The Intensity of Telework in 2002 in the EU, Switzerland and the USA

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ABSTRACT

Measuring the spread of telework has been an objective of telework research since it has been appropriated by EU and nation state policy during the 1980s. While a great deal of statistics on the subject have become available from various sources, a number of questions have not been sufficiently explored yet, mostly due to the comparatively small share of teleworkers among the total labour force which has made representative data hard to obtain. The ongoing spread of teleworking in all EU countries makes this task increasingly easier. In the meantime, however, there is a trend towards "anywhere-anytime, natural interactions with a universe of IST applications and services" in working life which means that working from just anywhere becomes a reality for more and more people. With a view on statistical measurement, this gives rise to a number of challenges. Existing indicators, and related methodologies for data collection, must be put to the test as to whether they are still appropriate in the light of developments towards “ubiquitous computing” and “footloose working”. This paper presents first results of a survey undertaken as part of SIBIS (Statistical Indicators Benchmarking the Information Society), an IST programme research project that develops new indicators for the measurement of Information Society phenomena. The pilot survey was conducted in all EU Member States plus Switzerland and the USA, thereby giving a comprehensive view of the status quo of telework diffusion in 2002. It represents the first attempt to develop a statistical measure for the intensity of telework.

Keywords: spread of telework, statistics, indicators, EU, USA, benchmarking

1 INTRODUCTION

This paper presents some first results of a general population survey (GPS) undertaken as part of SIBIS (Statistical Indicators Benchmarking the Information Society), an IST programme research project that develops new indicators for the measurement of Information Society phenomena. The survey was conducted in all EU Member States plus Switzerland and the USA, thereby giving a comprehensive view of the status quo of telework diffusion in 2002.

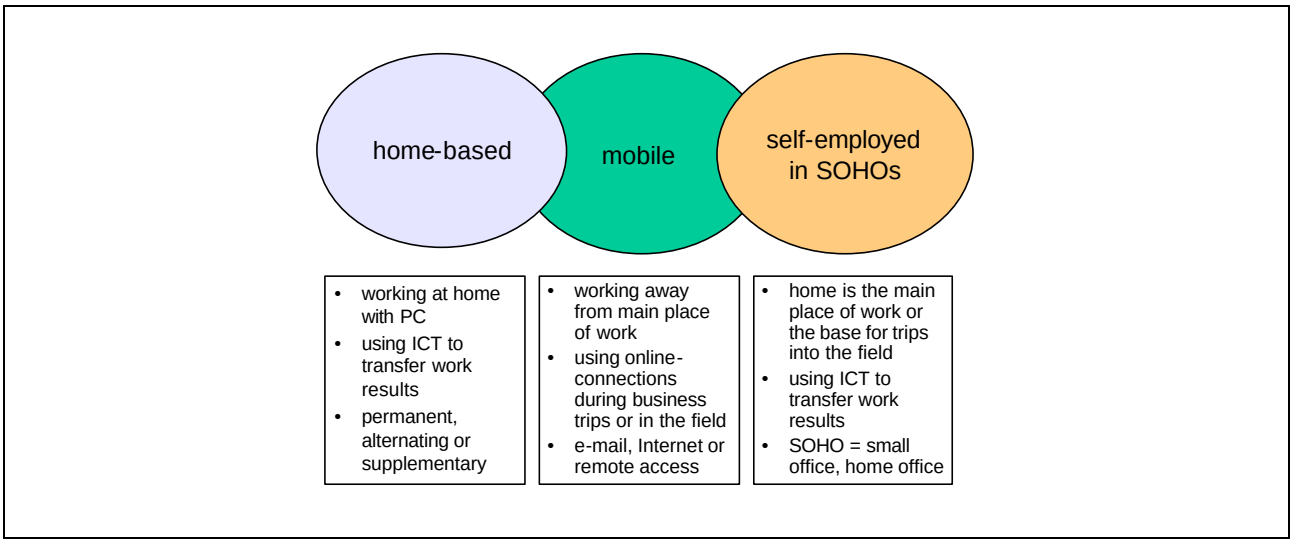
Some open questions in telework statistics

Since telework was discovered by policy-makers at nation state and EU level as a tool towards achieving a number of goals, including environmental schemes (most prominently in the USA) and the creation and modernisation of jobs (a preoccupation of the European Commission), there has been strong demand for statistics on the current, forecasted and potential spread of this form of working. In almost every European country national surveys have been conducted and statistics on the number of teleworkers published (see www.eto.org.uk for an overview). In some countries like the United Kingdom, the official labour force survey now includes a module on teleworking from home [12]. Unfortunately, it is mostly impossible to compare the results of these national studies because of strong differences in definitions, composition of samples and projection methods used. In addition, there are no plans yet to include telework-related questions in the regulation concerning the Community Labour Force Survey [1] which would enable comparisons between EU Member States based on regular, very large samples. For these reasons, there is a demand for dedicated cross-country surveys of the general population using representative samples to fill the existing gap in data availability.

The first study of this kind was done in 1994 by the TELDET consortium led by empirica [9], which was then updated and extended to include more diverse types of telework in the ECATT study in 1999 [4,6]. In November 2000, the European Commission included a set of questions on telework in its Eurobarometer, results of which have been published in [2]. While the ECATT study was the first to differentiate carefully between different types of telework

(home-based, mobile, SOHO-based self-employed – see Figure 1-1), the Eurobarometer study falls back behind this by using a catch-all question in an attempt to cover all types of telework in one go: "telework occurs when paid workers carry out all, or part, of their work away from their normal places of activity, usually from home, using information and communication technologies" and then asks: "Do you telework, or not?" and, if answered yes, "Regularly or occasionally?". This methodology is unlikely to provide data on which statements about the spread of telework, defined as it is today by the research community, can be reliably based.

Figure 1-1: Types of telework and interrelations



The ECATT study mentioned above was successful in doing away with some of the common myths about telework. It showed that most teleworkers are male, have above-average qualifications and management responsibility, and spend only a fraction of their working hours at home. This contradicted the common assumptions that telework involved mainly women because of its potential to ease the combination of job and child care, that it was primarily used for transferring low-qualified work such as data entry to the home and that typical teleworkers spent their full working time at home.

Still, other questions remain to be unresolved. Not much is known about the extent to which different motives are responsible for firstly workers and secondly employers to take up telework. Is teleworking mainly a result of business pressure to cut personnel costs or increase worker productivity, or is it mainly being introduced to accommodate employees' urge for less commuting and more flexibility and self-responsibility in working life? As a result of this knowledge gap it is unclear whether and how much telework has contributed to increasing labour force participation, to improving the compatibility of work and family duties, and to decreasing commuting, to take three examples.

Most scientific evidence on telework is being collected in case-study based research which means that the degree to which research results are representative for the entirety of teleworkers is unknown. Case studies often involve telework practice in companies which run trials or schemes that are publicly announced. According to all evidence available, however, most telework takes place outside of formal schemes. There are many reasons to assume that telework inside and outside of formal schemes differ significantly with regard to characteristics and outcomes of this way of working. Representative studies are therefore needed. SIBIS is one such study based on representative probability samples of the entire adult population.

Blurring distinctions means new indicators are needed

Most researchers agree today that the classical image of telework, i.e. the worker who has been provided by the employer with a computer workplace in her or his home and spends the working time there, is not anymore (quite likely has never been) able to describe a reality which is in fact much more complex. Not only do the large majority of teleworkers spend part of their working time at a central office [4]. They also often carry out some of their work at other places than the home [7,8], enabled by mobile office technology which has liberated work from the constraints of being bound to a particular space and time. The advance of 3G mobile networks and the surrounding mobile applications will

act as another strong push in this direction. Many believe today that we are facing a future of "anywhere-anytime, natural interactions with a universe of IST applications and services" [10] where the technology fades into the background of people's minds. Already today we can observe that IST applications such as mobile telephony and access to the Internet are becoming almost ubiquitous in many parts of the world, with more and more people taking for granted what just a few years ago have been the most sophisticated of high-tech applications one could think of. Telework is a good example for this trend: Working from just anywhere does not sound such a futuristic proposition anymore today. The boundaries between work at a central office, on the road or in the field, at customer's premises, at teleservice centres and at home are likely to disappear step by step.

With a view on statistical measurement, this gives rise to a number of challenges. Existing indicators, and related methodologies for data collection, must be put to the test as to whether they are still appropriate in the light of developments towards “ubiquitous computing” and “footloose working”. Until now, the relative spread of telework in country comparisons has been measured using the indicator "number of teleworkers". To do this, all of the country comparison studies mentioned above have used a clear-cut definition regarding the characteristics which constitute a teleworker following the principle: Either you are a teleworker, or you ain’t. Moreover, many studies too much take for granted that respondents already know whether they do telework or not. But it can be argued that telework is increasingly becoming "invisible" to the workers involved which means they might not be able to tell whether they are teleworking or not, because they do not realise themselves. This applies especially to telework which is not home-based.

For these reasons, it seems necessary to

- switch from 'teleworkers' as unit of reference to 'intensity of telework', measured e.g. in share of working time spent at other locations than the central office facility while staying in touch electronically;
- differentiate between different types of telework and use appropriate instruments (survey questions) which take into account that respondents are not aware of the concept of telework as it is being discussed by the researcher community.

In the following I will present some results of the SIBIS pilot survey which presents an attempt to address some of the questions raised above.

2 INDICATORS FOR HOME-BASED TELEWORK

Home-based telework implies a relocation of the workplace, for part or whole of the working time, from the establishment site to the home of the worker. This type of telework also implies, in most cases, more flexibility with regard to time and content of work. These are natural outcomes of changes to the extent of control which can be exerted on workers who are not present on-site. The SIBIS questionnaire distinguishes between intensity of teleworking practice: Supplementary teleworkers work at home for less than one day per week, alternating teleworkers spend at least one full working day at home, and permanent teleworkers are those who spend almost all of their working time at their own place. The SIBIS survey design ensures that it is possible to set thresholds for analytical reasons without building the threshold into the question itself, as this would determine to some extent what analyses are possible. For example, a study looking into the effects of telework on traffic volumes might only be interested in teleworkers who spend at least one whole working day per week at home, thereby reducing the number of commuting trips. Another research, however, that is interested in the effects of teleworking on family life might want data on all kinds of work being carried out at home, no matter if commuting is reduced or not. The SIBIS module allows for such flexibility by collecting data on the intensity of teleworking, i.e. the number of working hours spent at home.

Table 2-1 shows some results of the survey with respect to home-based teleworking. 7.4% of all respondents in paid work indicated they are teleworking from home presently, at least part of their working time (see below for country comparisons). This is a somewhat higher share than those who stated they were teleworking in the 2000 Eurobarometer survey (5.6%), which used a seemingly similar question (see above). This might either indicate that the spread of telework has increased considerably in the course of the last two years, but may also be due to the fact that the share of respondents who declare themselves to be teleworkers is highly sensitive to differences in the question wording. A point of particular importance seems to be whether the self-employed who use ICTs for transferring work results regard themselves as teleworkers or not[i]. Analysis of the SIBIS data showed that only half of all self-employed workers who work from home (or with home as a base) and transfer work results via ICTs answer “yes” to the question whether they telework from home.

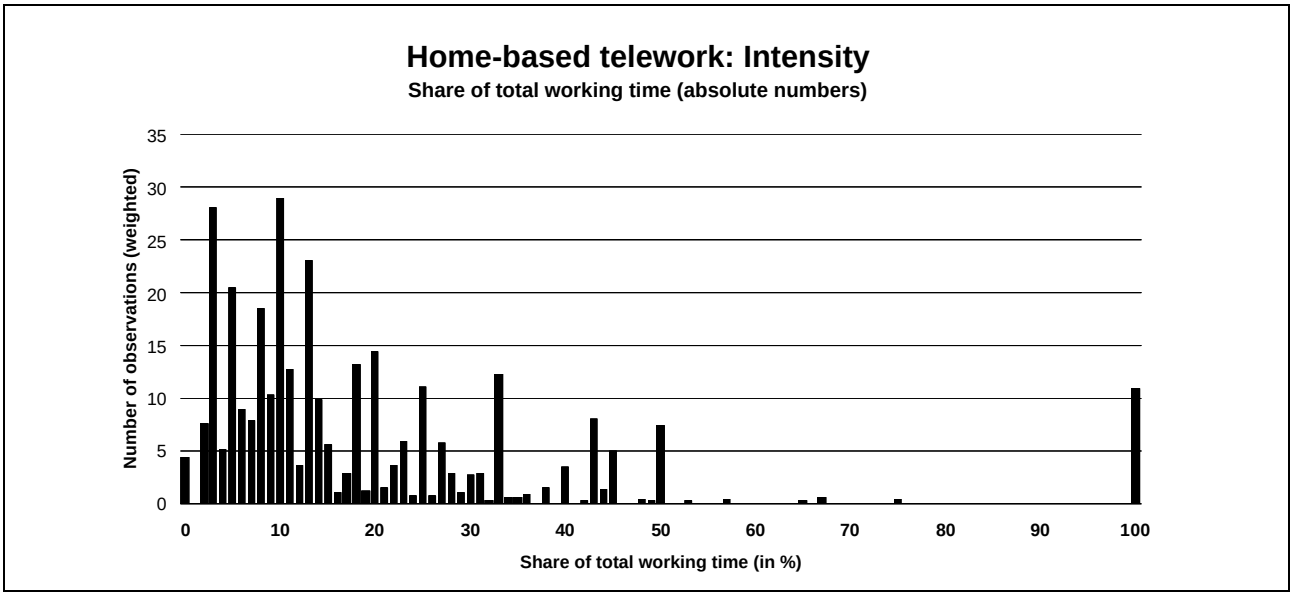
Table 2-1: Home-based teleworking (EU15, in %)

Teleworking from home	**7.4**	
thereof (100%):		
Teleworking at least one full working day/week (alternating and permanent teleworkers)		*28.1*
Teleworking less than one full working day/week (supplementary teleworkers)		*71.9*
Teleworking at least one full working day/week: DK		*-*
thereof (100%):		
Teleworking <10% of total working time		*31.0*
Teleworking 10% to <25% of total working time		*34.8*
Teleworking 25% to <50% of total working time		*16.9*
Teleworking 50% to <75% of total working time		*2.4*
Teleworking >=75% of total working time		*3.1*
Teleworking hours per week: DK		*11.8*
Not teleworking from home	**92.4**	
Teleworking from home: DK	**0.2**	
Total	**100**	

Base: all persons employed (N=5,100), weighted by EU15 population *Source: SIBIS 2002, GPS*

We follow from this that many self-employed persons to whom the definition of telework applies do not regard themselves as teleworkers. For this reason, self-employed individuals working from home in a so-called small office, home office (SOHO) have to be measured separately (see below) in order to avoid statistical under-representation of self-employed telework. Trying to use one question to catch home-based, mobile and self-employed telework, as has been tried in the Eurobarometer survey, does not seem to be likely to produce valid results.

Figure 2-1: Home-based telework – share of total working time (EU15)



Base: all persons teleworking from home (N=401), weighted by EU15 population. *Source: SIBIS 2002, GPS*

SIBIS GPS respondents who stated they are teleworking regularly were then asked about the number of working hours spent at home, on average. 28% of all home-based teleworkers indicate that they telework for more than one full working day per week (= alternating plus permanent teleworkers). This group may also be called tele-commuters, since they (and only they) are likely to reduce the number of commuting trips via staying whole days at home teleworking. The fact that only little over one quarter of all teleworkers spend more than one full day working from home seems to confirm recent research findings (see [4]) according to which most teleworkers still spend the majority of their working hours at a traditional work location; the home is being used as one additional location for work while still maintaining

the central office as the main working environment. As Figure 2-1 shows, by far the most teleworkers spend less than 30% of their total working time at home. Supplementary telework is the most widespread form of home-based telework.

At the other end of the spectrum, only a very small minority of teleworkers stay at home full time: 3% of all teleworkers are at least 75% of their working time at home, a number so small that country breakdowns inside of the EU are not possible with the SIBIS GPS pilot sample (for reasons of statistical validity). These so-called permanent teleworkers continue to be the big exception among teleworkers [4].

Table 2-2 shows the results broken down by country. The pattern across Europe with regard to the share of (all) home-based teleworkers is by now well established, with the Netherlands and the Scandinavian countries well ahead of the rest of the EU, and about on par with the USA. Among the big EU Member States, the U.K. is well above average and France, Italy and Spain below, with Germany very much at the average. Portugal has the lowest figure in the EU.

Table 2-2: Home-based telework and teleworker churn (in %)[ii]

	Home-based teleworkers – alternating or permanent	*Home-based teleworkers - supplementary*	(1) Current home-based teleworkers – all	(2) Previous home-based teleworkers - all	Churn ratio (2:1)
AUSTRIA	*(2.0)*	*(4.7)*	6.7	3.2	48
BELGIUM	*2.2*	*5.3*	7.5	3.1	41
DENMARK	*2.6*	*15.1*	17.7	5.9	33
FINLAND	*4.7*	*11.0*	15.7	2.4	15
FRANCE	*(2.2)*	*(2.3)*	4.4	2.8	62
GERMANY	*1.6*	*6.3*	7.9	2.5	31
GREECE	*(2.1)*	*(3.9)*	6.0	2.7	44
IRELAND	*(0.5)*	*(5.5)*	6.0	2.8	47
ITALY	*(0.8)*	*(1.7)*	2.5	1.4	55
LUXEMBOURG	*(0.9)*	*(2.4)*	3.3	3.8	116
NETHERLANDS	*9.0*	*11.6*	20.6	4.5	22
PORTUGAL	*(0.5)*	*(1.1)*	1.6	1.3	80
SPAIN	*(0.3)*	*(2.0)*	2.3	1.9	85
SWEDEN	*(5.3)*	*(9.5)*	14.9	4.1	28
U.K.	*2.4*	*8.5*	10.9	2.3	21
EU	*2.1*	*5.3*	7.4	2.5	34
CH	*(4.2)*	*(7.1)*	11.4	3.0	27
USA	*5.1*	*12.2*	17.3	7.3	42

Base: All persons employed (N=5,901), weighted; EU averages weighted by EU15 population. *Source: SIBIS 2002, GPS*

There are marked differences between countries with regard to the share of teleworkers who spend at least one full working day at home. In Denmark especially, such alternating or permanent teleworkers are greatly outnumbered by supplementary teleworkers, with only one in seven teleworkers spending whole working days at home. The other extreme is represented by the Netherlands, where almost every second teleworker stays at home for full working days regularly. The shape of home-based telework obviously differs quite much between countries. Further analysis is needed to explore whether these differences can be explained by diverging regulatory frameworks or employer attitudes. It is tempting to suggest that recent political activitiy in Denmark which encouraged employers to hand out online home computers to their staff has succeeded in increasing the number of workers who telework some part of their working time from home, but it seems to have had less success in raising the level of alternating or permanent teleworking.

How does this relate to the interest the workforce as well as the unemployed and other people looking for work show in the different types of telework? The SIBIS GPS discussed three telework options:

- doing almost all work teleworking from home;
- telework where not all the working time, but at least one full working day per week is spent at home; and
- work in an office provided near your home which would allow to reduce commuting (which refers to centre-based telework which is also discussed using the terms satellite offices, telecentres, telecottages, telework-centres),

and presented respondents with a three-point scale for answer categories (very interested, somewhat interested and not

interested). Table 2-3 presents the results with all persons employed as the base. The degree of interest is considerable: 40% of the EU workforce express interest in permanent telework, 52% in alternating telework and even 55% in centre-based telework (see below). Two out of three are interested in at least one of these forms of telework.

Table 2-3: Interest in telework among persons employed (in %)

	Interested in permanent home-based telework	Interested in alternating home-based telework	Interested in centre-based telework	Interested in any of these types of telework
AUSTRIA	45.2	59.8	53.9	70.3
BELGIUM	43.7	53.0	68.8	77.1
DENMARK	39.1	54.1	66.2	78.6
FINLAND	44.4	66.0	56.6	75.4
FRANCE	28.7	37.1	43.0	54.4
GERMANY	41.8	58.1	61.1	75.5
GREECE	35.7	40.5	50.0	53.7
IRELAND	50.8	57.7	54.7	68.9
ITALY	45.4	50.2	59.2	69.0
LUXEMBOURG	40.6	56.1	64.7	74.7
NETHERLANDS	44.2	68.5	64.1	74.7
PORTUGAL	22.9	24.8	34.7	39.8
SPAIN	41.7	45.6	46.1	59.6
SWEDEN	43.3	60.6	45.6	67.3
U.K.	41.5	55.7	54.9	65.3
EU	40.1	51.5	54.5	66.5
CH	34.8	44.8	51.2	63.5
USA	50.5	61.7	61.6	73.3

Note: Figures for "interested" includes answers "very interested" and "somewhat interested". Base: All persons employed (N=5,901); weighted; EU averages weighted by EU15 population. *Source: SIBIS 2002, GPS*

While interest in alternating telework is somewhat higher, the number of workers interested in permanent telework is still remarkable given the low actual spread of this method of work. We may follow from this that there are either much less employers willing to let staff work permanently at home, or much less jobs feasible for permanent telework than it would require to meet the general demand in this work form. These figures for interest have, however, to be treated with care as the expression of interest does not imply that any real commitment would exist if actually faced with the option to telework. According to anecdotal evidence from case study and pilot projects the interest of employees in telework is often very undifferentiated in the initial stage of being confronted with the concept of teleworking from home, but then becomes more differentiated after contemplating the pros and cons of actually starting to telework themselves. This hypothesis is confirmed by the data as the difference in interest between permanent and alternating telework is bigger in countries with a high share of teleworkers (which arguably also means more public awareness of the subject) such as Finland, Denmark and the Netherlands than in countries with low telework penetration (i.e. only scarce confrontation with the subject in public life) such as Italy, Spain, Portugal and Greece.

Nevertheless, even if these factors are taken into account the data still seems to indicate that home-based telework with a large share of the total working time spent at home presents something of an ideal for many people in the labour force, while in reality it is very flexible configurations (with the highest share of working time still spent in traditional work settings) which prove attractive and at the same time feasible enough to be supported by employers.

As to be expected, levels of interest in telework are higher among the unemployed and other persons looking for paid work. Three quarters of this group express interest in at least one type of telework. Since unemployment tends to be highest in the peripheral and remote regions of the European Community, these regions can be described as having a greater mismatch between telework demand and supply than the more central regions. As other studies have pointed out before, telework has until now not lead to a better supply of remote regions with (knowledge economy) jobs in spite of its technical potential to deliver just that [11].

Table 2-4: Interest in telework among the unemployed and other persons looking for work (in %)

	Interested in permanent home-based telework	Interested in alternating home-based telework	Interested in centre-based telework	Interested in any of these types of telework
AUSTRIA	47.1	63.5	58.6	70.6
BELGIUM	37.8	50.8	72.9	75.1
DENMARK	45.8	44.9	61.8	68.9
FINLAND	58.3	64.7	67.2	78.0
FRANCE	49.7	59.3	64.5	73.4
GERMANY	51.5	60.8	68.4	73.5
GREECE	52.0	52.1	55.7	61.1
IRELAND	72.2	77.9	75.4	86.4
ITALY	63.8	68.5	74.2	83.4
LUXEMBOURG	63.4	54.4	75.8	84.3
NETHERLANDS	(62.0)	(72.0)	(67.9)	(76.2)
PORTUGAL	37.6	43.8	46.1	52.3
SPAIN	57.6	62.8	70.1	78.5
SWEDEN	(59.6)	(68.9)	(54.8)	(82.5)
U.K.	61.3	69.3	71.6	77.0
EU	55.3	62.9	68.1	75.6
CH	42.0	49.8	55.2	68.4
USA	61.3	65.2	65.3	77.7

Note: Figures for "interested" includes answers "very interested" and "somewhat interested". Base: Unemployed and other persons looking for work (N=1,458), weighted; EU averages weighted by EU15 population. Source: SIBIS 2002, GPS

Current practice and interest in telework need to be compared with perceived feasibility of current jobs for teleworking. The SIBIS GPS asked respondents whether they perceive their current job feasible for telework under the assumption that they would have to spend at least one full working day per week at home (see Table 2-5). 28% of all non-teleworkers regard their job as feasible for this type of alternating telework, more than 10 times the number of workers who already telework for at least one day per week. This indicates that the principal interest expressed in telework is to a considerable extent not being translated into actual telework practice yet although jobs are regarded as being feasible for telework.

Table 2-5: Feasibility of home-based telework (EU15, in %)

Teleworking already (at least one full working day per week)	**2.1**		
Not teleworking already (or less than one full working day per week) or DK	**97.9**		
thereof (100%):			
Job is feasible for telework		*28.0*	
Job is not feasible for telework		*67.3*	
*thereof (100%): Main reason (multiple answers)**			
Company does not permit telework			*13.6*
Superior does not approve of telework			*5.3*
Job requires face-to-face contact with customers, colleagues or other persons			*64.8*
Job requires access to machines or other things which cannot be accessed from home			*47.7*
Other reasons			*8.0*
Reasons: DK			*1.3*
Feasibility: DK, missing data		*4.7*	
Total	**100**	*100*	

*Base: all persons employed (N=5,100), weighted by EU15 population; * Base: all persons (excluding self-employed) which state that their job is not feasible for telework (N=2,854), weighted by EU15 population* *Source: SIBIS 2002, GPS*

Of those who declare that their job is not feasible for telework (67% of all non-teleworkers), roughly two third state the need for face-to-face contacts with customers, colleagues or other persons as one reason; half of all mention access to machines or other things which cannot be accessed from home; but only 14% and 5% respectively state as a reason that the company does not permit or that superiors do not approve of telework. Management-side opposition against telework

seems, therefore, to play not as big a role than cold be expected although it may still play the decisive role for the decision whether feasibility is translated into actual tele-workplaces or not.

One aspect of telework which has attracted scant attention so far apart from case-study based research is teleworker churn, i.e. the incidence of that teleworking only taking place in a specific stage of the working life, followed by a stage which sees full-time working at a central office again. There is some anecdotal evidence that indeed telework is more suited to specific familiar and career settings than others to the effect that telework loses attractiveness once a new stage in the life cycle has been reached (see [5]). In the SIBIS GPS, respondents who indicated they are not teleworking from home were asked whether they have teleworked before in the last 5 years, and whether they have done so for at least one full working day per week (see Table 2-2). The share is 2.5% of all non-teleworkers in the EU for the former, and close to 1% for the latter (base: all persons employed). This means that for every three persons who are teleworking currently in the EU there is about one who has teleworked on a regular basis before but stopped doing so.

Table 2-6: Churn in home-based teleworking (EU15, in %)

Teleworking from home	**7.4**
Not teleworking from home currently and ...	
... has teleworked from home regularly in last 5 years with at least one full working day per week spent at home	0.8
... has teleworked from home regularly in last 5 years with less than one full working day per week spent at home	1.7
... has not teleworked from home regularly in last 5 years	90.0
Teleworking from home currently or previously: DK	**0.1**
Total	**100**

Base: all persons employed (N=5,100), weighted by EU15 population *Source: SIBIS 2002, GPS*

This figure (what we call the teleworkers churn ratio) differs considerably between countries (see Table 2-2 on page 5). In countries with low overall penetration rates, teleworker churn seems to be particularly high (Luxembourg, Portugal, Spain) while some other countries have very low churn rates, in particular Finland and also the U.K. and the Netherlands. While the data does not give any evidence about the reasons for stopping telework, they indicate that these reasons are effective to a different degree in the countries of the EU, with telework a more consistent affair e.g. in Finland than it is in the south European Member States.

3 OUTCOMES OF HOME-BASED TELEWORK

Measuring outcomes by using representative surveys can be done in two ways: Either by questioning teleworkers (i.e. asking for a self-assessment of outcomes by the persons involved) or by the analysis of correlations between intensity of telework and outcome variables (e.g. work satisfaction).

With regard to the former, the SIBIS telework modules include a hypothetical question on the impacts not being allowed to work at home would have for persons identified as practising home-based teleworking. From focus group discussions and pre-tests we follow that this kind of question will produce reliable results in spite of the general problems associated with hypothetical questions in surveys. As most home-based workers today are (still) very much aware of the fact that working at home is something extraordinary, they prove to be able to compare their own working conditions with the situation in more traditional, e.g. central office-based work settings. A hypothetical question has been preferred against a more direct question asking for the effects of starting to telework, as it cannot be assumed anymore that today's teleworkers have recently (or ever) worked in a traditional work setting. Only workers who have recently changed their work location, e.g. from central office-based to the home, would be able to answer a question such as "What effect has (switching to) telework had on your work performance?".

The results (see Table 3-1) show clearly that telework is perceived to have a beneficial effect on work performance (with 23% of all teleworkers agreeing completely to the statement that without telework they would not doing their job as well, and another 28% agreeing somewhat). Quite obviously telework is not only being pursued for private reasons, but also for making work more efficient and effective.

This part of the questionnaire is also designed to enable estimates on the quantitative effects of telework on labour market parameters such as employment rates and working hours. 9% of all home-based teleworkers state that they could not be in paid work at all without the possibility to telework from home ("agree completely") and another 8.5% agree

"somewhat" to this statement. The effect of home-based telework on EU employment rates can thus be estimated: between 0.7% and 1.3% of EU employment is being made possible by telework[iii]. This amounts to about one to two million jobs of the current total workforce of 160 million in the EU, and does not include self-employed teleworkers in SOHOs.

Table 3-1: Outcomes of home-based telework (EU15, in %)

Without telework I ...	agree completely	agree somewhat	do not agree	DK	Total
(a) ... could not be in paid work at all	8.8	8.5	78.9	3.9	100
(b) ... could not do your job as well as with telework	23.3	28.4	45.4	2.9	100
(c) ... would have to look for another job which is located closer to your home	9.9	7.4	79.4	3.4	100
(d) ... would have to reduce your working hours per week	14.5	12.2	69.6	3.6	100

Questions: Most working people are not allowed to work from home. Please consider you would not be allowed to telework from home, for whatever reasons. What would that mean for your ability to do your job? Base: all persons teleworking from home (N=401), weighted by EU15 population. *Source: SIBIS 2002, GPS*

Additionally, between 15% (agree completely) and 27% (agree at least somewhat) of all home-based teleworkers think that they would have to work less hours if telework was not available. Finally, telework is likely to contribute to (geographical) job mobility: Between 10% (agree completely) and 17% (agree at least somewhat) of all teleworkers would have, according to their own assessment, to look for another job which is located closer to their home if they could not telework from home.

4 INDICATORS ON MOBILE TELEWORK

As the term "telework" is commonly understood to indicate working at home, measuring mobile telework in surveys should avoid to use the term. SIBIS defines mobile teleworkers as those who spend 10 hours per week or more away from their home and their main place of work, e.g. on business trips, travelling or on customer's premises, and make use of online connections while doing so. The GPS survey design allows other thresholds to be used as well. Table 4-1 presents some results, according to which 15% of the EU workforce can be described as "mobile workers" (spending more than 10 working hours per week away from home and their main place of work) and 4% as "mobile teleworkers".

Table 4-1: Mobile teleworking (EU15, in %)

Mobile teleworkers (use computer connections when travelling)	**4.0**	
thereof (multiple response): Purpose		
for accessing the Internet		*73.4*
for sending or reading e-mails		*92.4*
for connecting to their company's internal computer system		*72.4*
thereof (multiple response): Location		
hotel, conference site or similar location		*68.7*
another company's premises		*52.0*
Internet café or commercial teleservice center		*5.4*
on the move using mobile device for data transfer		*37.0*
Other mobile workers (have spent at least 10 hours away from home and main place of work, but not teleworking)	**11.4**	
Not spent at least 10 hours per week away from home and main place of work	**81.8**	
Mobile telework: DK	**2.8**	
Total	**100**	

Base: All persons employed (N=5,100); weighted by EU15 population. *Source: SIBIS 2002, GPS*

The main purposes of mobile teleworkers to use online connections is sending and reading e-mail (92%), but three quarters each also browse the Internet and connect to their company's internal computer system.

Understanding mobile telework implies that the means by which workers connect to electronic communication channels

are assessed. Therefore, the SIBIS module in mobile work contains questions on type of activity and access points for mobile use of online data connections. One potential access point are teleservice centres which offer travellers a temporary workplace equipped with PC, Internet access, printer, fax etc. Such service providers are emerging at the nodes of international traffic networks, i.e. at central locations in large cities as well as airports. They may contribute to making mobile work attractive for more and more travellers. However currently only 5% of all mobile teleworkers make use of teleservice centres, whereas most choose the hotel room or conference site, another company's premises a similar location for going online. More than a third use truly mobile technology, that is data transfer via mobile devices, for the purpose.

5 INDICATORS ON TELE-COOPERATION AND THE SELF-EMPLOYED

Tele-cooperation is closely related to telework and has indeed sometimes been called 'in situ telework' because, although the majority of white-collar workers today appear to be co-located in central office buildings, in fact they are often working closely together with value chain and project partners at far away locations. Evidence suggests that tele-cooperation has boosted worker productivity and innovative performance throughout the EU economy by allowing flexible configurations of human capital without actually moving people from one place to the other [13].

Table 5-1: Tele-cooperation (EU15, in %)

Tele-cooperating = Persons using e-mail, video-conferencing or electronic data transfer when communicating with external contacts	**37.8**		
thereof (multiple response):			
Using e-mail		***96.5***	
thereof (100%):			
10 or more times a day			*34.0*
less, but at least once a day			*39.0*
Using electronic data transfer		***81.9***	
thereof (100%):			
10 or more times a day			*20.0*
less, but at least once a day			*33.9*
Using video-conferencing		***19.3***	
Not tele-cooperating	**62.0**		
Tele-coopeeration: DK	**0.2**		
Total (all employed)	**100**		

Base: All persons employed (N=5,100); weighted by EU15 population. *Source: SIBIS 2002, GPS*

Tele-cooperation was operationalised for the SIBIS GPS as communicating with external business contacts via e-mail, video-conferencing or electronic data transfer. As an explanation external persons were described as "customers, clients, suppliers, other business contacts, but also colleagues working at other locations of the same company".

Tele-cooperation is already widely in use in Europe (see Table 5-1) with an average of almost 38% of EU workers practising it at least "sometimes". For each of the three ICTs mentioned, the intensity of usage was assessed. E-mail and electronic data transfer are used at least once a day by more than three quarters and more than half of all people tele-cooperating, respectively. The number of users of video-conferencing, and the frequency of usage are much lower.

It becomes obvious from comparing the share of workers involved in telework and in tele-cooperation (as defined above) that tele-mediated work practices are affecting many more people than only those who actually work from a remote place. It has often been observed that ICTs enable work to be brought to the worker (telework) instead of transporting workers to work (commuting). But work inputs and outputs are also increasingly transmitted between traditional workplaces via ICTs, as value chains become increasingly spread and interwoven across companies and locations on an international scale. This is a process which involves all parts of the economy and, as the SIBIS pilot data show, already more than a third of the EU workforce.

In the future further steps will become necessary to gather data on the nature of tele-mediated cooperation. This is likely to require special surveys which analyse working processes in much detail. Existing surveys such as Germany's "Qualification and Employment Situation Survey" (BIBB/IAB) can act as bases for this [3].

Table 5-2: Self-employed teleworkers in SOHOs (EU15, in %)

	Base: all employed		Base: self-employed
Teleworking in SOHO	**3.4**		**20.8**
thereof (100%):			
Using e-mail		*99.1*	
Using video-conferencing		*16.9*	
Using electronic data transfer		*85.1*	
Self-employed teleworker, but not from SOHO	**0.5**		**3.3**
Not teleworking	**12.3**		**75.9**
Not self-employed	**83.4**		**-**
DK	**0.4**		**-**
Total	**100**		**100**

Base: All persons employed (N=5,100), all self-employed (N=809); weighted by EU15 population. *Source: SIBIS 2002, GPS*

The questionnaire module on tele-cooperation described above is also used to single out self-employed workers who use online ICTs for interaction with clients, collaborators and suppliers. These are called "self-employed teleworkers in SOHOs" if they work from home, on the same grounds as their home or with their home as their base. According to the GPS data, 3.4% of EU employment are self-employed teleworkers in SOHOs (see Table 5-2) which equals 21% off all self-employed[iv]. The share of teleworkers is therefore considerably higher among the self-employed than among workers with a contract of employment. Telework is on the way to becoming the standard working mode for the majority of the self-employed and among them freelancers (many of which traditionally work from home), in particular.

6 OVERALL SPREAD OF TELEWORK

Table 6-1 gives an overview of the spread of telework in the EU broken down by country, as far as sample sizes per country allow[v].

Table 6-1: Types of telework (in %)

	All home-based teleworkers	*Home-based teleworkers – alternating/permanent*	Mobile teleworkers	Self-employed teleworkers in SOHOs	All teleworkers (exclusing overlaps)
AUSTRIA	6.7	*(2.0)*	(3.7)	(5.7)	(13.8)
BELGIUM	7.5	*2.2*	(2.4)	(2.5)	(10.6)
DENMARK	17.7	*2.6*	2.7	(2.9)	(21.5)
FINLAND	15.7	*4.7*	6.2	(3.2)	(21.8)
FRANCE	4.4	*(2.2)*	2.1	(0.8)	(6.3)
GERMANY	7.9	*1.6*	5.7	5.2	16.6
GREECE	6.0	*(2.1)*	(3.5)	(3.4)	(11.1)
IRELAND	6.0	*(0.5)*	4.2	(3.3)	(10.9)
ITALY	2.5	*(0.8)*	5.5	(2.6)	(9.5)
LUXEMBOURG	3.3	*(0.9)*	(1.5)	(1.8)	(5.6)
NETHERLANDS	20.6	*9.0*	4.1	(5.0)	(26.4)
PORTUGAL	1.6	*(0.5)*	(0.3)	(1.5)	(3.4)
SPAIN	2.3	*(0.3)*	(0.8)	(2.0)	(4.9)
SWEDEN	14.9	*(5.3)*	4.9	(2.0)	(18.7)
U.K.	10.9	*2.4*	4.7	4.5	17.3
EU	7.4	*2.1*	4.0	3.4	13.0
CH	11.4	*(4.2)*	7.6	(2.2)	(16.8)
USA	17.3	*5.1*	5.9	6.3	24.6

Base: All persons employed (N=5,901), weighted; EU averages weighted by EU15 population. *Source: SIBIS 2002, GPS*

The share of EU employment practising some form of telework is 13%, against 25% in the USA. Teleworking from home makes up 7 percentage points of this (USA: 17). Additionally, 4% (6%) of EU workers are mobile teleworkers and

3% (6%) are self-employed teleworkers working in SOHOs. There are overlaps between all of these categories.

The data shows, therefore, that the EU average still lags behind the USA considerably, although the difference is less marked with respect to mobile telework (where Europe arguably enjoys a technological advantage) and in spite of the fact that the Netherlands and the Scandinavian countries sport figures that are sometimes as high (or even higher) than in the USA.

Table 6-2: Development of telework in the EU 1999 - 2002

Type	*in % of all persons employed*		**average annual growth (in %)**
	1999	**2002**	
Alternating and permanent home-based telework	2.0	2.1	2
Supplementary home-based telework	2.0	5.3	39
Mobile telework	1.5	4.0	38
Self-employed telework in SOHOs	0.9	3.4	54
All telework (excluding overlaps)	**6.0**	**13.0**	**29**

Base 1999: All persons employed; base 2002: All persons employed (N=5,100); both weighted by EU15 population.

Source: ECATT 1999, GPS; SIBIS 2002, GPS

Comparing the figures on diffusion between different types of telework shows that the largest category is that of home-based teleworkers. However, only 2 percentage points of the overall figure of 13% teleworkers in the EU workforce belong to the category of alternating and permanent teleworkers – the category which comes closest to the traditional cliché of the teleworker spending full days or even their whole working time at home. Meanwhile the figures for mobile and SOHO-based telework are rising fast, as a tentative comparison between the 2002 SIBIS data and 1999 ECATT data shows (see Table 6-2)[vi]. The share of mobile teleworkers has been rising at a rate of 38% per year since 1999, while the self-employed in SOHOs have experienced a growth rate of 54%. In both cases, technological progress which has resulted in more powerful and easier to use ICTs becoming available to a larger share of the workforce, have been instrumental in changing the way workers interact with internal and external work partners at their workplace and on business trips.

What is most striking about the 1999-2002 comparison is the difference in development between alternating and permanent home-based telework on the one hand, and supplementary home-based telework on the other hand. The latter is growing fast, with a more than two and a half bigger number of supplementary teleworkers today than in 1999. The number of teleworkers who spend at least one full working day at home, however, has not grown much at all in the last three years. There seems to be a shift of home-based teleworkers towards less time spent at home. Obviously, the progress in the availability of cheap and powerful remote access technology has not led to workers spending more and more time working at home, but rather to more and more workers spending only a fraction of their weekly working time at home. This points towards a greater flexibility in the use of individual working locations, but at the expense of some of the traditional advantages ascribed to telework such as savings on commuting.

7 SUMMARY AND CONCLUSIONS

A number of conclusions can be drawn from the results of the SIBIS pilot survey. The data clearly show that telework has many different faces, of which traditional teleworkers who spend a major share of their working time at home represent only one, and maybe not even the most significant, facet.

7% of the EU workforce are practising home-based telework. Because of this the share of EU population in employment is between one and two million higher than it would be without the possibility for telework. This is an important contribution to the European Employment Policy's goal of increasing the employment rate throughout the EU.

The most important effect of telework, however, seems to be to make workers more efficient and effective by granting them greater flexibility in how to organise their work. Most teleworkers use their home not for working full days (only 2% of all persons employed spend at least one full working day per week at home), but for supplementary teleworking. This means that they work only some hours per day at home, but still commute to a more traditional working

environment for the brunt of their work. The home becomes a touch-down office, which is equipped for giving online access to company resources whenever needed, but it is in most cases not being used for full working days.

Preliminary results from a comparison with data from the 1999 ECATT survey even suggest that the share of the EU workforce which practises permanent or alternating telework with more than one full day per week spent at home is actually stagnating while the number of supplementary teleworkers is growing fast. This finding indicates that more and more people make use of the locational flexibility offered by ICTs and spend some working time at home, but only comparatively few stay whole days at home. The number of tele-workplaces (in the technical sense of a networked workplace installed permanently or temporarily in the home) is increasing at a rapid rate, but the number of persons working at home at any given point in time remains modest. The location of work becomes more footloose, but there is no general shift of work from the office into the home.

The reasons for this are only partly extractable from the data, but the perceived need for face-to-face interaction with colleagues, customers or other persons certainly plays a key role. Still, about one quarter of all jobs are considered feasible for alternating home-based teleworking by their holders, more than 10 times the number of actual people teleworking in this way. Together with the high degree of interest expressed by the labour force in telework, these figures suggest that the demand for telework is much higher than the supply provided by employing organisations. More and more companies prove willing to give their staff remote access to their computer network, but the acceptability of staff working from home whole days seems to be limited.

This trend is complemented by the strong increase in mobile teleworking, i.e. the use of online connections for work purposes during business trips. Here again, the technology is being put in place and increasingly used. The share of mobile teleworkers has grown from 1.5% to 4% in the course of only three years. This is likely to benefit employers, as the efficiency of business process increases because of more continuous communication flows.

Self-employed teleworkers in SOHOs, many of which are freelancers, are also becoming much more numerous as tele-mediated communication with clients and work partners opens up new possibilities for improving business performance. While the share of SOHO-based teleworkers in the EU was only 1% in 1999, it is more than 3% in 2002 as a result of annual growth averaging more than 50%.

From these observations we can follow that most telework today takes place in flexible settings, with the home acting as only one of a bigger number of options for work locations. Consequently, the number of mobile teleworkers is likely to outnumber home-based teleworkers soon. These trends should be reason enough to rethink some of the original assumptions about telework and how it will affect society. Telework seems to be part of a general move towards greater variability and flexibility of the way work is organised, and is being implemented in ways that are believed to maximise the effectiveness and efficiency of the work process. With regard to home-based telework, the highest return seems to be believed to come from equipping workers with tele-workplaces, but keeping them at the central office location for most of their working time.

In the future, trying to measure locationally flexible work by counting the number of teleworkers is bound to become more and more futile, as working in networked working environments anytime and, for many, anywhere will become the norm rather than the exception. The intensity approach used in SIBIS for home-based telework will have to be extended to all other working environments. This might, however, require more sophisticated (which also means more expensive) measuring techniques such as time use studies, especially if the results are going to be used for country comparisons.

These have been first results from the SIBIS pilot general population survey. For more information on the project, methodology, and additional results, readers are kindly requested to visit the project website under www.sibis-eu.org.

REFERENCES

[1] COMMISSION OF THE EUROPEAN COMMUNITIES (2000), Commission Regulation No 1575/2000 Implementing Council Regulation N°577/98 on the Organization of a Labour Force Sample Survey in the Community Concerning the Codification to be Used for Data Transmission from 2001 onwards, Bruxelles.

[2] COMMISSION OF THE EUROPEAN COMMUNITIES (2001), eWork 2001 - Status Report on New Ways to Work in the Knowledge Economy, European Commission, Directorate C, Bruxelles.

[3] DOSTAL, W., JANSEN, R., PARMENTIER, K. (eds)(2000), Wandel der Erwerbsarbeit: Arbeitssituation, Informatisierung, berufliche Mobilität und Weiterbildung, Beiträge zur Arbeitsmarkt- und Berufsforschung, 213, Nürnberg: Bundesanstalt für Arbeit.

[4] EMPIRICA (2000), Benchmarking Progress on New Ways of Working and New Forms of Business Across Europe. ECaTT Final Report. IST Programme, KAII: New Methods of Work and Electronic Commerce. Brussels.

[5] FAMILIES (2002), Consolidated results of project, March 2002, www.families-project.com.
[6] GAREIS, K. (1999), Benchmarking Progress on Telework and Other New Ways of Working in Europe, Proceedings of the Fourth International Workshop on Telework, Tokio, August 31st - September 3rd 1999, n.p.
[7] GAREIS, K. (2000), Home-based vs. Mobile Telework. The Interrelationship between Different Types of Telework. Proceedings of Fifth International Workshop on Telework: 2000 and Beyond - Teleworking and the Future of Work?, Stockholm, Sweden, n.p.
[8] JULSTRUD, T.E. (1998), Combinations and Tracks: An Investigation of the Relationship Between Homework and Mobile Work. In: Suomi, R. et al. (eds), Telework Environments. Proceedings of the Third International Workshop on Telework, TUCS General Publication, no. 5: 148-163.
[9] KORTE, W.B., WYNNE, R. (1996), Telework - Penetration, Potential and Practice in Europe, Amsterdam et al.: IOS Press.
[10] LIIKANEN, E. (2001), The Future Outlook of E-Mobility in Europe: Sustainability and eEurope, in: Commission of the European Communities (eds), eMobility - Report of the Conference on Mobility in the Knowledge Economy, Göteborg, June 2001, European Commission, Directorate C: 16-21.
[11] MILLARD, J. (2002), Summary of European Experience of Telework and Telecentres in the Regions - A Guide for Policy Makers, Flexwork Working Paper, URL www.flexwork-ei.org.
[12] OFFICE FOR NATIONAL STATISTICS, UNITED KINGDOM (2001), The Labour Force Survey User Guide, Vol 1-9, London.
[13] REICHWALD, R., MÖSLEIN, K., SACHENBACHER, H. ENGLBERGER, H. and OLDENBURG, S. (1998), Telekooperation. Verteilte Arbeits- und Organisationsformen, Berlin et al.: Springer.

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[i] The SIBIS definition of home-based teleworkers includes self-employed only then when these do not usually work from home, in the same grounds or buildings as their home, or in different places using home as a base. This group should e.g comprise owner managers of SMEs. Other self-employed persons who declare themselves as teleworkers are assigned to the group "self-employed teleworkers in SOHOs" (see below) and typically comprise all kinds of freelancers who have their office in or adjacent to their home.

[ii] In this paper, numbers in columns indicate limited validity due to low absolute numbers of responses to the respective question.

[iii] Share of employment teleworking from home: 7.4%; share of teleworkers who could not be in paid work without the possibility to telework from home: between 8.8% (agree completely) and 17.2% (agree at least somewhat).

[iv] Another 0.5% (3%) are self-employed teleworkers, but they do not work from home or the same ground or building as their home, which means they are assigned to the category of traditional home-based teleworkers (see above).

[v] There are a number of interrelations between the types of telework mentioned above, namely home-based, mobile and SOHO-based self-employed telework. Basically, home-based teleworkers can also spend a considerable share of their time on business trips, such as is the case for many salesmen. The same applies to self-employed teleworkers in SOHOs. For this reason, the number of teleworkers per type cannot simply be added up to arrive at the total share of teleworkers, but overlaps between types have to be taken into account.

[vi] It should be noted here that the comparability of the 1999 and 2002 figures is affected by a slight change in question wording. The 2002 questionnaire defined telework as work at home using telephone, fax and computer and in which work results are transferred electronically. The 1999 questionnaire used a description that did not mention electronic transfer of work results. The growth of home-based telework between 1999 and 2002 may therefore have been higher in reality than is reflected in this comparison. This adaptation of the working definition for telework was necessary since the common understanding of telework among researchers and decision-makers has changed as a result of progress in the availability of ICTs such as online access technology.