

THE PATHS OF WORK AND ICT INTO THE HOME

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Abstract: According to the discourse of telework, information and communication technology (ICT) is one of the main driving forces for telework. However, in Sweden the expansion of home based telework is far slower than the diffusion of computers into households as well as into the workplace. Experience from a group of teleworkers in Sweden indicate that ICT can be a constraint as well as a facilitator of telework. Evidence suggests that ICT is accompanying work into the household, rather than pushing it. In addition, to facilitate telework ICT must be reliable and user-friendly, and the teleworker needs adequate knowledge of and familiarity with the technology.

1. INTRODUCTION

A Swedish discourse on telework took form in the early 1980s, faded out for some years and came back with increasing strength in the 1990s, this time more closely connected to the information society discourse. One of the expectations in the rhetoric was that ICT would push telework, encouraging a great deal of all employees to work at home. This rapid expansion of telework did not occur in Sweden, so the statement that ICT is a pushing factor for telework must be questioned. In reality, ICT sometimes seems to be a restriction for telework, and thus a new hypothesis is proposed: that telework is a factor for pulling ICT into the household.

1.1 Determinism versus dynamic interaction

The observation that work increasingly consists of manipulating and communicating information, and therefore is suitable to combine with the use of computers, has been the basis for predictions of a very strong expansion of teleworking, primarily in the home. Other arguments for the growth of telework have been the assertions that communication technology is developing rapidly, prices are decreasing quickly and the equipment is becoming more and more user-friendly. The exaggerated forecasts, however, have been replaced by more modest ones as time has proven the expansion of telework problematic: so far there are few teleworkers [14, 16].

The belief in the fast growth of telework can be interpreted as a consequence of a deterministic view of technology, in this case ICT. A figure of thought which is more or less unconsciously inherent in modern society is that 'technology' continuously develops for the better and that technical development is the driving force for the development of society ('technology push'). 'Technological determinism' is characterised by the belief that this development is inexorable and more or less impossible to change; something to which individuals and society must adapt. Closely coupled to this determinism is the view of a linear development of technology: scientific discoveries are the source of technological inventions, which in their turn produce innovations that finally are applied in society.

A deterministic view of ICT and telework is frequent in advertisements for telework and also in political documents like the EU White Paper on Employment, the Bangemann report, and the Swedish IT commission report *Wings to Human Ability* [5, 6, 10]. The cause–effect relation is supposed to function in this manner: *ICT is a potent and useful tool for work and People want to be flexible and work at home*—these facts together lead to the *expansion of telework*. Such a deterministic view has been adopted not only by many politicians and technicians but also by researchers in the social sciences. A main result of research in the sociology of technology since the 1980s is, however, the claim that there are seldom any straight chains from technological inventions and innovations to implementation and usage of a product. On the contrary there is a dynamic interaction between technology, users and the technology's organisational and social context, which means that the deterministic view that technology causes social change is not a fruitful one. Technology is shaped not only during the design process, but also after it is taken into use: the artefact is not always used according to the expectations of the designer, it is subject to 'domestication' into households [15].

1.1.1 Definition and empirical material

The choice of statistics for telework is troublesome, for there is not *one* definition of telework, but several. Some of these state that a teleworker is an employee or self-employed person working full-time at home, using computer and telecommunications to communicate and deliver results of work [9]. But a person working a few hours per week at home is also counted as a teleworker in a number of surveys, including the largest one conducted in Sweden [3]. In this paper, I restrict the discussion of *telework* to *work with information handling, performed by individuals at a distance from those whom they work for or together with; that is, at home or in a neighbourhood office near home*. Telework is defined as *high-intensity* when it is performed more than five hours a week, otherwise it is *low-intensity*. The type or quantity of ICT used is not included in the definition—which means that the use of different technologies is an issue for observation and analysis [16].

The origins of empirical material for the paper are two: Swedish published statistics and my own studies of teleworking – the latter related to the projects of promoting telework in two Swedish towns within 'commuters distance', 60-100 km, from the capital of Stockholm.

In late 1994 and the beginning of 1995 respectively, I sent out questionnaires directed to all persons moving into apartments on one new site in Nyköping and two new condominium (HSB) sites in Nynäshamn, "all prepared for ISDN".³³ A third group was identified through a telework project in Nynäshamn, consisting of persons who responded to various information and advertising activities. They were commuters who worked part of their time near home, or were interested in doing so. This group will be referred to as the 'telecommuter group'.

Of about 500 persons in the population, 310 answered the postal questionnaires; 52 were 'high-intensity' teleworkers working at least six hours or one day per week at home or at a neighbourhood office. When the limit is restricted to two hours per week, the number was 104, which leaves 52 as 'low-intensity' teleworkers. About 30 of these 104 teleworkers were interviewed about their ICT use, among other questions. Self-employed people, professionals, and salaried employees were strongly over-represented among the teleworkers.

³³ A reason to choose these places for my study was the fact that ICT and telework were tightly connected in their marketing, ISDN being presented as the possibility of using the telephone net for voice as well as data communication. ISDN = Integrated Services Digital Network.

2. ICT A DRIVING FORCE FOR TELEWORK?

The first issue to consider is whether there is a growth in telework which can be related to ICT diffusion. Do teleworkers need a computer and a connection to the employers' network? Most international literature on telework is not very specific on teleworkers use of ICT. American and European reports in the 1980s and 1990s do not show that ICT is a prerequisite for telework. On the contrary, the technology is not developed to serve the average home worker, and most teleworkers use the telephone and deliver work by mail or personal meetings [13, 9]. Even if ICT is more important in the 1990s, improvements are still anticipated [11].

2.1 Computers and telework in Sweden

Three surveys by Statistics Sweden, in 1984, 1989, and 1995 (table 1), show that the use of computers has increased dramatically at work as well as at home. It is obvious that, from the middle of the 80s to the middle of the 90s, there was a rapid diffusion of ICT into the home, and that the expansion of computer use for work at home was even faster.

Table 1. Computer use in Sweden

	1984	%	1989	%	1995	%
Computer users	980 000	*24.0	1 445 000	*32.0	2 100 000	*51.0
At home	178 000	**3.4	546 000	**10.0	1 390 000	**27.0
At home for work	–		145 000	*3.2	588 000	*14.0
Modem	–		–		240 000	**4.7

*Percent of employed; ** percent of the population 16–64 years. Sources: [1, 2, 7].³⁴

The next figures to study are those of the expansion of telework, or more precisely, expansion of paid work at home, with or without the use of a computer. The research institute Nordplan commissioned national surveys of telework in 1986 and 1995 from Statistics Sweden with samples of 3,000 and 6,000 persons respectively [3, 4]. From table 2, we can see that the pace of expansion of telework near the home is modest, compared to the pace of expansion of computer use. The figures show that while the *total* number of teleworkers has not increased (still about 700,000), the number of *high-intensity* teleworkers has. This means that teleworkers in 1995 worked for a longer time at home than they did in 1986.

³⁴ Of all the computers in households in 1995, 200,000 had been provided by the person's employer, according to the latest computer usage survey, conducted in 1995.

Table 2. Teleworkers in Sweden, Percent of the employed

Teleworkers near home	1986	%	1995	%
Working >6h or one day/week at home	317 000	7.4	383 000	9.6
Working >2h per week at home	720 000	17.0	697 000	17.0
Thereof with computer	45 000	1.0	390 000	9.8
Thereof with modem	–		132 000	3.3

Sources: [3, 4].

According to the Swedish statistical material, the increase in computer use at work and at home has not been accompanied by an increase in teleworking.

On the other hand, we can see that teleworkers use work-related ICT far more often than other employed people, and high-intensity teleworkers use it more often than low-intensity teleworkers. As can be seen from table 2, a much larger portion of teleworkers used a computer in 1995 than in 1986, growing from 45,000 to 390,000. In 1995, 56% of all teleworkers used a personal computer as working tool. Furthermore the 1995 survey indicated that 19% used a modem, 20% a fax machine, and 6% e-mail.

This is confirmed by my empirical results. Table 3 shows the portion of each group that uses the specified equipment once a week or more (a telephone is used by 99%, so this is not a discriminating piece of equipment).

Table 3. Use of ICT equipment at home, Nyköping and Nynäshamn 1995

Equipment n = 278	All employed, %	Low-intensity teleworkers, %	High-intensity teleworkers, %
Computer	36	46	73
Modem	18	25	48
Printer	21	21	54

Source: [16].

Work-related ICT is used more frequently by teleworkers: twice the proportion of high-intensity teleworkers use a computer at home as compared to all employed people. The survey also indicates that persons who are more established as teleworkers use ICT more than beginners. Still, one fourth of high-intensity teleworkers can do their work near home without a computer, and about half of them without a modem.

These figures together show that there is no immediate correlation between computers at work, computers at home, and the amount of telework. Therefore, a closer look at the relations between ICT and telework which can be observed from my empirical material is called for.

2.2 ICT facilitating and limiting telework

International and Swedish researchers report difficulties for teleworkers in handling ICT: many do not have the adequate equipment, or it does not function according to their needs [13, 12]. Similar experiences were reported by teleworkers in my investigations: ICT turns out to be a limiting factor as often as a driving one.

From a question in the survey about the disadvantages of teleworking, we learn that high-intensity teleworkers consider “less or inferior technical equipment” as one of three main disadvantages, ranked third after “inferior contacts with colleagues” and “more difficult to relax from work”. To the question on which conditions should be altered to enable them to work more often in or near the home, 34 percent of high-intensity and 47 percent of low-intensity teleworkers answered “equipment such as telecommunications, computer, etc.”. Other conditions marked by many respondents are the nature and organisation of their work and their employer’s attitude (20–25%).

So, there are indications that lacking or inadequate ICT is an obstacle to telework. But it is also clear that social issues are obstacles of at least the same weight.

To obtain more information about what the problems with ICT are, we will look at interviews made 1996-99 with about 30 of these 104 teleworkers (including low-intensity ones). In this group of teleworkers, the majority are male, either professional employees in industrial companies or self-employed. The decision to work at home is their own, and almost none of them participates in a telework scheme. The employees work at home for anywhere from a couple of hours per week to several days. Only some persons who are self-employed work full-time at home. Another characteristic is the teleworker's long working hours. For many of them all their work near home is paid or unpaid overtime. That is, telework is a means of managing long working hours.

Some of the persons I have interviewed are computer professionals, still many of them report problems with ICT, especially data communications and software. E-mail is a very useful tool, but often messages disappear or attachments get stuck.

One technician (male) says:

Today you have to be handy and interested. It is not your age, but your interest that is crucial. ... What takes a great deal of working time is technology making a mess. It takes at least one hour each day to fight technical problems, above all communication problems.

And an ombudsman (male) explains why he does not work at home very much:

One reason is that I do not control the technology, I do things for which I don't depend heavily upon the technical gadgets. ... There is a lack of competence in using computers. We do not sit down to learn and work with it.

A head teacher (female) at an institute giving courses in computing commented:

I didn't know a bit about computers when I began working with a computer company. I am not interested in technology, but I know the possibilities and I know the persons that know the technology. It is only when e-mail creates trouble at weekends that I am stressed, otherwise it is easy to get support.

The overall impression is that ICT is a problem for teleworkers. For people with good competence in computers and communication it takes time from ordinary work. Those with lower competence depend on support from the employer or some other person. This means that people with low competence and weak support have difficulty in using ICT for their work at home.

3. DISCUSSION: FROM OFFICE TO HOME

The deterministic way of looking at ICT and telework implies that *since* ICT is a powerful and useful technology for information work, *and* because there are individuals who want to be flexible and work at home, telework *will* expand. This means that people with and without experience in ICT and of working at home quickly should adapt to ICT based home work.

Obviously this is not what has happened. ICT has been introduced as a tool for telework, but in a more indirect way: What we can see is a more complicated picture of causes and effects – there is a chain of interconnections to consider. We must look at the tradition of working at home as well as the use of ICT at work.

Bringing home work from office is an old tradition among several kinds of employees. What is not clearly observed is that in doing so they also brought with themselves technology useful or necessary for work – be it a book, a memo, a pencil, a typewriter, a telephone or a computer. This is what was happening when teleworkers, according to Nilles [13] and Huws, et al. [9], performed their work without (or with traditional) information technology: they used the same technology as they were used to at their

place of work. Interviews with teleworkers in the United Kingdom showed that most of them had used computers earlier in their workplace [8].

Now, as we have seen above, computer use at work has grown quickly in Sweden during a period of ten years, 1984–1995. This means that many employees have been provided with new work tools and over time computers have been used in more and more working operations. This, in turn, means that more people are dependent upon access to their computer—and network—for an increasing part of their working-hours. One could argue that the dependence on a computer, fax machine, printer, network connection, etc. partially has been substituted for paper, pencil, typewriter, mail and telephone. The computer is often used for communication: e-mail, data bases and web sites are replacing letters, phone calls, catalogues and books.

When office work is brought home, it is likely to be work which is normally performed with ICT as a tool. This also makes it more convenient to use ICT for work at home. My interviews indicate that people want to use the same machines as those in their office when working at home, and this is more obvious the more time a person spends working at home. From the figures of modem use it is evident that computer communication is more common for teleworkers with long working-hours at home.

The path ICT supported telework enters into the home is, therefore, not as straight as the discourse suggests. Before ICT is used at home for work, it is preceded by two steps. First there must be an interest in working at home; second the person who wants to work at home must be familiar with the new technology and be able to handle it working alone. Most often this familiarity is acquired in the workplace, but with the increasing numbers of computers in the households, and younger people's early exposure to ICT, the learning of the tool in the future may perhaps not take place in the workplace.

3.1 The technology paradox

Coupled with the observed technical difficulties encountered by teleworkers, we arrive at a paradox: the introduction of computer based communication functions as a restriction for teleworking. Four hurdles can be seen in this terrain. The first is having access to a computer at home. The next hurdle is the problem of transporting information – basic data and results; and the third consists of bad functionality and user-surliness of technology. A fourth is the teleworker's (insufficient) knowledge of and familiarity with hardware and software.

Using more complicated information technology raises new obstacles to home work that must be handled in one way or another. Going to the empirical field, we find that a large part of the population I interviewed in

1996 to 1999 must solve their ICT matters on their own, with their own equipment or with surplus equipment from the job. Many employees use their privately owned computers to perform paid work (self-employed persons in possession of computers mostly use it for work). And the large group of self-employed also have to solve their problems on their own or with help from someone else in the family (most often a son or husband), or from a friend or colleague.

It is obvious that, in order for ICT to facilitate telework, the teleworker must have knowledge of and familiarity with the technology, and it must be complemented with technical and cognitive support. Presently personal computers and Internet access is spreading rapidly to households in Sweden. It seems clear that this will reduce the height of some of the hurdles, such as access to and knowledge of ICT, but not all of them, like user-friendliness.

4. SUMMARY

The conclusion of this discussion is that ICT is accompanying work into the household, rather than pushing it into it. Generally ICT is used for telework only after the worker first has used it as a working tool in his regular workplace. To promote telework, the technology must be user-friendly and support must be at hand when (not *if*) the technology is making trouble.

On the other hand, teleworkers are more frequent users of ICT than others employed; they are ICT users in the workplace and they need at least some of its functions in their everyday work. E-mail, in particular, is an important tool. Incomplete or poorly functioning ICT seems to be a severe restriction for people to work more at home. Therefore they need more and better ICT for the home, indicating that telework can be a pull factor.

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