Managers found coordinating telework costly, the needed programs difficult, and, in particular, controlling remote workers problematic. Issues of trust, control and power were regarded as the main obstacles constraining the implementation of teleworking programs and favouring professionals rather than clerical workers. These obstacles arose because telework challenges the traditional practice of management control and surveillance based on the presence and visibility of employees (Felstead *et al.*, 2005). However, as more recent studies demonstrate, the effects of management power change over time and space (Peters and den Dulk, 2003) and between types of organisation (Taskin and Edwards, 2007; Bergum, 2009). This observation points to a need for further exploration of contemporary developments.

Technology

Though the availability of ICTs in the home and elsewhere is important for systematic interest in and implementation of telework, ICTs constitute more of a facilitator than a driving force *per se* (Haddon and Brynin, 2005). In more general terms, ICTs are often perceived as a precondition for telework, though technology alone is far from sufficient. For example, the huge increase in Internet access in the 1990s and 2000s did not trigger any correspondingly rapid increase in telework. However, few adoption studies have addressed the new emergent

situation in which ICTs are becoming more personalised, mobile and interactive, and the capacity to transfer data (e.g. text, videos, and sounds) has radically increased—along with user skills and experience. One exception is Neirotti *et al.* (2013) who document a recent overall increase in the diffusion of telework in one Italian region, demonstrating that this increase is primarily attributable to a rise in 'mobile work' rather than to stationary, home-based forms of telework.

Personal factors

Several studies in various contexts centre on individual and household characteristics of teleworkers. On the whole, such 'demand-side' factors appear fairly influential, though results sometimes diverge between studies. It is generally found that teleworkers have high professional/occupational status, high income (Peters *et al.*, 2004; Hjorthol, 2006) and high education (Peters *et al.*, 2004; Haddon and Brynin, 2005; Gareis *et al.*, 2006; Hjorthol, 2006), and are often middle aged and male (Haddon and Brynin, 2005; Hjorthol, 2006; Nätti *et al.*, 2011). They are more likely to have family and young children (Scott *et al.*, 2012), indicating a need to balance work and family duties. However, research has yielded mixed results regarding the demographic and gender factors associated with telework adoption, which depend partly on cultural context. In US studies, female early adopters were more likely to cite family benefits as a motivation and to claim that telework helped them manage their everyday responsibilities (Mokhtarian *et al.*, 1998; Duxbury and Neufeld, 1999). Focusing on how people gauge the consequences of remote work, in a meta-study, Gajendran and Harrison (2007) found that telework has a largely positive effect, giving employees more control over how they perform their work, more job satisfaction, less stress and improved work–family balance. Other studies, however, cast some doubts on the extent to which telework really helps employees balance work and family responsibilities (Peters *et al.*, 2004; Hilbrecht *et al.*, 2013). Furthermore, psychological traits connected to personal discipline, preference for working alone and workaholism have been found to be connected to teleworking (Duxbury and Neufeld, 1999; Peters *et al.*, 2008). Correspondingly, there are certain person-related barriers to telework, for example, social isolation and the presence of household distractions (Wilton *et al.*, 2011). The decision to telework is also found to be positively socially influenced by friends, neighbours and colleagues at the workplace who also telework (Scott *et al.*, 2012).

Spatial factors

Telework could offer more locational flexibility among both employers and employees, allowing towns and rural areas at a distance from urban centres to improve their relative attractiveness. However, besides several studies of the relationships between physical transportation and ICT use (for a review, see Andreev *et al.*, 2010), few studies consider the geographical aspects of telework adoption. An observation concerning the supply side is that telework has predominantly been an urban or suburban phenomenon and is less common in remote areas (Grimes, 2000; Vilhelmson and Thulin, 2001; Pyöriä, 2011), partly because the employers most likely to allow telework—such as R&D-oriented organisations and knowledge-intensive services—are largely concentrated in urban growth centres (e.g. Cooke, 2002). From the demand side, the physical separation between place of residence and regular workplace, i.e. commuting distance, has not proven to be as strong a motivation for telework as initially expected (e.g. Hjorthol, 2006 Andreev *et al.*, 2010). This might indicate that commuting-based workers' preference for adopting telework is not that sensitive to geographical distance and does not differentiate between types of regions. It also hints that the relations between job location,

residential location and teleworking practices are complex, dynamic and difficult to sort out. This suggests a need for further attention to the extent to which regional accessibility is associated with workers' propensity to use telework options and to ongoing regional differentiation in teleworking opportunities.

Data and method

We use cross-sectional microlevel data from the Swedish National Travel Surveys (NTS) for the analysis. Besides collecting mobility resource and daily travel data from representative samples of the total population aged 6–84 years, these surveys contain questions about the occurrence, timing and location of telework and about work-related virtual mobility, ICT access and ICT use as well. For the purpose of this paper, we essentially use NTS data covering two periods, i.e. 2005–2006 and 2011–2012.[1] In some cases, we construct time series based also on earlier comparable surveys conducted in 1997, 1999, 2001 and 2004 and on initial estimates from the latest 2013 NTS.[2]

The quality of NTS data is comparatively high. In 2005–2006, with a response rate of 68%, 27,000 interviews were completed. The 2011–2012 sample comprised interviews with 24,000 individuals representing a response rate of 43%. In both surveys, non-respondents did not significantly differ from the total population as regards known background factors with two exceptions: people 25–35 years old and the foreign born are slightly under-represented. Data were collected via prepared telephone interviews (the interviewee was informed and given a supplementary pen-and-paper diary one week before registration and telephone contact). Some background information concerning the respondents was obtained from official registers (e.g. concerning income, education, occupation and place of residence).

For our purpose, we used a subsample comprising all gainfully employed people (including self-employed and employers) in the population, including those also considered teleworkers (information about the observed number of gainfully employed and teleworkers, see Table 1). However, as observed in the introductory section, there is no universal definition of telework. The empirical data permit several operational definitions regarding the central dimensions discussed, such as contractual arrangements, location, time, technology and personal factors. Essentially, here we define telework as meaning regular work done during the scheduled work time of day and at a location other than the ordinary, fixed workplace. People without a fixed workplace (with 'mobile' or flexible workplaces) are not included nor are people whose ordinary work is located at home. We regard telework as a practice that individuals themselves report that they *regularly* employ, though not as a full-time work arrangement or otherwise defined, for example, as regards a minimum timing threshold. Furthermore, our definition does not stipulate any ICT use. This is consistent with the observation that telework is sometimes motivated by the sheer need to work alone and undisturbed without the use of particularly advanced ICTs (Sullivan, 2003).

Also central to our analysis are the educational, occupational and regional aspects associated with telework. As regards education, we use register-based information classified consistent with the established progression of the Swedish school system. Concerning occupation, we use information from registers aggregated according to the Swedish Standard Industrial Classification (SNI) classification scheme.[3] This scheme was revised in 2007, complicating detailed comparisons between the studied years regarding the service sector of the economy in particular. To perform aggregate-level comparison, we distinguish what we call the 'advanced service' sector comprising industry codes J (information and communication), K (financial and insurance activities), M (professional, scientific and technical activities) and P (education). Concerning regions, using national survey sample data clearly limits the geographical resolution of the analysis. We therefore

apply an established urban–rural scale that identifies seven homogenous regions in Sweden according to their local and regional population density and proximity to urban centres ('H regions'). This scale comprises the larger urban regions of Stockholm, Göteborg, and Malmö and rural areas in southern and northern Sweden.

The descriptive analysis of the survey entailed constructing time series of the incidence of teleworking in Sweden from 1997 to 2012, and making bivariate comparisons of factors affecting the decision to telework between 2005–2006 and 2011–2012 at the national and regional levels. Binary logistic regression was then used to model factors influencing teleworking probability. Weighting procedures were used to produce estimated total for the target population.

Results

Changes in workplace location and teleworking

We first explore the overall change in telework since the end of the 1990s, setting this in relation to the general development of work–home relationships in Sweden. In the subsequent sections, we concentrate on changes between 2005–2006 and 2011–2012.

As mentioned in the introduction, the number of teleworkers in Sweden reached a new high in 2011–2012. Time series (see Table 1) indicate that almost one quarter of all gainfully employed commuters now claim to work regularly at locations other than their fixed workplace—a radical increase within the short period since 2005–2006. Notably, telework is here identified as integral to, and a subset of, regular commuting-based work, which still constitutes by far the most dominant way of spatially organising work–home relationships. Regarding trends in other spatial forms of work organisation, potentially also influenced by ICTs, we find that mobile work (here understood as work regularly performed at various locations) has increased slightly, whereas entirely home-based work (often self-employed) and work abroad have remained almost constant (see Table 1). The overall spatial arrangement of home–work relationships has therefore remained remarkably stable over the studied 15-year period, the growth of telework constituting the only significant sign of increased flexibility.

Changing practices and potentials: timing, location and ICT

The increase in telework adoption is associated with changes measured in the basic dimensions discussed in the theoretical framework, i.e. timing, job suitability, technical capability and ICT use, and location. A baseline observation is that telework frequency increased by 74.1% over the 2005–2006 to 2011–2012 period of rapid expansion, at a much faster rate than employment in general, which increased by 3.8% (see Table 2).

As regards contractual arrangements concerning time and place, the fastest growth occurred among those performing telework frequently, i.e. more than three days per week, though the more infrequent teleworkers still constitute most teleworkers. We also find slightly faster growth among people teleworking part of the day than among those teleworking full time. As regards *place*, in 2011–2012 almost all (95.8%) teleworking occurred in the worker's home, which was also the fastest growing telework location over the period. Other locations often highlighted in the literature, including telecottages, secondary homes, public spaces and public transport, played a minor role and even declined over the period. This concerns regular work and work time and does not contradict the fact that people may increasingly be performing work tasks during overtime work at various locations, for example, when commuting.

Table 2: Teleworking practices: timing, location and use of ICTs by teleworkers in Sweden, 2005–2006 and 2011–2012; frequency, share of all teleworkers and relative change (Definition of telework(er), see note, Table 1)

		2005–2006 (thousands)	2011–2012 (thousands)	Relative change, 2005–2006 to 2011–2012 (%)
Teleworked on day of measurement		50 (10.1%)	168 (19.3%)	234.3*
Timing of regular telework, per month/week	1–3 times per month	153 (30.7%)	281 (32.4%)	83.8*
	1–2 times per week	114 (22.9%)	191 (22.0%)	67.5*
	2–3 times per week	45 (9.1%)	81 (9.3%)	77.7*
	3–4 times per week	41 (8.2%)	84 (9.7%)	104.8*
	Daily	43 (8.5%)	86 (9.9%)	102.9*
Timing of regular telework, day	Full working day	106 (21.2%)	166 (19.1%)	56.7*
	Part of working day	261 (52.3%)	475 (54.7%)	81.9*
	Both full and part of working day	100 (20.1%)	177 (20.4%)	76.6*
Location of telework	At home	444 (89.0%)	832 (95.8%)	87.3*
	Other location	55 (11.0%)	37 (4.2%)	–33.0
Use of ICT when teleworking	Uses the Internet at home for work	385 (77.2%)	813 (93.6%)	111.2*
	Can manage work e-mail	342 (68.5%)	798 (91.9%)	133.7*
	Can connect to work computer systems	220 (44.1%)	579 (66.7%)	163.6*
All teleworkers, total		499 (100%)	868 (100%)	74.1*
All commuting-based workers, total		3925	4017	2.3*
All gainfully employed, total		4535	4709	3.8*

Note. *Statistically significant change, $p < 0.05$.

Concerning the enabling role of *technology*, we find that basic forms of ICT use, such as using the Internet and managing work e-mail, have increased greatly and are now integral to teleworking for almost everyone. There has also been a rapid increase in access to more advanced online connections between home and work, two-thirds (66.7%) of teleworkers now being able to connect to the workplace server from their home-based (or remote) computer compared with 44.1% in 2005–2006.

As regards fundamental *work-related* prerequisites, the 0.9 million employees (equivalent to 21.6% of all commuting-based workers) who report engaging in telework in 2011–2012 obviously also have the right and opportunity to do so—i.e. suitable job tasks and employer approval. However, still more people have this opportunity and the potential has increased during the studied period (see Table 3). Of the total population of commuting-based workers, nearly one third (31.7%) estimate having work, or work tasks, that in principle allow for telework, one quarter (24.7%) have employer permission to engage in telework, and slightly fewer, 22.5% say that they could use this opportunity if they wanted to. The

Table 3: Indices of teleworking potential in Sweden, 2005–2006 and 2011–2012; frequency, share of all commuting-based workers and relative change

		2005–2006 (thousands)	2011–2012 (thousands)	Relative change, 2005–2006 to 2011–2012 (%)
Work-related conditions	Work tasks that could be performed remotely	925 (23.6%)	1,495 (37.2%)	61.6*
	The employer allows for teleworking	691 (17.6%)	1,164 (29.0%)	68.5*
	Can work remotely if one wishes	640 (16.3%)	1,060 (26.4%)	65.6*
Technical conditions	Use the Internet at home for work	1,325 (33.8%)	2,044 (50.9%)	54.3*
	Can handle work e-mail outside the workplace (2005: from home)	1,317 (33.6%)	2,344 (58.4%)	78.0*
	Can connect to work computer systems outside the workplace (2005: from home)	633 (16.1%)	1,188 (29.6%)	87.6*
	Can connect to work computer systems via mobile computer	192 (4.9%)	1,099 (27.4%)	469.5*
	Access to e-mail address associated with work	2,398 (61.1%)	3,152 (78.5%)	31.5*
	Access to broadband at home	2,540 (64.7%)	3,019 (75.2%)	18.9*

Note. *Statistically significant change, $p < 0.05$.

corresponding situation holds for the technical ability to telework from home, for example an increased capacity to connect remotely to the work computer system, increasingly when mobile as well.

The contemporary teleworker

So far, we have traced the changing practices and potentials of teleworking. Who are contemporary teleworkers and has the composition of the background factors shifted in any way? Concentrating on a few relevant factors consistent with previous research, several observations can be made (see Table 4). During the 2005–2006 to 2011–2012 period, we find that women remained slightly under-represented in the actual teleworking population, though the *gender gap* comprises only a few per cent. As regards *family life cycle* and *age*, we find that parents with children at home (smaller children, in particular) are over-represented and among the fastest growing groups of teleworkers. Growth is largely concentrated among middle-aged people 35–54 years old. Furthermore, *education* and *profession* are

Table 4: Teleworkers in Sweden: personal characteristics, 2005–2006 and 2011–2012; frequency, within-group share and relative change in teleworkers

		Teleworkers (thousands)		Within-group share[a] (%)		Relative change 2005–2006 to 2011–2012 (%)
		2005–2006	2011–2012	2005–2006	2011–2012	
Gender	Female	229	396	10.9	19.9	72.8*
	Male	270	472	12.4	23.3	75.1*
Age, years	15–24	9	12	2.3	3.3	43.5
	25–34	95	132	12.0	19.3	38.8
	35–44	143	271	15.1	25.3	90.0*
	45–54	108	205	12.9	22.9	90.0*
	55–64	83	134	11.5	17.3	61.3*
	65–84	6	11	11.6	13.6	92.9
Life cycle stage	Younger, 15–44 years, no children	99	141	8.6	12.8	42.0*
	Parents, younger children (0–6 years)	114	222	16.3	25.5	95.1*
	Parents, older children (7–18 years)	135	247	13.4	23.5	83.3*
	Older, 45 + years, no children	124	198	10.6	16.0	59.5*
Education	Primary school	24	33	3.9	6.2	38.6
	Upper secondary school	146	240	7.4	12.1	64.6*
	University	307	562	19.5	29.5	82.8*
	Postgraduate	19	27	37.8	42.0	43.2
Employment sector	Advanced services	235	371	23.3	34.5	58.1*
	Other	264	497	8.2	14.3	88.2*
Employment contract	Permanent	361	670	12.2	20.8	85.7*
	Fixed term, project	37	40	7.0	9.0	8.7

(continued)

Table 4 (Continued).

		Teleworkers (thousands)		Within-group share[a] (%)		Relative change 2005–2006 to 2011–2012 (%)
		2005–2006	2011–2012	2005–2006	2011–2012	
Income	SEK 0–199,999	31	36	4.0	8.0	14.7*
	SEK 200,000–299,000	126	81	7.5	7.6	–35.4*
	SEK 300,000–399,999	160	270	17.5	18.8	68.2*
	SEK 400,000–599,999	115	263	31.3	35.4	128.9*
	SEK 600,000+	41	148	35.1	51.5	259.5*
Broadband access in the home	Yes	390	721	14.3	21.3	84.6*
	No	83	139	9.1	15.9	67.7*
Living region	Stockholm region	157	284	16.9	29.3	80.6*
	Göteborg region	48	85	11.8	21.0	76.2*
	Malmö region	39	56	15.6	21.2	43.6
	Medium-sized city regions	158	270	10.4	18.2	70.7*
	Small city regions	61	72	8.9	12.3	18.1
	Small towns/rural regions	24	33	11.0	16.5	38.0
	Remote rural regions	12	17	5.1	8.3	39.1
All		499	868	11.0	19.1	74.1*

Notes. [a]The share of teleworkers of all commuting-based workers within in each group. E.g., the share of teleworkers among women increased from 10.9% to 19.9% between the years of investigation.
*Statistically significant change, $p < 0.05$.

crucial factors, as the university educated, those employed in what are broadly termed 'advanced services', and high income earners are increasingly more engaged in telework. However, somewhat faster growth of telework in sectors other than the advanced services indicates that teleworking arrangements are now diffusing to more traditional parts of the economy.

The regional factor

The spread of the space-transcending practice of telework also has geographical implications. From a regional perspective, the larger urban regions of Sweden, Stockholm in particular, but also Göteborg and Malmö, have comparatively larger shares of teleworkers, while the rates decrease in smaller cities and more sparsely populated rural regions (see Table 4). The fastest growth in telework in the studied period is observed in the largest urban regions, whereas growth in towns and rural regions is far below average, this also being the case when the divergence between the actual and expected number of teleworkers is considered (see Figure 1). Even when controlling for underlying changes in regional employment, teleworkers are increasingly over-represented in large urban areas and increasingly

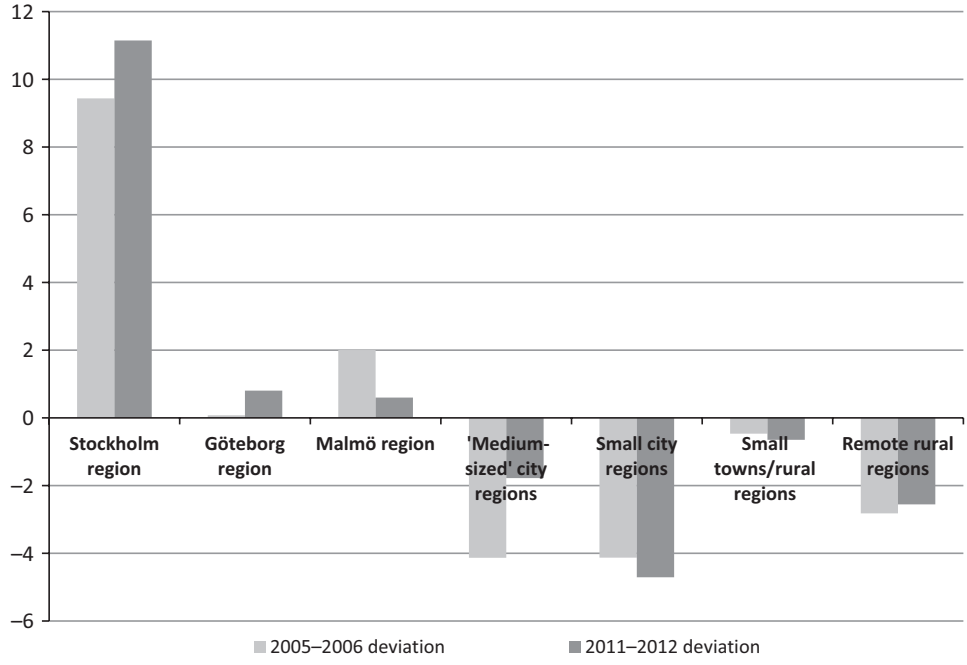

Figure 1: Regional aspects—the difference between actual and expected share of teleworkers in 2005–2006 and 2011–2012 calculated as the share of all teleworkers in a region versus the share of all gainfully employed (percentage points). Note. Definition of regions. Stockholm region: Municipalities within the Stockholm labour market area (2,200,000 inhabitants). Göteborg region: Municipalities within Göteborg labour market area (940,000 inhabitants). Malmö region: Municipalities within Malmö labour market area (600,000 inhabitants). Medium-sized city regions: Municipalities with population more than 90,000 within 30 km from city centre. Small city regions: Municipalities with 27,000–90,000 inhabitants within 30 km from centre and more than 300,000 inhabitants within 100 km from centre. Small towns/rural regions: Municipalities with 27,000–90,000 inhabitants within 30 km and less than 300,000 inhabitants within 100 km from centre. Remote rural regions: Municipalities with less than 27,000 inhabitants within 30 km from centre

under-represented in medium-sized and small city regions and rural areas mainly because advanced services and businesses are increasingly clustered in the larger urban areas of Sweden.

Multivariate analysis

Finally, we check whether the variables so far analysed and discussed separately, selected based on earlier findings concerning important factors influencing the individual decision to telework, also matter in a multivariate setting, that is, when statistically controlled for. As the dependent variable—i.e. performing telework regularly or not—is dichotomous, we use binary logistic regression for the

Table 5: Factors affecting telework adoption: people stating that they regularly telework. Logistic regression (telework no = 0, yes = 1)

	Model 1, 2005–2006 (n = 10,409)			Model 2, 2011–2012 (n = 10,522)		
	B	Sig.	Exp(B)	B	Sig.	Exp(B)
Employment sector (ref = other)						
Advanced services	0.856***	0.000	2.353	0.660***	0.000	1.935
Education (ref = primary school)						
Upper secondary school	0.447***	0.003	1.564	0.649***	0.000	1.914
University	1.439***	0.000	4.216	1.628***	0.000	5.095
Postgraduate	2.259***	0.000	9.575	2.352***	0.000	10.507
Internet access (ref = no)						
Broadband access at home	0.370***	0.000	1.448	0.321***	0.000	1.378
Living region (ref = Stockholm region)						
Göteborg/Malmö regions	−0.268**	0.010	0.765	−0.390***	0.000	0.677
Medium-sized city regions	−0.361***	0.000	0.697	−0.402***	0.000	0.669
Small city/towns/ rural regions	−0.332***	0.000	0.718	−0.706***	0.000	0.493
Remote rural regions	−0.784***	0.000	0.457	−1.174***	0.000	0.309
Gender (ref = female)						
Male	0.370***	0.000	1.448	0.264***	0.000	1.303
Life cycle phase (ref = parents of younger children, 0–6 yrs)						
Younger, 15–44 yrs, no children	−0.662***	0.000	0.516	−0.640***	0.000	0.527
Parents of older children (7–18 yrs)	−0.245***	0.005	0.782	0.037	0.609	1.037
Older, 45 + years, no children	−0.211*	0.019	0.810	−0.175*	0.019	0.839
Other	−0.290*	0.041	0.748	−0.218*	0.043	0.804
Employment contract (ref = permanent)						
Fixed term/project	−0.050	0.616	0.952	−0.289**	0.003	0.749
Constant	−3.093***	0.000	0.045	−2.603	0.000	0.074
Nagelkerke R^2	0.150			0.166		

Note. Significance levels: ***$p < 0.001$ **$p < 0.01$ *$p < 0.05$.

purpose. In Table 5, we model the probability of adopting telework in 2005–2006 (Model 1) and 2011–2012 (Model 2) against a set of factors used in the preceding bivariate comparisons, considering proxies for type of job (i.e. employment sector, employment conditions, and educational skills), personal characteristics and roles (i.e. gender, age, and household life cycle), ICT equipment at home (i.e. broadband Internet access) and type of living region (i.e. 'H region'). Though the application of multivariate methods can give the impression that causation has been identified, in this setting (using cross-sectional data), it can merely prove associations between telework and other factors.

A main result is that, with few exceptions, we find similar general patterns in signs, significance and coefficients for both 2005–2006 and 2011–2012. Being male, having a family and young children, being university educated, being permanently employed in advanced services, and living in the larger urban regions of Sweden are all factors that significantly increase the likelihood of regularly performing telework. This outcome is largely consistent with the expectations engendered by previous studies and the descriptive statistics (see e.g. Allvin *et al.*, 2011). It is nevertheless noteworthy that the same factors are still at work while the level of acceptance has increased. One exception is 'being a parent with children 7–18 years old', which has significantly less impact than does the reference category, 'having younger children', in 2005–2006, while no significant difference is found six years later. This shift is likely due to a cohort effect. Another exception concerns the employment contract, where not having permanent employment has become negatively associated with teleworking in recent years, indicating that employees with weak ties have become more committed spending their working time at the regular workplace, possibly due to increased labour market uncertainties and employment insecurity in general. It is also observed that workers living in the larger urban areas of Sweden are more likely to adopt telework compared to those living in more remote and sparsely populated regions (other factors held constant). Though it is tempting to compare the regression coefficients over time, such an elaboration is avoided on statistical grounds due to the risk of erroneous inference.[4]

Conclusions

In conclusion, we find firm evidence that telework has become routine for a sizeable fraction, an emergent early majority, of the Swedish working population in recent years. As a subset of commuting-based work, telework therefore helps maintain the underlying traditional and dominant pattern of workplaces at fixed locations spatially separate from homes. Potentially competing arrangements arguably also promoted by virtualization—for example, mobile work (multisite or at no fixed location) and entirely home-based work—have consistently remained at low levels. Besides the growth of telework, this gives contradictory input to the general debate on the ongoing spatial decoupling and locational flexibility of work in contemporary society (see e.g. Allvin *et al.*, 2011, for a discussion).

How, then, can the rapid increase in telework be understood? Given that available datasets are cross-sectional—limiting the explanatory power of the analysis—and given the compound, multiple factors promoting and constraining telework, causation is obviously difficult to establish simply by ranking a few concrete determinants. However, from a theoretical perspective, we believe that our findings support four plausible explanations. These are discussed below, where we also identify important issues meriting further research.

A *first* explanation relates to the basic notion that the spread of socio-technical innovations takes time due to friction, a notion emphasised in classical innovation diffusion research (e.g. Rogers, 1962; Hägerstrand, 1967). In this context, it is reasonable to assume that it takes time for employers and employees to accept and adjust to new, more flexible work arrangements. In particular, previous

research notes employers' initial resistance to allowing telework, as it puts workers out of their sight and immediate control (e.g. Taskin and Edwards, 2007). We find evidence that employers' willingness to permit telework has increased over the study period, implying that essential constraining factors associated with managers' trust, power and control have been eased. This may be due to the introduction of increasingly advanced Internet-based systems for monitoring, supervising and evaluating work performed at a distance. Concurrently, ongoing labour market changes in Sweden, leading to a higher proportion of knowledge-intensive work, signal a shift from direct supervision to more result-based control (as argued by e.g. Alvesson, 2004). This development has likely contributed to forms of management and control that favour the acceptance of telework, a shift with implications for employees that calls for further research.

A *second* plausible explanation for the growth of telework also relates to working life in transition, whereby occupations and work tasks increasingly involve communication and the transfer of knowledge and informational products, symbols and services over great distances (Cooke, 2002; Felstead *et al.*, 2005). Our findings suggest that jobs and work tasks have gradually become more appropriate for remote work. However, this trend is not observable in every sector or everywhere, as we find that telework is still strongly associated with high-status occupations in the advanced service sector. This includes work in the information and communication, financial and insurance and education sectors as well as work in professional, scientific and technical occupations. However, some signs indicate that telework is diffusing to more traditional, less-advanced parts of the service economy as well. At the contractual level, telework increasingly involves workers with permanent jobs, the association with workers with 'flexible' work arrangements having weakened, an observation that runs counter to perceptions that telework reinforces the 'precarisation' of work (Standing, 2011). Both these emerging tendencies—i.e. the spread of telework into more traditional, less-advanced services and telework being less associated with job insecurity—prompt further investigation.

A *third* explanation relates to the attractiveness of flexible work arrangements among certain groups and to wider issues of work–life balance, conflict and satisfaction. Our findings suggest that telework is becoming an increasingly important strategy among groups struggling to combine the daily use of time for various purposes at different locations, as investigated by, for example, Wheatley (2012). From the individual adoption perspective, our findings suggest that personal conditions, particularly as related to family situation and the juggling of time for household and family responsibilities, career and leisure activities, encourage work at home. Individuals with families and children are overrepresented and indeed are among the fastest growing groups of teleworkers. In the Swedish case, this is probably reinforced by the legal right of employees to stay home temporarily and care for sick children when needed. Unlike in many other European countries (see Haddon and Brynin, 2005), the teleworking divide between women and men is smaller in Sweden, possibly due to the similar labour market participation rates of women and men. This touches on important gendered aspects of teleworking and its current drivers, as Sweden paradoxically has an extremely gender-segregated labour market, partly due to its large public sector with a high proportion of women employees (Gonäs, 2006). This situation increases the actual probability of women finding telework opportunities, because telework in the 'less-advanced' service sector is also on the increase.

A *fourth* explanation relates to obvious advances in ICTs in recent years. Our findings suggest that the increased portability, interactivity and media richness of new ICTs emerging since 2005 have made teleworking more feasible for many. Observed growth in telework goes hand in hand with radically improved broadband access in Sweden (see e.g. Thulin and Vilhelmson, 2010). This has increased employee capacity to process richer information and to interact with the ordinary workplace, and has also probably increased the perceived need to be accessible

for work almost everywhere and any time. Without falling into the trap of technological determinism, the facilitating role of effective technology is clear in the registered increase in the (virtual) work activity space. Yet, to further improve our theoretical and practical understanding of telework adoption and expansion, upcoming research should more thoroughly examine the discussed factors related to working life in transition rather than to technology—that is, factors associated with managers' trust, power and control, with the changing character of jobs, work tasks and contracts in advanced as well as less-advanced sectors and regions, and with household-related factors linked to wider issues of work–life balance and blurring, time use and quality of life.

Our main conclusions concerning recent telework adoption are accompanied by important findings at more specific spatial and temporal levels. At the regional level, we find ongoing spatial concentration, as Sweden's comparatively large urban regions have strengthened their position as major teleworking milieux, a situation essentially mirroring major shifts in the composition of regional labour markets. This tendency opposes the hopes often articulated over the years that telework will diffuse geographically, into rural areas in particular, and speaks in favour of the continued spatial clustering of knowledge-based industries (see e.g. Power, 2002). As regards the more precise location of telework, most ordinary telework is performed in employee homes, while other places often highlighted in the literature (e.g. telecentres, telecottages, cafés and other public spaces) are much less frequent telework sites. This observation stands in contrast to discussions, suggesting that mobile locales could be an influential driving force of telework (Hislop and Axtell, 2007; Neirotti *et al.*, 2013) though it does not contradict observations that people increasingly work when commuting, although such work is not included in dedicated work time. From a timing perspective, the present results substantiate the importance of not viewing telework as a full-time endeavour or an overriding identity (Bailey and Kurland, 2002). By far, most teleworking is still rather infrequent (i.e. once a week or less often) and often part-time. The most rapid increase, albeit from low levels, involves more frequent and even daily practices. This means that the general increase in telework volume affects not only the number of people involved but also the frequency of teleworking activity. Finally, we infer a potential for more teleworking in the near future, because there is a gap between the actual number of teleworkers and those who have job tasks perceived as suitable and also have employer permission to telework.

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Notes

[1] The 2005–2006 NTS covered 12 consecutive months; the 2011–2012 NTS covered 24 months.

[2] Data were retrieved from the Swedish National Surveys of ICT Use, 1997 and 2004, and from the Swedish National Travel Surveys, 1999 and 2001. Identical questions concerning gainful work and telework were asked in all the surveys, while the sample sizes were smaller in surveys before 2005–2006 (observed numbers, see Tables 1 and 2).

[3] The Swedish Standard Industrial Classification (SNI) scheme, based on the EU's NACE Rev. 2 standard, is primary an activity classification system. Production units such as companies and local units are classified according to the activity carried out.

[4] Comparing different magnitudes (sizes) of logistic regression, coefficients for similar models across groups, samples or time points can lead to erroneous conclusions; there is no consensus as to how to make such comparisons correctly (Allison, 1999; Mood, 2010).

References

Alexander, B., M. Dijst and D. Ettema (2010), 'Fragmentation of Work Activity as a Multi-Dimensional Construct and its Association with ICT, Employment and Socio-Demographic Characteristics', *Journal of Transport Geography* **18**, 55–64.

Allison, P.D. (1999), 'Comparing Logit and Probit Coefficients Across Groups', *Sociological Methods and Research* **28**, 2, 186–208.

Allvin, M., G. Aronsson, T. Hagström, G. Johansson and U. Lundberg (2011), *Work without Boundaries: Psychological Perspectives on the New Working Life*. (Singapore: Wiley-Blackwell).

Alvesson, M. (2004), *Knowledge work and knowledge-intensive firms* (Oxford: Oxford University Press).

Andreev, P., I. Salomon and N. Pliskin (2010), 'Review: State of Teleactivities', *Transportation Research C: Emerging Technologies* **18**, 1, 3–20.

Bailey, D.E. and N.B. Kurland (2002), 'A Review of Telework Research: Findings, New Directions, nd Lessons for the Study of Modern Work', *Journal of Organizational Behavior* **23**, 383–400.

Baruch, Y. (2000), 'Teleworking: Benefits and Pitfalls as Perceived by Professionals and Managers', *New Technology, Work and Employment* **15**, 34–49.

Bergum, S. (2007), ''What has Happened to Telework? Failure, Diffusion or Modification', *The Journal of E-Working* **1**, 13–44.

Bergum, S. (2009), *Management of teleworkers: Managerial communication at a distance*. PhD thesis, Series A-10:2009, Turku School of Economics, Turku. http://www.doria.fi/bitstream/handle/10024/98537/Ae10_2009Bergum.pdf?sequence=2

Cooke, P. 2002. *Knowledge Economies. Clusters, Learning and Competitive Advantage* (London: Routledge).

Duxbury, L.E. and D. Neufeld (1999), 'An Empirical Evaluation of the Impacts of Telecommuting on Intra-Organizational Communication', *Journal of Engineering and Technology Management* **16**, 1–28.

Felstead, A., N. Jewson and S. Walters (2005), *Changing Places of Work*. (London: Palgrave).

Gajendran, R.J. and D.A. Harrison (2007), 'The Good, the Bad, and the Unknown about Telecommuting: Meta-Analysis of Psychological Mediators and Individual Consequences', *Journal of Applied Psychology* **92**, 6, 1524–1541.

Gareis, K., S. Lilischkis and A. Mentrup (2006), 'Mapping the Mobile Eworkforce in Europe', in Andriessen, J.H. and Vartiainen, M. (Eds), *Mobile Virtual Work* (Berlin: Springer), pp. 45–70.

Garrett, R.K. and J.N. Danziger (2007), ''Which Telework? Defining and Testing a Taxonomy of Technology-Mediated Work at a Distance', *Social Science Computer Review* **25**, 1, 27–47.

Gil Solá, A. and B. Vilhelmson (2012), 'Convergence or Divergence? Changing Gender Differences in Commuting in Two Swedish Urban Regions', *Cybergeo: European Journal of Geography*, 1–14. Article 591, Online since 14 February 2012, https://cybergeo.revues.org/25141

Golden, T.D., J.F. Veiga and R.N. Dino (2008), 'The Impact of Professional Isolation on Teleworker Job Performance and Turnover Intention: Does Time Spent Teleworking, Interacting Face-To-Face, or Having Access to Communication-Enhancing Technology Matter?', *Journal of Applied Psychology* **93**, 6, 1412–1421.

Gonäs, L. (2006), 'Gendered Divisions of Work - A Multilevel Approach', in L. Gonäs and J. Karlsson (Eds), *Gender Segregation. Divisions of Work in Post-Industrial Welfare States* (London: Ashgate), pp. 29–45.

Grimes, S. (2000), 'Rural Areas in the Information Society: Diminishing Distance or Increasing Learning Capacity?', *Journal of Rural Studies* **16**, 13–21.

Haddon, L. and M. Brynin (2005), 'The Character of Telework and the Characteristics of Teleworkers', *New Technology, Work and Employment* **20**, 1, 34–46.

Haddon, L. and A. Lewis (1994), 'The Experience of Teleworking: An Annotated Review', *International Journal of Human Resource Management* **5**, 1, 193–223.

Hägerstrand, T. (1967), *Innovation Diffusion as a Spatial Process*. (Lund: Gleerup).

Handy, S. and P.L. Mokhtarian (1996), 'The Future of Telecommuting', *Futures* **28**, 3, 227–240.

Harrington, S.J. and C.P. Ruppel (1999), 'Telecommuting: A Test of Trust, Competing Values, and Relative Advantage', *IEEE Transactions on Professional Communication* **42**, 223–239.

Hilbrecht, M., S. Shaw, L.C. Johnson and J. Andrey (2013), 'Remixing Work, Family and Leisure: Teleworkers' Experiences of Everyday Life', *New Technology, Work and Employment* **28**, 2, 130–144.

Hislop, D. and C. Axtell (2007), 'The Neglect of Spatial Mobility in Contemporary Studies of Work: The Case of Telework', *New Technology, Work and Employment* **22**, 1, 34–51.
Hjorthol, R.J. (2006), 'Teleworking in Some Norwegian Urban Areas: Motives and Transport Effects', *Urban Geography* **27**, 7, 610–627.
Hynes, M. (2014), 'Telework isn't Working: A Policy Review', *The Economic and Social Review* **45**, 4, 579–602.
Keirl, S. (2006), 'Ethical Technological Literacy as Democratic Curriculum Keystone', in Dakers, J.R. (ed.), *Defining Technological Literacy: Towards an Epistemological Framework*. (New York: Palgrave Macmillan), pp. 81–103.
Kowalski, K.B. and J.A. Swanson (2005), 'Critical Success Factors in Developing Teleworking Programs', *Benchmarking: An International Journal* **12**, 3, 236–249.
Lister, K. and T. Harnish (2011), *The State of Telework in the U.S. How Individuals, Business, and Government Benefit*. San Diego: Telework Research Network. http://www.workshifting.com/downloads/downloads/Telework-Trends-US.pdf
Mokhtarian, P.L. and I. Salomon (1996), 'Modeling the Choice of Telecommuting: 3. Identifying the Choice Set and Estimating Binary Choice Models for Technology-Based Alternatives', *Environment and Planning A* **28**, 1877–1894.
Mokhtarian, P.L., M.N. Bagley and I. Salomon (1998), 'The Impact of Gender, Occupation, and Presence of Children on Telecommuting Motivations and Constraints', *Journal of the American Society for Information Science* **49**, 1115–1134.
Mood, C. (2010), 'Logistic Regression: Why We Cannot Do What We Think We Can Do, and What We Can Do About It', *European Sociological Review* **26**, 1, 67–82.
Nätti, J., M. Tammelin, T. Antilla and S. Ojala (2011), 'Work at Home and Time Use in Finland', *New Technology, Work and Employment* **26**, 1, 68–77.
Neirotti, P., E. Paolucci and E. Raguseo (2013), 'Mapping the Antecedents of Telework Diffusion: Firm-Level Evidence from Italy', *New Technology, Work and Employment* **28**, 1, 16–36.
Peters, P. and L. den Dulk (2003), 'Cross Cultural Differences in Manager's Support for Home-Based Telework: A Theoretical Elaboration', *International Journal of Cross Cultural Management* **3**, 3, 329–346.
Peters, P., K.G. Tijdens and C. Wetzels (2004), 'Employees' Opportunities, Preferences, and Practices in Telecommuting Adoption', *Information and Management* **41**, 469–482.
Peters, P., C. Wetzelsand and K. Tijdens (2008), 'Telework: Timesaving or Time-Consuming? An Investigation onto Actual Working Hours', *Journal of Interdisciplinary Economics* **19**, 4, 421–442.
Power, D. (2002), '"Cultural Industries" in Sweden: An Assessment of their Place in the Swedish Economy', *Economic Geography* **78**, 2, 103–126.
Pyöriä, P. (2011), 'Managing Telework: Risks, Fears and Rules', *Management Research Review* **34**, 4, 386–399.
Rasmussen, E. and G. Corbett (2008), 'Why isn't Teleworking Working?', *New Zealand Journal of Employment Relations* **33**, 2, 20–32.
Rogers, E.M. (1962), *Diffusion of Innovations*. (Glencoe: Free Press).
Scott, D.M., I. Dam, A. Páez and R.D. Wilton (2012), 'Investigating the Effects of Social Influence on the Choice to Telework', *Environment and Planning A* **44**, 5, 1016–1031.
Standing, G. (2011), *The Precariat: The New Dangerous Class*. (London: Bloomsbury Academic).
Sturesson, L. (2003), 'The Role of Telework: In Rhetoric and Practice', in Rapp, B., *et al.* (Eds), *Organizations and Work Beyond 2000* (Berlin: Springer Verlag), pp. 301–313.
Sullivan, C. (2003), 'What's in a Name? Definitions and Conceptualisations of Teleworking and Homeworking', *New Technology, Work and Employment* **18**, 3, 158–165.
Taskin, L. and P. Edwards (2007), 'The Possibilities and Limits of Telework in a Bureaucratic Environment: Lessons from the Public Sector', *New Technology, Work and Employment* **22**, 3, 195–207.
Thulin, E. and B. Vilhelmson (2010), 'The Internet, Mobile Phones and the Geographies of Everyday Life', in B. Hermelin and U. Jansson (Eds), *Placing Human Geography. Sweden through Time and Space*, YMER 2010, Svenska Sällskapet för Antroplogi och Geografi, (Stockholm: SSAG), pp. 277–309.
Tomaskovic-Devey, D. and B.J. Risman (1993), 'Telecommuting Innovation and Organization: A Contingency Theory of Labor Process Change', *Social Science Quarterly* **74**, 2, 367–385.
Van Lier, T., A. de Witte and C. Macharis (2014), 'How Worthwhile is Teleworking from a Sustainable Mobility Perspective? The Case of Brussels Capital Region', *European Journal of Transport and Infrastructure Research* **14**, 3, 244–267.

Vilhelmson, B. and E. Thulin (2001), 'Is Regular Work at Fixed Places Fading Away? The Development of ICT-Based and Travel-Based Modes of Work in Sweden', *Environment and Planning A* **2001**, 33, 1015–1029.
Welz, C. and F. Wolf (2010), *Telework in the European Union*. European Foundation for the Improvement of Living and Working Conditions, www.eurofound.europa.eu
Wheatley, D. (2012), 'Good to be Home? Time-Use and Satisfaction Levels among Home-Based Teleworkers', *New Technology, Work and Employment* **27**, 3, 224–241.
Wilks, L. and J. Billsberry (2007), ''Should We Do Away with Teleworking? An Examination of Whether Teleworking Can Be Defined in the New World of Work', *New Technology, Work and Employment* **22**, 2, 168–177.
Wilton, R.D., A. Páez and D.M. Scott (2011), 'Why Do You Care What Other People Think? A Qualitative Investigation of Social Influence and Telecommuting', *Transportation Research A: Policy and Practice* **45**, 269–282.
Yen, J.R. (2000), 'Interpreting Employee Telecommuting Adoption: An Economic Perspective', *Transportation* **27**, 149–164.

