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Where the Butterfly Alights: the Global Location of eWork

U Huws
N Jagger
P Bates

An EMERGENCE Project Report

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EMERGENCE

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The Institute for Employment Studies

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Contents

Executive Summary

This study forms part of the EMERGENCE project, which, with core funding from the European Commission's Information Society Technologies Programme, aims to measure and map ICT-related employment relocation at a global level. It complements a major international employer survey designed to estimate the spread of eWork and its location, and case studies designed to gain insight into the dynamics of locational choice.

Overview

This report begins by summarising the literature on the new economy, the delocalisation of work, virtual enterprises, nomadic work, the future of work and globalisation. This review is used to develop hypotheses, which later form a basis for collecting data at a global level, producing a database in which the hypotheses are tested, using a cluster analysis technique.

The report goes on to review the existing statistical indicators of eWork both at the EU level and globally. Although these statistics fail to capture the full scope of eWork, they do provide some contextual information for the fuller picture which will be painted by the results of the EMERGENCE employer survey. This will be published as a companion volume.

eWork in Europe

No satisfactory definitions of eWork currently exist in either sectoral or occupational statistics. Nevertheless, some indicators were generated which shed some light on its likely distribution.

IT-intensive occupations and sectors

Both IT-intensive occupations and IT-intensive sectors are found to be strongly clustered in certain European regions, generally in, or adjoining, capital cities in Northern Europe. IT-intensive occupations form the highest percentage of workers in the regions surrounding the capital cities of Stockholm, Paris, Brussels, London, Helsinki and Vienna, and in the densely populated Netherlands.

IT-intensive sectors show a similar pattern, although here, Rome, Madrid and Munich have also made their way into the top twelve regions, ranked on the basis of the proportion of employees in IT sectors in the total workforce.

eWork

Three occupational indicators are generated for eWork. The first two, 'potential telework occupations' and 'potential mobile telework occupations' are derived from the results of the UK Labour Force Survey which is currently the only one to collect detailed information on teleworking. Extrapolated to the European level, these occupations are also found to be distributed unevenly.

This demonstrates considerable variation across the EU. The countries with the highest proportion of the workforce in potential telework occupations are Denmark, the Netherlands, Sweden, the UK and Luxembourg, whilst those with the lowest are Greece, Portugal and Spain.

As with information technology employment intensity, there is a strong bias towards urban regions in Northern Europe when it comes to the intensity of potential telework. A clustering around capital cities is especially marked, especially in the regions surrounding Stockholm, Paris, Helsinki and London. There are also strong concentrations in the Netherlands and around Hamburg, Darmstadt and other German cities.

In relation to the potential for mobile teleworking (defined as workers who spend at least one day a week working from several locations using the home as a base), the dominance of the Nordic countries and the UK is if anything even stronger, although the Netherlands and Germany also have high proportions of the workforce in these occupations. Greece, Portugal and Spain have the smallest proportion of potential mobile telework occupations.

These results suggest a strong clustering of these forms of eWork in those regions that are also highly IT-intensive in terms of their sectoral and occupational structure.

Finally, tentative indicators are generated for 'potential call centre occupations'. This must be regarded as a speculative exercise, since no reliable basis for defining these occupations exists. The results, which are indicative only, suggest strong potential concentrations in Italy and Luxembourg. These are followed by the Netherlands, Germany and Denmark and certain regions of the UK and Sweden.

New global division of labour in eWork

The quality of statistical information that is available from Eurostat in the EU at a regional level is not available in most countries, and it is not possible to carry out such a detailed analysis at a global level. Nevertheless, there is an urgent need for some reliable information about which countries are emerging as major suppliers and users of the new telemediated business services.

From what little research already exists, eight factors were identified which seem to influence eWork location:

- relative service sector salaries
- graduate availability
- language
- students studying abroad
- time zone
- telecommunications infrastructure
- quantity of telecommunications traffic
- telecommunications costs
- trust or previous contact
- Internet access and literacy
- economic development and 'openness'
- demographic factors.

Statistical indicators for these factors were then sought in order to study the characteristics of each country. In this way, national strengths and weaknesses in any global competition to attract eWork could be identified. This resulted in the creation of an eIndicators database, which covers 204 countries and includes 171 variables. A cluster analysis of these data was then carried out to see what sorts of groupings emerged, and identify countries which seemed to be particularly advantageously placed, or at particular risk of exclusion from the digital economy.

Because of the lack of reliable indicators for some of these factors, and because of enormous differences in population size and other variables between countries, these clusters should not be regarded as definitive. In some large countries, for instance, the existence of highly dynamic pockets of new economy sector growth might be invisible because they are swamped, statistically speaking, by declining old economy industries. Conversely, a country, such as Botswana, with a small population and a great deal of mineral wealth, might present a similar profile to a highly developed economy, although the majority of its people may still be living in poverty.

The six clusters that emerged should not therefore be regarded as definitive, but rather as starting points for further investigation. They are:

E-leaders

These countries define the shape of e-work and are likely to be the main source of relocated employment. The group consists of Australia, France, Germany, Japan, the United Kingdom and the United States.

E-capables

These countries, although smaller, operate at the same level as the e-leaders, but are less likely to define the shape of e-work at a global level. They comprise Austria, Belgium, Cyprus, Denmark, Finland, Greece, Hong Kong, Ireland, Israel, Italy, Malta, Macao, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovenia, Spain, Sweden, Switzerland, Taiwan and the Virgin Islands (US).

E-hares

These countries are relatively small, with historically poor telecommunications infrastructure but rapid recent growth. They seem capable of capturing significant global eWork niches in the future. E-hares cover a diverse range, including Cambodia, Chile, Ghana, Hungary, Indonesia, Mauritius and the Philippines.

E-tigers

These countries are large, usually with relatively well-developed infrastructures and available human resources. Often, they are already significant players in global eWork. However, they are perceived as raising problems of trust and, in some cases, are seen as relatively corrupt and therefore poor places to do business. They include China, Egypt, Guatemala, India, Jamaica, Korea, the Lebanon, Mexico, Poland, Russia, Thailand and the Ukraine.

E-maybes

These countries are small in population with well-developed infrastructures and human resources, as well as a reputation for trustworthiness — but often without the spare capacity to take on relocated employment. The cluster includes some centres of offshore banking, like Bermuda, Barbados and Jersey as well as developed economies like Canada, Iceland, Liechtenstein and Luxembourg.

E-losers

These countries tend to have neither the telecommunications infrastructure nor the human capital resources to benefit from eWork, whilst also being perceived as inefficient and corrupt. Including most of Africa, much of South America and clusters of Balkan and Central European states, this large list of countries accounts for nearly three in ten of the world's population and seem likely to be seriously at risk of outright exclusion from the emerging e-economy.

Nearly half of the world's population lives in e-tiger countries, whilst as much as 28 per cent live in the e-loser countries, which make up over half of all countries. The e-leaders, although comprising only six countries, represent about one-tenth of the world's population. The e-capable countries, and especially the e-maybe countries, are relatively small in population terms, while the e-hare countries represent about one-tenth of the world's population.

Conclusions

The report concludes that eWork remains strongly clustered in particular regions. Far from distributing ICT-related employment more evenly, it seems that the opportunities offered by the new Information Society Technologies to relocate work are resulting in the development of a more specialist global division of labour in which 'like attracts like', with a danger of increasing regional polarisation.

This does not mean that all 'rich' regions develop in the same way or at the same pace, or that the converse is true for 'poor' regions. Some regions in some countries appear to be making much more rapid progress towards developing an information economy than others, even when other factors appear similar. In Europe, for instance, the Netherlands stands out as a country in which many regional labour markets appear to be unusually intensive in terms both of IT employment and eWork.

The global-level analysis also suggests that the picture is by no means static. There does not appear to be an inevitable trajectory whereby those regions that start with more of this type of economic activity are likely to continue to attract more in an undifferentiated way. On the contrary, it appears that regions develop in specific and differentiated ways. Some regions are able to exploit their advantages to carve out particular niches in the new global division of information work and find a 'fast track' for economic development. Others are bypassed by the new opportunities opened up by IST technologies.

Recommendations

The report concludes with some recommendations to statistics providers.

Sectoral classification

Further refinement should be undertaken of the work already carried out by the US Government and by the OECD on adapting the existing sectoral classifications to take account of the 'digital' or 'information' economy. It would be extremely helpful to the research and policy communities if a new international sectoral classification scheme were developed for adoption by national statistical offices which is both backwardly compatible with existing statistics and fully comparable internationally. In the first instance, arriving at an agreement on reclassification between the national statistics offices of the existing EU member states, EU accession states, and EFTA states would constitute a major step in this direction.

Occupational classification

The convergence and reconstitution of traditional industrial sectors is mirrored by a transformation of traditional occupational profiles and nomenclatures. There is an urgent need for internationally comparable definitions of a range of new occupations, varying from 'call centre operator' to 'webmaster'.

Because of differences in national qualifications systems, the process of occupational profiling may take different forms in different countries. However, it would seem entirely possible, at least at the EU level, to pool the results of research in different member states in order to inform a discussion leading to an agreement on a common scheme. The aim would be to refine the ISCO classification to produce a much more differentiated set of codes for workers in the information economy.

This would be useful for a variety of different policy purposes including benchmarking national qualifications, encouraging labour mobility, anticipating skills shortages, and the development of training, employment and regional development policies.

Labour Force Surveys

The inclusion of questions in the UK labour force survey which make it possible to identify home-based and multi-locational teleworkers has proved to be a cost-effective way of producing robust information, annually updated, on the growth of these forms of work and the characteristics of the workers involved.

The inclusion of such questions in other national labour force surveys in Europe, and hence in the European Labour Force Survey (especially when combined with revised sectoral and occupational codes as proposed above), would offer an exceptionally powerful means for monitoring the development of eWork and studying its characteristics.

National accounts and trade statistics

If the revised sectoral classifications proposed above can be agreed and adopted, then it would be helpful if they could be implemented as quickly as possible in the drawing up of national accounts and the presentation of trade statistics. This would make it possible to identify the contribution that the information economy makes to growth and to foreign direct investment, and to track the international flows of eWork.

Qualifications

Considerable progress has already been made within the EU in benchmarking occupational qualifications, in the interests of promoting labour mobility and the transferability of skills. As new occupational definitions emerge, it would be useful if this process could be accompanied by a codification of the relevant national qualifications relating to information technology employment or eWork. This would make it possible to generate genuinely comparable information about the skills of the workforce at a regional level. This would not only be of great use to researchers and policy-makers but would also be an aid to employers or investors searching for locations for new information economy activities.

Pilot studies

The recommendations made so far refer to refinements to, or further developments of, existing data gathering instruments or procedures. There is also a need to identify entirely new indicators that are not captured by the existing instruments. One means of doing so is the development of hypotheses that can be tested in pilot studies. A productive way forward here might involve triangular forms of collaboration, between the European Commission or other international bodies, together with national statistics offices, together with academic or professional researchers. In this way, such pilot studies could be developed in ways which experimentally test the collection of new variables, or try out new methods of collection, whilst remaining compatible, and therefore comparable, with existing research instruments and methods.

Speed

The speed of technological change is so rapid that statistics become ever more quickly outdated and may become almost useless for any purpose other than a purely historical one after a few months, let alone years.

The new technologies do themselves offer a number of means whereby the processes of communication, collection, analysis and dissemination can be speeded up. It would be of great benefit to all parties if all the major international statistics providers could be urged to take advantage of these developments and make it a priority to make data available as quickly as possible, using the Internet as a means of rapid global distribution.

1. Introduction

In 1999, we published *Teleworking and Globalisation: Towards a Methodology for Mapping and Measuring the Emerging Global Division of Labour in the Information Economy*. Introducing it, we explained:

> *'This study is a first attempt to do something which, to our knowledge, has never been attempted before: to measure and chart the new global division of labour which is emerging in what, for lack of a better term, we tentatively refer to as 'telemediated information processing work'. Or, put more fashionably, to determine the extent to which the combined technologies of computing and telecommunications have actually brought about 'the death of distance'[1], a 'weightless world'[2], a 'connected economy'[3], or, quite simply, 'globalisation' in terms of the distribution of employment.*
>
> *'This is a formidably difficult task. Almost all the statistics and tools available to the economists and geographers and others whose business it is to plot trends in employment are rooted in the assumption that 'work' is something which takes place on a fixed geographical spot (normally the employer's premises) for a specified number of hours by a person with a contract which conforms to a recognisable and stable standard within the terms of national jurisdiction, and that 'trade' involves the exchange of goods and services in discrete and measurable transactions.*
>
> *'The 'informatisation' of economies, as Castells has called it[4], has thrown all these assumptions into question. The convergence between the industrial sectors and occupations used in standard classification schemes and the emergence of new ones, the breakdown of the unity of time and space of the traditional workplace, the multiplication of contractual arrangements with a blurring of the boundaries between 'employment' and 'trade' relationships, the increasing knowledge-intensiveness of traded commodities and the growing use of electronic media to transmit information products and services tracelessly across borders have rendered many of the old research methods redundant.*

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1 Frances Cairncross, *The Death of Distance: How the Communications Revolution will Change our Lives*, Harvard Business School Press, Boston, 1997

2 Diane Coyle, *Weightless World: Strategies for Managing the Digital Economy*, Capstone Publishing, Oxford, 1997

3 Christopher Meyer and Stan Davis, *Blur: the Speed of Change in the Connected Economy*, Addison-Wesley, 1998

4 Castells M, *End of Millenium: The Information Age: Economy, Society and Culture, Volume II*, Blackwell, Oxford and Malden, Massachusetts, 1998

'In the face of these changes, labour market researchers who rely on traditional methods find themselves suddenly helpless. It is as though we are entomologists who have been trained to study caterpillars. An armoury of methods has been devised for tracking their exact characteristics, rates of growth and movements. We might know, for instance, precisely which species tend to congregate on which types of plant, how long it takes them to get there, how high they can climb, how much they eat in an average day and so on. But suddenly (after a period of liquefaction and reformation inside a chrysalis) they become butterflies. No longer obliged to proceed, a footstep at a time, in linear fashion over physical surfaces, they can take off into a third dimension and fly in any direction, landing we know not where. The rules which enabled one to predict their movements no longer apply. How can we begin to map their progress and foretell their future distribution? Must we throw out all our old instruments? Or can they be adapted for these new purposes?'

Since then, things have progressed. We were fortunate enough in 2000, along with research partners in other parts of Europe, North America and Australia[1], to receive funding from the European Commission's IST Programme, supplemented by grants from other bodies including the Austrian, Australian and Canadian governments and the HK Service in Denmark, to carry out a major three-year international study of eWork location — the EMERGENCE project.

This report forms part of that study and represents a development from the exploratory work we carried out in 1999. It forms a companion to a large survey of eWork location, so far carried out in 18 European countries, and will in due course be supplemented by the results of case-studies and the extension of the survey beyond Europe. The purpose of the work presented here is to assemble such statistics as exist at a global level that might shed light on eWork location, and analyse them in such a way as to identify those sites which are favoured for particular forms of eWork, or, to extend the metaphor we used in 1999, to find where the butterflies alight. This is supplemented by a study of the existing statistics at a regional level within the EU.

The problem we faced, however, was still essentially the same as in 1999. We were looking for phenomena that the existing statistics were not designed to capture. Our earlier work, together with the results of our review of the literature and case study evidence, had allowed us to form certain hypotheses, but these remained largely untested.

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[1] The EMERGENCE Project (the acronym stands for Estimation and Mapping of Employment Relocation in a Global Economy in the New Communications Environment) involves a partnership between IES and NOP in the UK, FORBA in Austria, HIVA in Belgium, the DTI in Denmark, IRES in Italy, the Institute of Sociology in Hungary, IMIT in Sweden, Simon Fraser University in Canada and Edith Cowan University in Australia, as well as subcontractors in Greece, France and Spain and research associates in many other countries.

To continue the analogy with naturalists, we were in a jungle on a strange continent: faced with teeming evidence of insect life but uncertain about the nature of these organisms or their inter-relationships with each other. They did not seem to fit into existing classification systems; neither did their movements appear to follow familiar patterns.

In such a situation it is necessary to use whatever means are to hand to begin to make sense of the evidence and start to form a picture of the local ecology and the place of particular species in it. Which colours and patterns seem to be associated with similar behaviour? Which creatures are found in association with each other? Which seem to avoid each other? Which congregate around the drinking holes? And which seem to manage almost without fluids? Where are the largest and most vigorous-looking to be found? Which are active at night? Which plants are most likely to be surrounded by diverse life forms?

The mental process goes something like this: collect whatever information you can, examine it to see whether regular patterns can be discerned and which factors seem to be associated with each, develop hypotheses that there might be some systematic relationships between these factors, then re-examine the evidence to see whether these hold up.

This is more or less the procedure we followed in the parts of this study, which attempt an analysis at the global level. The technique we used, cluster analysis, is not a usual one in economic research. It is flawed in a number of respects. Nevertheless, in the absence of any other reliable evidence, we believe that it offers a useful starting point, both for developing and testing hypotheses, and for identifying starting points for future research.

The global cluster analysis carried out at a country level has been supplemented in this study by an analysis of sectoral and occupational data at a regional level within the EU.

In this report we first, in Chapter 2, summarise the existing state of knowledge on the global distribution of eWork. In Chapter 3, we discuss the indicators that are available in the EU at a national level and in Chapter 4 we present our analysis at a regional level. Chapter 5 looks more broadly at occupational indicators of eWork, using data from the European Labour Force Survey. Chapter 6 discusses some of the factors influencing the international division of labour in the information economy and the indicators which can be found for them, whilst Chapter 7 presents the results of our Cluster Analysis. Finally, Chapter 8 summarises our conclusions and sketches out the implications for future statistics collection and analysis.

Ursula Huws
Nick Jagger
Brighton, February, 2001

2. Existing Literature and Evidence

The literature on the global information economy is vast, crossing as it does the disciplines of economics, sociology, geography and technological forecasting, to name but a few. It ranges from the highly technical or theoretical at one extreme, to the popular, journalistic and applied at the other. It is beyond the scope of this report to provide more than an illustrative overview of this literature. Our main concern has been to scan it for any light it might shed on the characterisation, extent and distribution of eWork and the dynamics of its development.

2.1 The New Economy

The notion that we are witnessing the emergence of a 'new economy' is very widely discussed in the pages of general economic and 'new media' journals, such as *The Economist,* the *Wall Street Journal,* the *New York Review of Books* and *Wired* as well as in more specialist publications such as *New Economy Watch.* The phrase is used in several distinct senses.

One of the most important of these is as a descriptive term, to define the new industries which have developed using the new digital technologies — the 'dot.com' companies, a loosely defined group of overlapping sectors which include software development, website development and management, broadcasting, publishing, multimedia and other content provider industries, together with hardware and telecommunications companies. The most serious attempts to date to delineate these sectors, sometimes known as the 'digital economy' have been by the US government's Department of Commerce[1], Industry Canada[2], and the OECD[3].

[1] US Department of Commerce (2000) *Digital Economy 2000,* www.ecommerce.gov

[2] Howitt P, (ed.) *The Implications of Knowledge-Based Growth for Micro-Economic Policies,* Industry Canada, and University of Calgary Press, Calgary, 1998

[3] Pattinson B, Montagnier P, Moussiegt L, *Measuring the ICT Sector*, OECD, 2001

The term is used in a more abstract and theoretical sense by some economists, like Danny Quah[1], who argue that we are entering an era in which increasing proportions of added value are created by inputs of 'knowledge' which, because it is inappropriable, does not obey the same economic laws as consumable items, such as raw materials. Quah's argument that the new economy is 'weightless' has been taken up and popularised by authors like Diana Coyle[2] and Charles Leadbetter[3] and others[4].

These works offer an array of examples to illustrate their point, some of which provide useful insights into the dynamics of eWork. However, they fail to define 'knowledge work' in a manner that makes it possible to identify 'knowledge workers' in the occupational statistics.

Some attempts to theorise 'knowledge work' have been made, for instance by Luc Soete[5] who distinguishes three forms in which knowledge contributes to growth. These are 'easily transferable codifiable knowledge', 'non-codifiable knowledge, also known as tacit knowledge (skills)' and 'codified knowledge'. These categories are not, however translated into concrete occupational definitions.

2.2 The delocalisation of work

This literature on the new economy is closely associated with a group of publications with a more geographical focus, which argue that the facility with which the new technologies allow work to be relocated is bringing about 'the end of geography'[6] or the 'death of distance'[7] to use the titles of books by Richard O'Brien and Frances Cairncross. These generally up-beat

1 Quah D T, 'Increasingly Weightless Economies' in *Bank of England Quarterly Bulletin,* February, 1997, p 49 and 'Policies for the Weightless Economy', Lecture to the Social Market Foundation, London, April 21, 1998

2 Coyle D, *Weightless World: Strategies for Managing the Digital Economy,* Capstone Publishing, Oxford, 1997

3 Leadbeater C, *Living on Thin Air* , Penguin, Harmondsworth, 2000

4 see for instance, Don Tapscott (ed.) *Blueprint to the Digital Economy: Wealth Creation in the Era of E-business'*, 1998; Don Tapscott, *The Digital Economy: Promise and Peril in the Age of Networked Intelligence'*, McGraw Hill, 1995, and Dale Neef (ed.) *The Economic Impact of Knowledge (Resources for the Knowledge-based Economy)*, Butterworth-Heinemann, 1998

5 Soete L, 'The Challenges of Innovation' in *IPTS Report 7*, Institute for Prospective Technological Studies, Seville, September, 1996, pp 7-13.

6 O'Brien R, *Global Financial Integration : The End of Geography* (Chatham House Papers)

7 Cairncross F, *The Death of Distance: How the Communications Revolution will Change our Lives*, Harvard Business School Press, Boston, 1997

publications suggest that these developments bring unprecedented new opportunities to previously neglected regions. They can, however, be contrasted with a slightly older geographical literature arguing that regional concentration, rather than regional dispersion of 'information work' is the most likely outcome of this use of ITCs. Some key figures in this field are David Harvey[1], Saskia Sassen[2], Doreen Massey[3], Mitchell Moss[4] and a group of researchers at the Centre for Urban and Regional Development Strategies (CURDS) at the University of Newcastle-upon-Tyne, including Mark Hepworth[5], Kevin Robins[6] and Andrew Gillespie[7].

Such publications are in turn linked with work on industrial clustering, for instance by Porter[8] and Kanter[9] which also argue that the trend is towards increasing geographical specialisation, rather than homogeneity.

Again, we find a wealth of anecdotal evidence in these publications illustrating that work is indeed being dispersed

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1 see, for instance, Harvey D, *The Condition of Postmodernity,* Basil Blackwell, Oxford, 1989, and 'Between space and time: reflections on the geographical imagination', *Annals of the Association of American Geographers,* 80, pp 418-434

2 Sassen S, *The Global City: New York, London, Tokyo,* Princeton University Press, Princeton, 1991

3 Massey D, *Spatial Divisions of Labour*, Macmillan, London, 1984

4 Moss M, 'Telecommunications, World Cities and Urban Policy', *Urban Studies,* 24, pp 534-546, 'Telecommunications and International Financial Centres' in Brotchie *et al.* (eds) *The Spatial Impact of Technological Change*, Croom Helm, London, 1987 and (with Dunau A) 'Offices, Informational Technology and Locational Trends' in Black K, *et al.* (eds) *The Changing Office Workplace* pp 171-182, Urban Land Institute, Washington DC, 1986

5 Hepworth M, *Geography of the Information Economy*, Belhaven Press, London, 1989, 'The Geography of Technological Change in the Information Economy', *Regional Studies,* 20, pp 407-428

6 Robins K, and Hepworth M, 'Electronic Spaces' in *Futures,* April, 1988, Robins K and Gillespie A, 'Beyond Fordism? Place, Space and Hyperspace', unpublished paper presented to the International Conference, *Information, Technology and the New Meaning of Space*, Frankfurt, May 15-19, 1988

7 Gillespie A, 'Telematics and its Implications for Industrial and Spatial Organization' in *Regional Development Dialogue,* Vol. 14 No. 2, Summer, 1993 and Gillespie A E and Hepworth M E, *Telecommunications and Regional Development in the Information Society,* Working Paper No 1, Newcastle Studies of the Information Economy, University of Newcastle upon Tyne Centre for Urban and Regional Development Studies, October, 1986

8 Porter, M, *Competitive Advantage of Nations*, Macmillan, London, 1990

9 Kanter, R,M,*World Class*, Simon & Schuster, 1995

throughout the globe with the support of digital technologies — if only to certain locations. However, these studies present no empirical research, or statistical data which would make it possible to estimate the extent or distribution of this relocated employment.

2.3 Virtual enterprises

The literature on delocalisation, much of it from the perspective of organisational theory, overlaps considerably with the literature on 'virtual enterprises'. This is based on a notion that organisations can no longer be defined in terms of the physical premises that they occupy, or indeed their formal contractual relationships with each other or with their employees. Rather, they must be perceived as networks, held together on the one hand by complex contractual webs and mutual dependencies, and on the other by shared ITC platforms.

The early publications on virtual organisations, for instance by Ettighoffer[1], were in turn linked with the voluminous literature on teleworking (which we do not discuss in detail here, since this is covered exhaustively elsewhere[2]) and on various forms of organisational restructuring such as 'Business Process Re-engineering' or BPR. The most famous proponent of BPR was Michael Hammer[3] but the subject was also addressed by other authors, such as Colin Coulson-Thomas and colleagues[4] and Max Boisot[5]. Such publications focused mainly on the various forms that restructuring might take and how they could be introduced.

More recently, attention has shifted outwards from the individual 'virtual' organisation towards its relationship with its supply chain. This is seen in David Oates's study of outsourcing and the virtual organisation[6], and some of the contributors to Cary Cooper

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1 Ettighoffer D, *L'Entreprise Virtuelle ou les Nouveaux Modes de Travail*, Paris, 1993

2 summarised *inter alia* in Huws U, *Teleworking an Overview of the Research*, Department of Trade and Industry, London, 1996 and in the annual *Telework Status Reports* of the European Commission's DG Information Society

3 Hammer M, Champy J, *Reengineering the Corporation*, Harper Business, London, 1994; *The Reengineering Handbook,* Harper Collins, London, 1995, and *Beyond Reengineering: How the Process-Centered Organisation is Changing our Work and Lives,* Harper Collins, 1996

4 Coulson-Thomas C, *Business Process Re-engineering: Myth and Reality,* Kogan Page, London, 1994

5 Boisot M, *Information Space: a Framework for Learning in Organizations, Institutions and Cultures,* Routledge, London and New York, 1995

6 Oates D, *Outsourcing and the Virtual Organization: the Incredible Shrinking Company*

and Denise Rousseau's collection of essays on virtual organisations[1], as well as the work of Bob Norton and Cathy Smith on the subject.[2]

Once again, we find fascinating case study material here, but nothing that would enable us to pick out 'virtual' organisations from non-virtual ones in the economic statistics.

2.4 Nomadic work

Apart from the literature on delocalisation, there is a related body of work on the growing mobility of workers and the use of ICTs to support peripatetic work, encapsulated by Tsugio Makimoto's phrase 'Digital Nomad'[3].

There is a general agreement in this literature that mobile working is as important as, if not more important than, home-based teleworking. Makimoto estimates that in the future hot-desking will become widespread, with large corporations planning their offices on the basis of one workstation for every four staff members. This suggests that such workers will typically spend three-quarters of their working time away from base, much of it working while on the move. Similar forecasts have been made by a number of industry commentators, including Bill Gates[4].

Despite this, very little work has been done to establish the prevalence or characteristics of mobile teleworking. A survey of *Practical Computing* readers we carried out in the UK in 1990[5], and a similar survey carried out by Mori for Toshiba in 2001[6], form partial exceptions. Whilst giving some useful information about the characteristics of nomadic workers, these studies do not provide information about the prevalence of this form of working. Only the UK includes questions in its Labour Force Survey making it possible to track the growth of such teleworking.

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1 Cooper C L and Rousseau D M, *The Virtual Organisation,* Wiley, Chichester, 1999

2 Norton B and Smith C, *Understanding the Virtual Organization,* Barrons Educational, 1998

3 Makimoto T and Manners D, *Digital Nomad*, Wiley, Chichester, 1997

4 Gates B, *The Road Ahead*, Penguin Books, London and New York, revised edition, 1996

5 Huws U, 'Pinning down the mobile worker' in *Practical Computing,* March 1990

6 'Workaholic' Britain Puts in a Six Day Working Week Says E-Mori and Toshiba', Toshiba Press Release, London, 7th February, 2001

2.5 Future of Work

The literature on the future of work that takes some account of the impact of ICTs on work location goes back to the 1970s, and includes the work of such well-known futurologists as Daniel Bell[1] and Alvin Toffler[2]. Unsurprisingly, such books contain a great deal of speculation about changes in the location of work but little in the way of concrete definitions.

In the 1990s, a new genre of literature on the subject emerged in the United States, exemplified by books such as 'When Work Disappears'[3], 'the Jobless Future'[4] and 'the End of Work'[5]. As their titles suggest, these contend that the cumulative impact of technological change is not so much to relocate employment as to destroy it.

In some cases, the arguments are similar to those used by some of the more pessimistic authors of studies about globalisation, such as William Greider[6]. He suggests that as production is automated, the number of production workers will shrink, leaving a smaller population with sufficient income to buy the products of the newly automated factories. This will lead to a crisis of overproduction, which will result in mass unemployment in both developed and developing countries. These ideas have been challenged by some economists, including Paul Krugman[7].

2.6 Globalisation

This brings us to the wider subject of globalisation. At the most general level, there have been several major works that have attempted to analyse the dynamics of globalisation and its relationship with 'informatisation' or the development of a 'networked economy'. The best known of these is perhaps the monumental three-volume opus by Castells[8]. Another sociologist

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1 Daniel Bell, *The Coming of Post-Industrial Society*, Basic Books, 1973

2 Toffler A, *The Third Wave*, Pan, London, 1981

3 Williams W J, *When Work Disappears,* Random House, New York and Toronto, 1996

4 Aronowitz S and DiFazio W, *The Jobless Future*, University of Minnesota Press, Minneapolis and London, 1994

5 Rifkin J, *The End of Work*, Putnam Books, New York, 1995

6 Grieder W, *One World, Ready or Not: The Manic Logic of Global Capitalism*

7 Krugman P, *The Accidental Theorist and Other Dispatches from the Dismal Science,* Norton, 1999

8 Castells M, *The Information Age: Economy, Society and Culture, Volume I: The Rise of the Network society;* 1996 *Volume II: The Power of Identity;* 1997, *Volume III End of Millenium,* 1998, Blackwell, Oxford and Malden, Massachussetts

who has paid serious attention to the subject is Anthony Giddens, not only in his own writing[1], but together with Will Hutton, in bringing together other important thinkers on the subject[2].

Other important recent contributions to the general discussions on globalisation have included John Gray[3], James Mittelman[4] and Michael Hart and Antonio Negri[5].

There is some disagreement in the literature about precisely how globalisation is to be characterised, its causes and dynamics. Some economists, such as Paul Hirst and Grahame Thompson[6], are even sceptical about the extent to which globalisation can be said to be a real phenomenon.

Nevertheless, there seems to be a general consensus that it is becoming easier and easier to relocate economic activity — including employment — around the globe, and that this may change the characteristics of regions and their position in the new global economy. Castells, Hutton and Giddens argue that increasing differentiation between regions may well be the result. Other commentators contend that there will be an increasing homogenisation between different national styles of economic management and forms of capitalism (although Gray argues that it is possible to distinguish different distinct forms, such as 'Asian capitalism'). There is also general agreement about the growing dominance of transnational corporations. These not only play a critical role in determining what employment gets located where, but also play an increasingly important role in shaping work culture, regardless of where it is located.

Whilst they greatly enrich the discussions about these developments, what these books fail to do, within their broader socio-economic analysis, is to offer a clear conceptual framework within which it is possible to isolate 'information work' and study its locational dynamics in the context of globalisation and technological change.

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1 Giddens A, *Runaway World: How Globalization is Shaping our Lives*, Routledge, New York, 2000

2 Hutton W and Giddens A (eds), *Global Capitalism,* the New Press, New York, 2000

3 Gray J, *False Dawn: The Delusions of Global Capitalism,* the New Press, New York, 1999

4 Mittelman J H, *The Globalization Syndrome: Transformation and Resistance*, Princeton University Press, Princeton, 2000

5 Hart M and Negri M, *Empire*, Harvard University Press, Boston and London, 2000

6 Hirst P and Thompson G, *Globalization in Question*, Polity Press, Oxford, 1996, p 27

2.7 Empirical studies

A final source of information on eWork location is the results of various surveys that have been carried out on the extent of partially or fully home-based teleworking or of other forms of remote work, such as call centre work. We have reviewed the evidence on teleworking extensively elsewhere[1], so will not repeat this here. Although they provide evidence of the extent to which employers and individuals are making use of Information Society Technologies to work remotely, such surveys are of limited relevance to this study. This is because such work generally takes place within commuting distance of the employer's premises, whilst our focus here is on the relocation of work across national and regional boundaries.

Most studies of home teleworking have been carried out in developed countries, such as Europe, the United States, Canada, Australia, Japan and Singapore; they do not therefore offer a basis for international comparison at a global level.

Of greater interest for our purposes is the literature on call centres and other forms of remote work carried out on employer premises.

Market research studies are carried out annually on the call centre sector by companies such as Datamonitor[2] and MZA[3] at a European level and in some countries at a national level. In the UK, Incomes Data Services also carries out an annual survey[4] whilst the extent of call centre employment is discussed in a number of industry forums, such as *Inbound-Outbound*[5], and by academic researchers[6] and consultants[7]. Unfortunately, comparatively little of this

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1 *inter alia,* Huws U, *Teleworking: an Overview of the Research,* Joint publication of the Department of Transport, Department of Trade and Industry, Department of the Environment, Department for Education and Employment and Employment Service, London, July, 1996 and Huws U, Jagger N and O'Regan S, *Teleworking and Globalisation*, Institute for Employment Studies, Brighton, 1999

2 Datamonitor, *Call Centres in Europe,* 2000, *Call Centres in the UK*, 2000

3 MZA, ACD volume of *European Telecommunications Market Report*, MZA, August, 1999

4 Incomes Data Services, *Pay and conditions in call centres* 1998. 1999 and 2000

5 'How Many Call Centres in Europe?', *Inbound Outbound,* December/January, 1998

6 Fernie S, Call centres – the workplace of the future or the sweatshops of the past in a new disguise?, *Centrepiece*, Centre for Economic Performance, London School of Economics, 1998

7 Roncoroni S, *Call Centres – a new way of working*, presentation and verbal communication at Institute of Personnel Directors Annual Conference, Harrogate, October, 1998

research addresses questions of locational choice, although this was examined in an international survey of call centre managers we carried out in 1999[1]. Again, there is no reliable information on call centres at a global level.

The literature on remote data processing and software development is even more fragmentary and anecdotal. Only one study of which we are aware even attempted to measure its extent. This was a 1996 US survey, reported in the *Economist*, which found over 100 of America's top 500 firms buying software services from subcontractors in India[2].

Other commercial sources of data, market analyses and survey results are available from time to time, many of them usefully summarised by Nua[3] in their newsletter on Internet surveys. Such studies tend to focus, however on the markets for particular products and services and on consumers' use of the Internet, rather than Internet-based employment.

Apart from various official data sets, which are detailed later in this report, the sources of information which we have found particularly useful for this study, include the World Bank[4], The NBER[5], the OECD[6], McConnell International[7] and Transparency International[8].

The hypotheses derived from this review, together with the indicators selected and our analysis of them, are presented in later chapters of this report.

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1 Huws U and Denbigh A, *Virtually There: the Evolution of Call Centres*, Mitel, Swindon, 1999, summarised in EMERGENCE Newsletter, 2, August, 2000.

2 Survey: the World Economy' in *The Economist,* September 28th, 1996, pp 43-44

3 NUA Internet Surveys, http://www.nua.ie/surveys/

4 Analysys, *The Network Revolution and the Developing World*, A Final Report for World Bank and infoDev, Washington, 2000 and Braga C *The Impact of Internationalization of Services on Developing Countries*, Washington, 1995
www.worldbank.org/fandd/nglish/0396/articles/070396.htm

5 Frankel J A, *Globalization of the Economy*, NBER Working Paper 7858, 2000

6 OECD Services *Statistics on Value Added and Employment*, OECD, Paris, 2000

7 McConnell International, *Risk E-Business: Seizing the Opportunity of Global E-Readiness:*
http://www.mcconnellinternational.com/ereadiness/
EReadinessReport.htm, 2000

8 Lambsdorff J G, *The Transparency International Corruption Perceptions Index,* 1999 — Framework Document, www.transparency.de

We are well aware that many of the indicators selected in the following pages correlate extremely poorly with the new activities described in the literature we have summarised above. We can only respond to critics by asserting that, poor as they may be, they are at present the best available. It is hoped that the results of the EMERGENCE project will contribute to the development of improved definitions and indicators in the future. In the meanwhile, we hope that they will prove to be better than nothing.

3. IT Employment — Indicators for EU Countries

This chapter examines what can be learnt from harmonised sources at the EU national level about the extent and nature of the information economy as measured by the presence of IT employment.

3.1 Approaches to measurement

Eurostat is the primary source of harmonised data for the EU; therefore, the production of indicators at this level is dependent on the data collected by this body. Apart from economic data, the best source at the regional level, both in terms of coverage and timeliness, is the Labour Force Survey (LFS). The LFS is a series of national household surveys aimed primarily at establishing the levels of economic activity and unemployment at the regional level. However, the LFS also collects data on occupations and sectors of employment as well as patterns of employment and educational attainment.

There are a range of approaches to measuring the information economy in general and the IT sector in particular. These approaches are to a large extent driven by definitions of the information economy and the available data. In this part of our study, we use the production of IT hardware and software, including multimedia and broadcast television, as the definition of 'core' information economy functions. The approach uses two main dimensions:

- occupations or information economy workers, and
- sectors or information technology industries

3.2 Information technology workers

Information technology workers are usually defined in terms of their occupations. The available data from the Community Labour Force Survey (LFS) use occupational data coded at the three digit level using the International Standard Classification of Occupations (ISCO-88(COM)). The combination of the level of data availability, and a narrow definition of information

technology occupations, means that the analysis presented here covers the following ISCO categories:

- Computing professionals — ISCO 213
- Computer associate professionals — ISCO 312, and
- Optical and electronic equipment operators — ISCO 313

These categories are dealt with in turn below.

3.2.1 Computing professionals

The computing professional category is an ISCO (International Standard Classification of Occupations) three-digit category. At the time of writing, data were available covering 1999 for the bulk of the EU15, excepting the UK where the data relate to 1998, and Ireland where, despite a recent updating of occupational classifications, the data are not currently included in Eurostat datasets at the requisite level of disaggregation[1].

The ISCO minor group 213 contains two unit groups:

- 2131 Computing systems designers, analysts and programmers, and
- 2139 Computing professionals not elsewhere classified.

Table 3.1 shows the number of computing professionals (as defined by ISCO 213) in each EU country in 1999. It also shows this as a proportion of total employment in each country.

As can be seen, the UK has the largest number of computing professionals with around 380,600. Sweden, however, has the highest proportion of all employees as computing professionals at 1.9 per cent, while both Greece and Italy only have 0.1 per cent of their employees in this category. Over a quarter (26.2 per cent) of computer professionals in Italy were female compared with only 6.5 per cent in Belgium.

[1] Data from the Irish Central Statistical Office (CSO) coded using the Standard Occupational Classification as currently used in the UK and Ireland indicates that of the SOC category 214 'Software engineers' 25.5 per cent of the 5,500 total were female and of the SOC category 320 'Computer analysts, programmers 33.1 per cent of the 13,300 total were female in 1999. However these new occupational classifications have not yet been translated into ISCO data currently held by Eurostat in Luxembourg and it is therefore impossible to provide a reliable comparison between Ireland and other EU countries at the time of writing.

Table 3.1: Numbers of computer professionals by country and as a proportion of the workforce, 1999

	Number of Computer Professionals	% of Computer Professionals Female	Computer Professionals as % of all employees
	(1,000's)	%	%
Austria	12.0	6.5	0.3
Belgium	59.4	18.8	1.5
Germany	247.7	16.3	0.7
Denmark	33.7	11.0	1.3
Spain	69.9	12.6	0.5
Finland	38.1	22.4	1.6
France	234.5	20.0	1.0
Greece	4.6	..	0.1
Ireland (1)	—	—	—
Italy	12.0	26.2	0.1
Luxembourg	2.1	..	1.2
Netherlands	109.9	13.7	1.5
Portugal	..	..	..
Sweden	75.9	18.0	1.9
United Kingdom (2)	380.6	18.7	1.4

Notes: .. Numbers too small to report reliably; (1) Data not available; (2) 1998 data

Source: IES (2000) Special Analysis of Eurostat Community Labour Force Survey

3.2.2 Other information technology workers

One of the problems with the occupational information from the Community LFS is the lack of fine detail available. Although ISCO-88 (COM) — the version of ISCO-88 used by Eurostat — has four digit definitions, data are only available at the three-digit level from the Community LFS. Apart from the computing professional category already reported, two other categories are of interest: 312 — Computer associate professionals' and '313 — Optical and electronic equipment operators'.

The ISCO minor group, 312 Computer Associate Professionals, is composed of three unit groups:

- 3121 Computer assistants
- 3122 Computer equipment operators, and
- 3123 Industrial robot controllers.

Table 3.2 provides data on the numbers of computer associate professionals, the percentage that are female and the proportion of all employees represented by this category. Like Table 3.1, the data it presents are fully comparable for all EU countries except the UK (where they relate to a different year) and Ireland (where

Table 3.2: Numbers of computer associate professionals and as a proportion of the workforce, 1999

	Number of computer associate professionals	% of computer associate professionals Female	Computer associate professionals as % of all employees
	(1,000's)	%	%
Austria	39.1	11.6	1.1
Belgium	(4.1)	..	0.1
Germany	220.6	24.5	0.6
Denmark	20.1	23.2	0.7
Spain	56.9	12.3	0.4
Finland	10.9	43.1	0.5
France	119.7	22.1	0.5
Greece	6.5	33.6	0.2
Ireland (1)	—	—	—
Italy	171.4	17.9	0.8
Luxembourg	(1.1)	..	0.6
Netherlands	101.4	12.5	1.3
Portugal	23.4	25.9	0.5
Sweden	24.5	26.5	0.6
United Kingdom (2)	86.0	38.7	0.3

Notes: .. Numbers too small to report reliably; ( ) Numbers maybe unreliable; (1) Data not available; (2) 1998 data

Source: IES (2000) Special Analysis of Eurostat Community Labour Force Survey

for the time being comparable data are not available). This shows that Germany has the largest absolute number of computer associate professionals at 220,600. However, proportionally the Netherlands has the highest concentration at 1.3 per cent of all employees. Finland has the highest female proportion at 43.1 per cent and Austria the lowest at 11.6 per cent.

The ISCO minor group 313 'Optical and electronic equipment operators' includes the following unit groups:

- 3131 Photographers and image and sound recording equipment operators
- 3132 Broadcasting and telecommunications equipment operators
- 3133 Medical equipment operators
- 3139 Optical and electronic equipment operators not elsewhere classified

Table 3.3 presents similar data to Tables 3.1 and 3.2, but covering optical and electronic equipment operators. This shows that, again, the largest absolute numbers were in Germany, while the greatest numbers proportionally were in the Netherlands. Also,

Table 3.3: Numbers of optical and electronic equipment operators and as a proportion of the workforce, 1999

	Number of optical and electronic equipment operators	% of optical and electronic equipment operators female	Optical and electronic equipment operators as % of all employees
	(1,000's)	%	%
Austria	8.2	31.4	0.2
Belgium	9.9	22.7	0.3
Germany	75.7	45.6	0.2
Denmark	5.3	27.1	0.2
Spain	29.4	25.8	0.2
Finland	4.5	24.9	0.2
France	33.4	30.5	0.1
Greece	11.6	28.9	0.3
Ireland (1)	—	—	—
Italy	39.2	18.3	0.2
Luxembourg	..	..	..
Netherlands	29.1	54.0	0.4
Portugal	10.9	45.0	0.2
Sweden	13.1	20.3	0.3
United Kingdom (2)	35.8	..	0.1

Notes: .. Numbers too small to report reliably; (1) Data not available; (2) 1998 data

Source: IES (2000) Special Analysis of Eurostat Community Labour Force Survey

the Netherlands had the highest proportion of women at 54 per cent, while Italy had the smallest proportion of female optical and electronic equipment operators at 18.3 per cent.

3.2.3 Aggregate IT workers

IT workers is an aggregate category derived from combining ISCO minor groups 213, 312 and 313. This combination overcomes the difficulty presented by the fact that the conversion from national occupational codes often does not allow for an accurate distinction between the ISCO minor groups: 'computer professionals' (213) and 'computer associate professionals' (312). This creates a risk that underlying differences in national occupational classifications may generate illusory national differences. The aggregate category also has the advantage of generating larger numbers, meaning that no cells have to be suppressed as unreliable.

Table 3.4 shows that in absolute terms Germany employs the most information technology workers with over half a million (554,100) followed by the United Kingdom with 466,600. As a proportion of all employees, however, the Netherlands has the most information technology workers with 3.2 per cent, followed by Sweden with 2.8 per cent of employees. Greece has proportionally the least,

Table 3.4: IT workers number and percentage of employed, 1999

	Number of IT workers (1,000's)	% of IT workers female %	IT workers as % of all employees %
Austria	59.3	13.3	1.6
Belgium	73.4	19.0	1.9
Germany	554.1	23.7	1.5
Denmark	59.1	16.6	2.2
Spain	156.2	15.0	1.1
Finland	53.4	26.8	2.3
France	387.5	21.5	1.7
Greece	22.6	27.6	0.6
Ireland (1)	—	—	—
Italy	222.6	18.4	1.1
Luxembourg	3.6	14.1	2.1
Netherlands	240.5	18.1	3.2
Portugal	41.7	29.2	0.9
Sweden	113.5	25.1	2.8
United Kingdom (2)	466.6	20.0	1.8

Notes: (1) Data not available; (2) 1998 data

Source: IES (2000) Special Analysis of Eurostat Community Labour Force Survey

with only 0.6 per cent of Greek employees in the IT work category. Portugal has the highest proportion of female information technology workers, with 29.2 per cent, while Austria has the lowest female proportion at 13.3 per cent.

3.3 Information Technology sectors

As well as defining information technology workers in terms of their occupations, it is also possible to define them in terms of their sectors of employment. The main problem with the sectoral approach is defining which sectors should be classified as involving information technology employment to a significant extent.

3.3.1 Defining information technology sectors

There are a variety of ways of defining information technology sectors: in terms of intensity of IT workers, intensity of IT products or *a priori.* In practice, the various methods often end up with the same result. This will be illustrated by first examining the IT worker density of various two digit NACE sectors across Europe.

Table 3.5: Sectors with above average proportion of IT workers for EU 15 (excluding Ireland and the UK), 1999

NACE code	Description	Numbers (1,000's)	% of sector	% of information technology employment
22	Publishing, printing and reproduction of recorded media	29.1	1.9	1.5
24	Manufacture of chemicals and chemical products	33.2	1.9	1.7
30	Manufacture of office machinery and computers	56.0	19.6	2.8
31	Manufacture of electrical machinery and apparatus n.e.c.	24.8	2.3	1.3
32	Manufacture of radio, television and communication equipment and apparatus	37.7	5.4	1.9
33	Manufacture of medical, precision and optical instruments, watches and clocks	19.3	2.9	1.0
35	Manufacture of other transport equipment	15.0	2.5	0.8
40	Electricity, gas, steam and hot water supply	14.5	1.7	0.7
51	Wholesale trade and commission trade, except of motor vehicles and motorcycles	72.2	1.6	3.7
64	Post and telecommunications	73.4	3.4	3.7
65	Financial intermediation, except insurance and pension funding	76.2	2.9	3.9
66	Insurance and pension funding, except compulsory social security	42.1	3.9	2.1
72	Computer and related activities	636.6	53.1	32.2
73	Research and development	17.5	3.9	0.9
74	Other business activities	192.5	2.7	9.7
92	Recreational, cultural and sporting activities	101.3	5.0	5.1
	Grand Total	*1977.5*	*1.6*	*100.0*

Notes: IT workers defined in terms of ISCO 213, 312 and 313

Source: IES and a special analysis by Eurostat of Community LFS data

3.3.2 Sectors with above average IT workers

Table 3.5 shows the sectors with above average proportions of information technology workers in terms of absolute numbers, as a percentage of those employed in the sector and as a percentage of total information technology employment.

Table 3.5 shows clearly that two sectors contain proportionally far more information technology employees than any others. These are NACE 30, 'Manufacture of office machinery and computers', and, more importantly, NACE 72, 'Computer and related activities'. Over half (53.1 per cent) of those employed in 'Computer and related activities' were in information technology occupations. At the same time this sector also employed almost a third (32.2) per cent of all those in information technology occupations. In the 'Manufacture of office machinery and computers' sector nearly one in five employees (19.6 per cent)

were in information economy occupations, although this only represented 2.8 per cent of all information technology employment. The NACE sector 74 'Other business activities', had nearly one in ten of its employees in information technology occupations, while NACE 9.2 'Recreational, cultural and sporting activities' had 5.1 per cent.

3.3.3 Information technology sectors

On the basis of density of information technology employees, NACE 30 and NACE 72 can be regarded as information technology sectors. These are:

- 'Manufacture of office machinery and computers' (NACE 30)
- 'Computer and related activities' (NACE 72).

Other *a-priori* methods of defining information technology sectors also arrive at these two sectors, although some approaches also include NACE 73, 'research and development', and NACE 74, 'other business activities'. However, in line with the constrained occupational definition used in this chapter, the approach taken here is to adopt a constrained sectoral definition too.

Table 3.6 shows the numbers of employees in both of these information technology sectors and the percentage of total employment that these numbers represent. The first feature that emerges from this analysis is that the numbers involved are relatively small. In only one country, Ireland, are more than two per cent of all employees to be found in these information technology sectors and this is largely on the basis of a relatively large office machinery and computers sector which employs one per cent of all Irish employees. Following Ireland, the UK has the second largest information technology sector employment proportionally and the largest in absolute terms. Sweden has proportionally the same size sector as the UK at 1.9 per cent of total employment, followed by Denmark at 1.8 per cent. The smallest information technology sector proportionally is found in Greece where only 0.3 per cent of employment is in these sectors.

3.4 Business services

It is often argued that the business services sectors, such as NACE 73 and NACE 74, should also be included in the category of information technology sectors. As we have seen, they contain relatively low proportions of those in information technology occupations. Nevertheless, these sectors play an important role in the wider information economy and are therefore worthy of examination in this context. In the next chapter, we will discuss them in greater detail in the context of eWork.

Table 3.6: IT Sectors number of employees and as a percentage of all employees, 1999

	NACE 30 Manufacture of office machinery and computers		NACE 72 Computer and related activities		NACE 30 + 72	
	(1,000's)	% of total employees	(1,000's)	% of total employees	(1,000's)	% of total employees
Austria	9.5	0.3	26.0	0.7	35.5	1.0
Belgium	8.1	0.2	27.8	0.7	35.9	0.9
Germany	119.1	0.3	302.3	0.8	421.4	1.2
Denmark	..	..	47.3	1.8	48.9	1.8
Spain	23.2	0.2	84.2	0.6	107.4	0.8
Finland	..	..	29.2	1.3	31.4	1.4
France	45.7	0.2	246.2	1.1	292.0	1.3
Greece	..	..	10.3	0.3	10.7	0.3
Ireland	15.9	1.0	29.9	1.9	45.8	2.9
Italy	40.0	0.2	192.7	0.9	232.7	1.1
Luxembourg	..	..	(1.4)	(0.8)	(1.4)	(0.8)
Netherlands	13.5	0.2	114.5	1.5	128.0	1.7
Portugal	..	..	(13.6)	(0.3)	15.1	0.3
Sweden	..	..	73.1	1.8	77.2	1.9
United Kingdom (1)	130.4	0.5	363.1	1.4	493.5	1.9

Notes: .. Numbers too small to report reliably; ( ) treat estimates with caution (1) UK 1998 data

Source: IES (2000) Special Analysis of Eurostat Community Labour Force Survey

Table 3.7: Business services number of employees and as a percentage of all employees, 1999

	NACE 73 Research & Development		NACE 74 Other business activities		NACE 73 and NACE 74	
	(1,000's)	% of total	(1,000's)	% of total	(1,000's)	% of total
Austria	5.1	0.1	169.3	4.6	174.4	4.8
Belgium	7.6	0.2	226.2	5.7	233.8	5.9
Germany	120.2	0.3	1936.5	5.4	2056.7	5.8
Denmark	13.5	0.5	146.6	5.4	160.0	5.9
Spain	19.4	0.1	737.8	5.4	757.2	5.5
Finland	16.6	0.7	135.7	5.9	152.3	6.6
France	143.2	0.6	1356.8	6.0	1500.0	6.6
Greece	5.1	0.1	176.3	4.6	181.4	4.7
Ireland	2.4	0.2	89.4	5.7	91.9	5.9
Italy	43.1	0.2	1032.9	5.1	1076.1	5.3
Luxembourg	0.8	0.4	9.9	5.6	10.6	6.0
Netherlands	37.4	0.5	621.4	8.2	658.8	8.7
Portugal	5.8	0.1	166.1	3.6	171.9	3.8
Sweden	29.2	0.7	255.4	6.4	284.5	7.1
United Kingdom (1)	103.6	0.4	1759.6	6.7	1863.2	7.0

Notes: (1) 1998 data

Source: IES (2000) Special Analysis of Eurostat Community Labour Force Survey

Table 3.7 shows the absolute numbers employed in NACE 73 and NACE 74 as well as the proportion of total national employment that these numbers represent. When the two sectors are combined, the Netherlands has the highest numbers proportionally while Germany has the largest absolute numbers. Finland and Sweden have the highest proportions in 'research and development' at 0.7 per cent of employees, while the United Kingdom has the highest proportionally in the 'other business activities' sector.

4. Information Technology Employment — EU Regional Division of Labour

This chapter extends the analysis of Chapter 3 down to the regional level within the EU.

4.1 The problems of regional information technology employment indicators

As with harmonised national level data for the EU, Eurostat is the main provider of harmonised regional level data. The main problem with regional level analysis within the EU is that the regions are national constructs and have no common logic in terms of size or organisation. This is despite the Nomenclature of Territorial Units for Statistics (NUTS) which attempts to create a common structure[1]. This means that although analysis can be carried out at a defined NUTS level, for example NUTS level I, some of the regions so defined are larger than some of the EU countries, while others are so small that sample based surveys are incapable of generating reliable data. These problems mean that a relatively high level of aggregation is required of any indicators used and for some regions in some countries, it is necessary to accept that there are no reliable data available.

4.2 Regional information technology workers

It is possible to use the definition of information technology workers developed in Chapter 3 at a regional level; that is:

- ISCO 213 — Computer professionals
- ISCO 312 — Computer associate professionals, and
- ISCO 313 — Optical and electronic equipment operators.

This definition gives an indicator that covers a large enough range of occupations to allow data to be derived from the Community Labour Force Survey (LFS) at the level of NUTS level II regions.

[1] Eurostat (1995), Regions: Nomenclature of Territorial Units for Statistics (NUTS), OOPCC, Luxembourg

Table 4.1: Top 12 regions in terms of ITCE occupational intensity, 1999

NUTS code	Country Region	No.s of ITCE employees	% ITCE
SE01	Stockholm (Sweden)	40.6	4.9
FR10	Île de France (France)	207.1	4.2
NL31	Utrecht (Netherlands)	23.4	4.2
FI16	Uusimaa (Finland)	28.8	4.1
NL33	Zuid-Holland (Netherlands)	60.7	3.8
UKJ1	Berkshire, Bucks, Oxfordshire (UK)	41.4	3.8
NL32	Noord-Holland (Netherlands)	45.6	3.7
BE10	Bruxelles (Belgium)	12.0	3.6
BE31	Brabant Wallon (Belgium)	4.8	3.5
AT13	Wien (Austria)	24.2	3.2
UKH2	Bedfordshire, Hertfordshire (UK)	25.0	3.1
UKI1	Inner London (UK)	35.4	3.1

Notes: Regions with data too low to be reliable excluded and UK data for 1998, no data available for Ireland

Source: IES and a Eurostat special analysis of the Community Labour Force Survey

The full data are provided in Table A1 in Appendix A; however Table 4.1 shows the twelve regions with the highest intensity of information technology workers.

This shows that Stockholm, as a NUTS level II region, has the highest proportion of its employees in the information technology category. Another region containing a national capital, Île de France, has the second highest density of information technology employees, while the Netherlands and the UK each have three regions in the top twelve. The three Netherlands high-scoring regions are all in the West-Nederland NUTS level I region, while the three UK regions comprise Inner London and regions to the immediate north and west of London. Of the remaining four regions, three others contain the national capitals of Belgium, Finland and Austria, while the last region, Brabant Wallon, is closely linked to the Belgian capital. This pattern emphasises the extremely urban and metropolitan character of much current information technology employment.

4.3 Regional information technology sectors

The analysis can also be performed in terms of employees of information technology sectors, that is those in:

- NACE 30 — Manufacture of office machinery and computers, and
- NACE 72 — Computer and related activities.

Table 4.2: Top 12 regions in terms of IT sector employment intensity, 1999

NUTS code	Country Region	Numbers employed in IT sectors	% of total employment in IT sector
UKJ1	Berkshire, Bucks, Oxfordshire (UK)	60.7	5.6
SE01	Stockholm (Sweden)	30.8	3.7
UKH2	Bedfordshire, Hertfordshire (UK)	29.2	3.6
FR10	Île de France (France)	163.9	3.4
UKJ2	Surrey, East-West Sussex (UK)	38.2	3.3
FI16	Uusimaa (Finland)	21.1	3.0
UKK1	Avon, Gloucestershire, Wiltshire & North Somerset (UK)	30.7	2.9
UKJ3	Hampshire, Isle of Wight (UK)	23.8	2.8
NL31	Utrecht (Netherlands)	15.3	2.8
ES30	Communidad de Madrid (Spain)	51.0	2.7
IT60	Lazio (Italy)	47.5	2.6
DE21	Oberbayem (Germany)	50.7	2.6

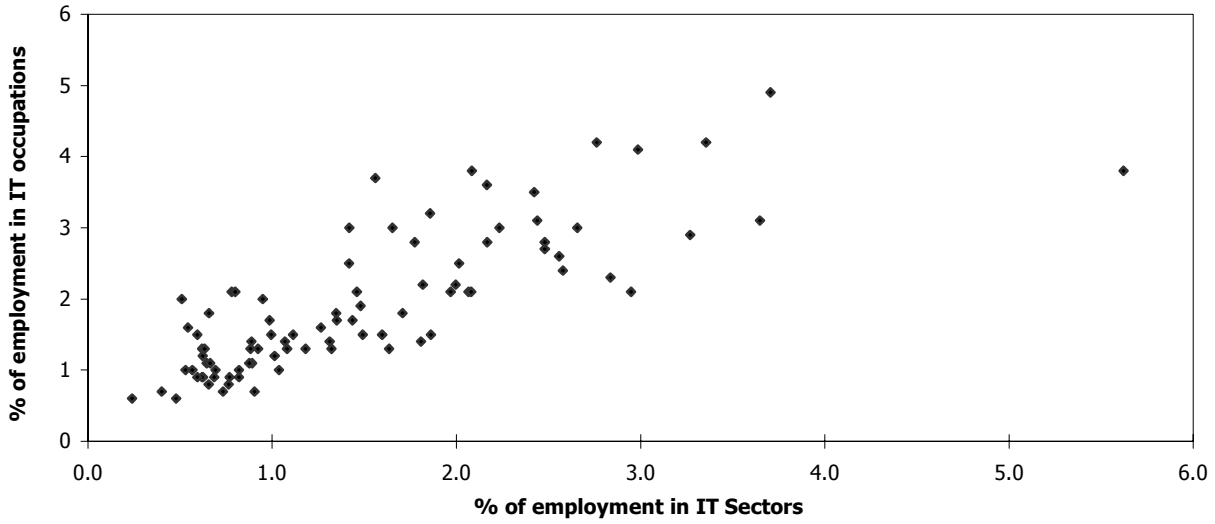
Notes: Regions with data too low to be reliable excluded and UK data for 1998

Source: IES and a Eurostat special analysis of the Community Labour Force Survey

Here, a similar highly urban and metropolitan distribution of IT sector employment is revealed. Table 4.2 presents the top twelve regions in terms of IT sector employment intensity.

Again the pattern is centred on the capitals of the UK, Sweden, France, Finland, the Netherlands, Spain and Italy. The exceptions are the five UK regions that surround London, (although not London itself) and, the region that contains the city of Munich. The detail of this indicator for all regions is also contained in Table A2 in Appendix A.

Figure 4.1: Regional percentage employment in IT sectors and IT occupations, 1999



Notes: Regions with data too low to be reliable excluded and UK data for 1998, no data available for Ireland

Source: IES and a Eurostat special analysis of the Community Labour Force Survey

Table 4.3: Top sixteen regions in terms of proportion of employment in NACE 74 'other business activities', 1999

NUTS code	Country/Region	NACE 74 Other Business activities (1,000s)	% of total
I1	Inner London (UK)	164.5	14.4
10	Bruxelles (Belgium)	37.7	11.3
32	Noord-Holland (Netherlands)	127.0	10.4
1	Stockholm (Sweden)	86.1	10.4
10	Île de France (France)	475.1	9.7
I2	Outer London (UK)	193.8	9.7
32	Berlin-Ost (Germany)	56.9	9.6
23	Flevoland (Netherlands)	14.5	9.6
33	Zuid-Holland (Netherlands)	155.1	9.6
J1	Berkshire, Bucks, Oxfordshire (UK)	103.3	9.6
60	Hamburg (Germany)	72.6	9.3
11	Groningen (Netherlands)	23.0	9.1
31	Utrecht (Netherlands)	50.1	9.0
30	Communidad de Madrid (Spain)	170.1	8.9
16	Uusimaa (Finland)	60.8	8.6
31	Berlin-West (Germany)	71.7	8.4
71	Darmstadt (Germany)	131.8	7.8

Source: IES and a special analysis of the Community Labour force Survey y Eurostat

The correlation between employment in IT occupations and IT sectors is illustrated in Figure 4.1 where the percentage of employment in IT occupations is plotted against the percentage of employment in IT sectors. The outlier, in terms of high density of IT sector employment, is the UK's 'Berkshire, Buckinghamshire and Oxfordshire' region. However, otherwise the pattern is fairly strongly linear, indicating a direct relationship between the two IT employment indicators.

4.4 Regional business services

The case for linking NACE 74 with the IT employment indicators as part of a more general information technology employment indicator is made by the similarly metropolitan distribution of 'other business activities' density. Table 4.3 gives the top sixteen regions in terms of NACE 74 density, while the details for all NUTS II regions are presented in Appendix A in Table A3. If anything, this distribution is even more concentrated on capital regions than that for IT sectors.

Table 4.4: Top twelve NUTS II regions in terms of percentage of 25 to 59 year olds with tertiary level education

Country	Region	Low < ISCED 3	Medium ISCED 3	High ISCED 5,6,7
Belgium	Brabant Wallon	26	29	45
Sweden	Stockholm	17	45	38
Belgium	Rég. Bruxelles Cap.	38	27	35
Netherlands	Utrecht	28	38	34
Germany	Berlin	15	52	33
Belgium	Vlaams Brabant	34	35	31
Germany	Brandenburg	7	62	31
Germany	Sachsen	5	64	31
UK	Greater London	45	24	31
Germany	Thüringen	6	63	30
UK	Berkshire, Bucks, Oxfordshire	39	31	30
Germany	Mecklenburg-Vorpommem	9	62	29

Source: IES and Eurostat (1999) Education across the European Union: statistics and indicators 1998, OPOCE, Luxembourg

4.5 Regional educational attainment

Finally, the linkage between information technology employment and human capital is emphasised with the distribution of the top twelve regions in terms of those with tertiary level qualifications. Table 4.4 shows that this distribution is strikingly similar to that for information technology occupations, with the highest concentrations around Stockholm, Brussels, London and Berlin or other urban regions in the Netherlands, Germany and Belgium.

5. eWork in the EU

So far, we have focused on employment that is clearly linked to information technology in terms of sector or occupation. It must be acknowledged, however, that the impact of ICTs extends far beyond those sectors which are directly involved in the production and distribution of these technologies, and of the occupations which involve computing or related skills. ICTs offer generic tools that are capable of transforming labour processes across many sectors of the economy, enabling new configurations of work in time and space. We use the term 'eWork' to denote employment that has been, or is capable of being delocalised through the use of ICTs.

In the EMERGENCE project, we distinguish a number of different forms of eWork, which are summarised in Table 5.1. This model creates distinctions across two broad axes: whether or not work is outsourced; and whether or not it is carried out on company premises. This creates a matrix in which a variety of different forms of eWork can be grouped. Individualised forms of remote work such as home-based or mobile telework may be carried out either by employees or freelances. Remote back offices or telecentres may either house employees of the company under study, or be owned by subcontractors or third parties.

Unfortunately, however, the existing employment statistics largely fail to capture the variables that would make it possible to measure the extent or characteristics of these forms of working. With a few exceptions, the occupational categorisations do not refer to the technology used by workers to carry out their work, and sectoral

Table 5.1: the EMERGENCE typology of eWork

	In-house	**Outsourced**
Individualised	Fully home-based working by employees Multilocational working by employees	Freelance working by home-based or nomadic individuals
On shared premises	Remote back offices or call centres owned by the organisation Use of telecentres, telecottages or other premises owned by third parties for remote working by employees	Supply of business services by independent contractors

Source: IES

classifications do not make it possible to distinguish those suppliers of information services who may be using ICTs to deliver them.

5.1 Home-based teleworking occupations

One partial exception to this is the UK Labour Force Survey (LFS) which makes it possible to capture home-based and multi-locational workers using ICTs to work remotely by occupation.

Table 5.2: UK teleworking occupations

SOC code	Description	Percentage 'teleworking' in previous week
101	General managers large organisations	14.2
111	Building/contract managers	14.2
121	Marketing and sales managers	19.1
123	Advertising *etc.* managers	16.3
124	Personnel, training *etc.* managers	12.7
126	Computer systems *etc.* managers	14.2
127	Company secretaries	20.4
170	Property & estate managers	14.9
173	Hotel & accommodation officers	21.1
199	Other managers & administrators n.e.s.	10.7
214	Software engineers	28.7
230	University, polytechnic teachers *etc.*	32.5
231	Further education teachers *etc.*	16.3
233	Secondary education teachers *etc.*	11.6
239	Other teaching professionals n.e.s.	26.3
250	Chartered & certified accountants	17.6
253	Management business consultants *etc.*	35.6
292	Clergy	51.4
320	Computer analysts, programmers	11.6
347	Occupational & speech therapists	13.5
361	Underwriters, claims assessors *etc.*	13.2
364	Organisational *etc.* officers	38.6
380	Authors, writers, journalists	34.3
381	Artists, graphic designers *etc.*	24.1
384	Actors, stage managers *etc.*	25.1
386	Camera, sound *etc.* equipment operators	28.7
391	Vocational & industrial trainers	17.5
710	Technical & wholesale sales reps	35.9
719	Other sales representatives n.e.s.	10.2

Source: IES and the 2000 March May Quarter of the UK LFS

In the Spring quarters of the UK LFS, those who have worked at least one full day at home in the reference week are asked whether they used both a telephone and a computer to carry out the work at home and whether it would be possible to work in this way without the technology. The responses to these questions can be used to generate a list of 'teleworking occupations'.

In Table 5.2, teleworking occupations are classified using the UK Standard Occupational Classification (SOC 90). Here we have defined as a 'teleworking occupation' any occupation in which more than ten per cent of all those in the occupation report that they spent at least a full day in the reference week working at home using a computer and a telephone. It should be noted that only those occupations where the numbers teleworking were statistically significant are included. This means that some occupations with small numbers, but high levels of reported teleworking are excluded. The LFS data show that a wide range of occupations are involved in telework, with nine of the 28 occupational categories classified as 'managerial' and eight as 'professional', with a further nine classified as 'associate professional'.

This list of UK teleworking occupations can be used to derive a similar list using the International Standard Classification of

Table 5.3: ISCO categories of 'potential telework' occupations

ISCO Code	Description
121	Directors and chief executives
123	Other specialist managers
211	Physicists, chemists and related professions
213	Computing professionals
231	College, university and higher education teaching professionals
235	Other teaching professionals
245	Writers and creative or performing artists
246	Religious professionals
312	Computer associate professionals
341	Finance and sales associate professionals
342	Business service agents and trade brokers
343	Administrative associate professionals
344	Customs, tax and related government associate professionals
346	Social work associate professionals
347	Artistic, entertainment and sports associate professionals
412	Numerical clerks
413	Material-recording and transport clerks
421	Cashiers, tellers and related clerks
422	Client information clerks

Source: IES analysis

Occupations (ISCO) as used by Eurostat., shown in Table 5.3. It must be emphasised, however, that these must be regarded as *potential* telework occupations, not necessarily actual ones. Extrapolation from the UK to the rest of Europe is a dubious exercise, given the diversity of occupational structure and organisational culture across the EU. We have only done so because of the lack of any alternative means of estimating the distribution of eWork using reliable official data sources.

Table 5.3 lists the potential telework occupations, using ISCO occupational categories, whilst Table 5.4 shows how they are distributed across the EU by country and gender. Unfortunately, because the latest revision of Irish occupational codes had not, at the time of writing, been translated into the ISCO codes, data from Ireland were not included in the Eurostat data sets. Ireland is thus excluded from this analysis.[1]

Table 5.4: 'Potential teleworkers' by country and gender

	Male		Female		Both	
	Potential Teleworkers	**% of employment**	**Potential Teleworkers**	**% of employment**	**Potential Teleworkers**	**% of employment**
Austria	354,085	17.3	242,469	15.2	596,554	16.4
Belgium	369,186	16.2	213,475	12.8	582,661	14.7
Germany	3,403,220	16.9	3,740,627	24.0	7,143,847	20.0
Denmark	333,074	23.0	203,329	16.4	536,403	19.9
Spain	1,117,459	12.8	721,699	14.6	1,839,158	13.5
Finland	222,073	18.3	215,918	19.5	437,990	18.9
France	1,840,907	14.7	1,863,463	18.4	3,704,370	16.3
Greece	211,092	8.8	196,230	13.6	407,322	10.6
Italy	2,075,091	16.1	1,477,290	20.0	3,552,381	17.5
Luxembourg	22,148	20.7	13,468	19.7	35,615	20.3
Netherlands	928,869	21.4	735,270	22.8	1,664,139	22.0
Portugal	298,415	11.9	314,208	15.2	612,623	13.4
Sweden	441,707	21.3	375,683	19.6	817,390	20.4
UK	3,120,537	21.4	2844,806	24.0	5965,343	22.6

Note: UK data apply to 1998 rather than 1999

Source: IES and a special analysis of the Community Labour Force Survey

[1] Of the eighteen ISCO codes included in the 'potential telework occupations', only eight are used in the Irish occupational classification. This has the effect of underestimating potential teleworkers in Ireland as compared with other EU countries, producing, for instance, an estimate that in 1997, only 73,534 men, or 4.4 per cent of male employees in Ireland fell into this category. To include these results in our tables would, we feel, give a false impression of Ireland's relative position on this indicator.

Table 5.5: Top 17 EU regions in terms of the percentage 'potential teleworkers', 1999

		Male		Female		Both	
NUTS Code	Region	Number	% of empt	Number	% of empt	Number	% of empt
UK I1	Inner London (UK)	224,858	35.8	163,191	31.9	388,049	34.1
UK J1	Berkshire, Bucks, Oxfordshire (UK)	183,780	30.8	143,024	29.5	326,804	30.3
SE 1	Stockholm (Sweden)	125,910	31.0	124,628	29.3	250,538	30.2
UK I2	Outer London (UK)	319,148	28.9	270,647	30.0	589,794	29.4
FI 16	Uusimaa (Finland)	104,405	29.3	95,790	27.3	200,195	28.3
UK H2	Bedfordshire, Hertfordshire (UK)	124,112	27.4	102,254	29.4	226,367	28.3
UK J2	Surrey, East-West Sussex (UK)	179,216	27.8	151,658	28.9	330,874	28.3
DE 60	Hamburg (Germany)	105,904	25.1	110,052	30.7	215,956	27.7
NL 31	Utrecht (Netherlands)	83,895	26.8	61,819	25.7	145,714	26.3
NL 23	Flevoland (Netherlands)	22,383	25.5	16,820	26.8	39,203	26.1
NL 32	Noord-Holland (Netherlands)	167,746	24.8	145,202	26.5	312,948	25.6
DE 71	Darmstadt (Germany)	205,143	21.6	220,041	29.8	425,184	25.2
UK H3	Essex (UK)	110,132	26.0	77,307	23.9	187,439	25.1
FR 10	Île de France (France)	593,508	22.9	620,478	27.0	1,213,986	24.9
UK K1	Avon, Gloucestershire, Wiltshire & North Somerset (UK)	135,640	23.5	121,866	26.3	257,507	24.8
DE 21	Oberbayem (Germany)	234,909	21.6	243,274	27.2	478,183	24.1
BE 24	Vlaams Brabant (Belgium)	61,153	25.4	45,097	22.4	106,251	24.0

Note: UK data apply to 1998 rather than 1999

Source: IES and a special analysis of the Community Labour Force Survey

This demonstrates considerable variation across the EU. The countries with the highest proportion of the workforce in potential telework occupations are Denmark, the Netherlands, Sweden, the UK and Luxembourg, whilst those with the lowest are Greece, Portugal and Spain.

Their distribution can be examined in finer detail at a regional level. Table 5.5 shows the top 17 EU regions in terms of the proportion of the workforce in 'potential telework' occupations.

As with Information Technology employment intensity, we find that there is a strong bias towards urban regions in Northern Europe when it comes to the intensity of potential telework. A clustering around capital cities is especially marked, with the regions around Stockholm, Paris, Helsinki and London all figuring in the list. There are also strong concentrations in the Netherlands and around Hamburg, Darmstadt and other German cities. All the UK regions in this list are immediately adjacent to London or in the 'M4-M40 corridor' to the west of London, which contains the highest concentration of IT industries.

Table 5.6: ISCO categories of 'potential mobile telework occupations'

ISCO Code	Description
121	Directors and chief executives
123	Other specialist managers
235	Other teaching professionals
245	Writers and creative or performing artists
341	Finance and sales associate professionals
342	Business service agents and trade brokers
344	Customs, tax and related government associate professionals
346	Social work associate professionals
347	Artistic, entertainment and sports associate professionals
413	Material-recording and transport clerks

Source: IES analysis

5.2 Multilocational telework occupations

In addition to making it possible to identify people who work at home, the UK Labour Force Survey also makes it possible to distinguish between people who work 'at home' and those who work 'in different places using home as a base'. These latter workers can be termed mobile or multilocational teleworkers.

We derived 'potential mobile telework' occupations using UK SOC codes in a similar manner to the 'potential telework' occupations listed above. In this case, however, the occupations selected were limited to those of people who were 'working in different places using home as a base'. The ISCO occupations in Table 5.6 emerged as a result of this process. This shows that, when compared with home-based teleworkers, mobile teleworkers are more likely to be associate professionals, with half the occupations falling into this category. The remainder is largely accounted for by managerial and professional occupations, with two out of ten occupations in each of these categories.

Table 5.7 shows the distribution of people in these occupations by country and gender in the EU.

Here, the dominance of the Nordic countries and the UK is, if anything, even stronger, although the Netherlands and Germany also have high proportions of the workforce in these occupations. Greece, Portugal and Spain have the smallest proportion of potential mobile telework occupations.

Again, we have looked at the picture at a regional level, and the results are presented in Table 5.8.

Table 5.7: 'Potential mobile telework occupations' by country and gender, 1999

	Male		Female		Both	
	Potential Mobile Teleworkers	% of employment	Potential Mobile Teleworkers	% of employment	Potential Mobile Teleworkers	% of employment
Austria	211,169	10.3	105,976	6.6	317,146	8.7
Belgium	244,071	10.7	91,746	5.5	335,817	8.5
Germany	2,069,914	10.3	1,772,383	11.4	3,842,297	10.7
Denmark	219,516	15.1	89,969	7.2	309,485	11.5
Spain	621,048	7.1	207,932	4.2	828,979	6.1
Finland	163,653	13.5	113,389	10.3	277,042	12.0
France	1,221,098	9.8	977,472	9.6	2,198,570	9.7
Greece	111,885	4.7	73,426	5.1	185,311	4.8
Italy	1,145,222	8.9	422,544	5.7	1,567,765	7.7
Luxembourg	10,254	9.6	3,627	5.3	13,881	7.9
Netherlands	522,873	12.1	276,825	8.6	799,699	10.6
Portugal	133,077	5.3	64,466	3.1	197,543	4.3
Sweden	312,043	15.0	185,737	9.7	497,780	12.5
UK	2,114,045	14.5	1,289,445	10.9	3,403,490	12.9

Note: UK data apply to 1998 rather than 1999

Source: IES and a special analysis of the Community Labour Force Survey

Table 5.8: Top 17 regions in terms of the percentage of 'potential mobile teleworkers', 1999

		Male		Female		Both	
NUTS Code		Numbers	% of empt	Numbers	% of empt	Numbers	% of empt
UK I1	Inner London (UK)	137,111	21.9	86,508	16.9	223,619	19.6
FI 16	Uusimaa (Finland)	75,943	21.3	52,291	14.9	128,234	18.1
UK J1	Berkshire, Bucks, Oxfordshire (UK)	117,489	19.7	76,158	15.7	193,647	17.9
SE 1	Stockholm (Sweden)	81,405	20.1	66,488	15.6	147,892	17.8
UK H2	Bedfordshire, Hertfordshire (UK)	88,244	19.5	48,281	13.9	136,526	17.1
UK J2	Surrey, East-West Sussex (UK)	119,744	18.6	78,475	15.0	198,219	17.0
UK I2	Outer London (UK)	195,764	17.8	123,663	13.7	319,427	15.9
DE 60	Hamburg (Germany)	65,093	15.4	55,850	15.6	120,943	15.5
UK J4	Kent (UK)	67,021	17.1	40,206	12.7	107,227	15.2
UK H3	Essex (UK)	77,842	18.4	34,480	10.7	112,322	15.0
UK D2	Cheshire (UK)	36,178	14.3	32,605	15.7	68,783	14.9
UK G1	Herefordshire, Worcestershire, Warwickshire (UK)	55,987	16.5	31,165	11.7	87,152	14.4
UK F2	Leicestershire, Northamptonshire (UK)	71,184	16.7	37,612	11.3	108,796	14.3
FR 10	Île de France (France)	354,774	13.7	326,851	14.2	681,625	14.0
UK J3	Hampshire, Isle of Wight (UK)	74,357	16.0	42,873	11.5	117,230	14.0
BE 31	Brabant Wallon (Belgium)	13,617	17.6	5,004	8.4	18,621	13.6
UK E4	West Yorkshire (UK)	81,600	15.5	48,317	11.2	129,917	13.6

Note: UK data apply to 1998 rather than 1999

Source: IES and a special analysis of the Community Labour Force Survey

In many ways, this picture is similar to that portrayed in Table 5.5: the regions surrounding Helsinki, Stockholm, Paris, Hamburg and London are still among the top locations of high mobile telework intensiveness. However, the Dutch regions which figured so prominently among the most IT-intensive and telework-intensive regions have dropped out, whilst a number of other UK regions have entered the scene. These latter include some in urbanised North-western and Midland regions (by contrast with the earlier tables in which the UK regions were exclusively in the South of England).

These results combine with those of the previous chapter to suggest a strong clustering of these forms of eWork in those regions that are also highly IT-intensive in terms of their sectoral and occupational structure.

5.3 Call centre occupations

A final type of eWork for which we sought indicators in the ELFS was call centre workers. Here, there was even less of a solid basis from which to commence. Although some countries are beginning to modify their national occupational classifications to take account of call centre work, in most cases few data have yet been collected, and the ISCO classification contains no category which corresponds precisely to call centre work.

The best that can be done is to draw on survey and case study evidence for descriptions of the activities commonly involved in call centre work and search for the occupational categories that encompass those activities. The resulting ISCO occupations have been labelled 'potential call centre occupations', but it must be emphasised that at this stage this designation must be regarded as speculative. We present the results in Table 5.9 as indicative only.

Here, we see something of a contrast with earlier tables, which may be as much a reflection of differing national occupational

Table 5.9: ISCO categories of 'potential call centre' occupations

ISCO Code	Description
312	Computer associate professionals
341	Finance and sales associate professionals
342	Business service agents and trade brokers
343	Administrative associate professionals
411	Secretaries and keyboard-operating clerks
412	Numerical clerks
413	Material-recording and transport clerks
421	Cashiers, tellers and related clerks
422	Client information clerks

Source: IES

Table 5.10: Potential call centre workers by country and gender,1999

	Male		Female		Both	
	Numbers	% of employment	Numbers	% of employment	Numbers	% of employment
Austria	201,298	9.9	237,402	14.8	438,700	12.0
Belgium	147,677	6.5	193,433	11.6	341,110	8.6
Germany	2,040,223	10.1	3,278,170	21.0	5,318,393	14.9
Denmark	177,379	12.2	202,990	16.3	380,368	14.1
Spain	892,900	10.3	854,314	17.2	1,747,214	12.8
Finland	72,302	6.0	191,907	17.4	264,209	11.4
France	1,041,501	8.3	1,863,311	18.4	2,904,812	12.8
Greece	155,426	6.5	209,212	14.5	364,637	9.5
Italy	2,163,725	16.8	1,923,652	26.0	4,087,376	20.1
Luxembourg	17,185	16.1	17,125	25.0	34,311	19.6
Netherlands	547,517	12.6	678,342	21.1	1,225,858	16.2
Portugal	243,039	9.7	319,368	15.5	562,408	12.3
Sweden	252,716	12.2	306,799	16.0	559,515	14.0
UK	1,263,458	8.7	2,051,650	17.3	3,315,108	12.5

Note: UK data apply to 1998 rather than 1999

Source: IES and a special analysis of the Community Labour Force Survey

structures, qualifications systems and organisational cultures as of any propensity to develop eWork. We must remember that our designated occupations were selected as *potential* call centre occupations, not as proxies for actual call centre employment. Even if we are right in surmising that all call centre employees are subsumed within these categories, then it would still be the case that only a fraction of the employees in these occupations would actually be call centre workers. The indicator must therefore be regarded as a loose one, indicating the presence of the sorts of service activities carried out in call centres and the existence of a potential pool of suitable qualified labour, not as signifying that call centres are necessarily present to an above-average extent. It is only because they are the best indicators currently available that we present them here as a starting point for further elaboration.

As can be seen, the countries with the highest proportion of occupations in this category are Italy and Luxembourg. These are followed by the Netherlands, Germany and Denmark. The lowest proportions are in Greece and Belgium. Once again, it has unfortunately been necessary to exclude Ireland from this analysis because the revised Irish national occupational classifications have not yet been implemented at the European level, so comparable data are not yet available.

Table 5.11 shows the results of analysing this variable at the NUTS2 regional level in the EU (excluding Ireland), presenting

Table 5.11: Top 17 regions in terms of the percentage potential call centre workers, 1999

		Male		Female		Both	
NUTS code	Region	Numbers	% of empt	Numbers	% of empt	Numbers	% of empt
IT 20	Lombardia (Italy)	388,766	16.9	332,354	22.6	721,121	19.1
SE 1	Stockholm (Sweden)	70,189	17.3	82,657	19.5	152,846	18.4
NL 23	Flevoland (Netherlands)	12,637	14.4	14,940	23.8	27,577	18.3
IT 40	Emila-Romagna (Italy)	153,882	15.8	146,762	20.7	300,644	17.8
NL 31	Utrecht (Netherlands)	46,918	15.0	50,630	21.0	97,549	17.6
UK H2	Bedfordshire, Hertfordshire (UK)	54,738	12.1	80,249	23.1	134,988	16.9
UK I2	Outer London (UK)	130,406	11.8	207,588	23.0	337,994	16.9
DE 60	Hamburg (Germany)	57,451	13.6	72,869	20.3	130,320	16.7
IT 60	Lazio (Italy)	178,739	15.3	129,532	19.2	308,271	16.7
IT 51	Toscana (Italy)	128,219	16.0	92,380	17.3	220,599	16.5
LU 0	Luxembourg	16,769	15.7	11,925	17.4	28,695	16.4
DE 71	Darmstadt (Germany)	118,895	12.5	155,482	21.0	274,377	16.3
NL 32	Noord-Holland (Netherlands)	93,523	13.8	106,553	19.5	200,076	16.3
UK H3	Essex (UK)	51,333	12.1	68,761	21.3	120,094	16.1
NL 33	Zuid-Holland (Netherlands)	128,122	13.9	130,116	18.9	258,237	16.0
IT 11	Piemonte (Italy)	140,732	13.7	127,998	19.2	268,730	15.9
IT 13	Liguria (Italy)	56,049	16.0	36,761	15.7	92,810	15.9

Note: UK data apply to 1998 rather than 1999

Source: IES and a special analysis of the Community Labour Force Survey

the seventeen regions in which the proportion of the workforce in these occupations is highest.

The preponderance of Italian regions in this table is in line with Italy's position as the country with the highest proportion of the workforce in these occupations. Luxembourg and the Dutch regions listed here also conform to expectations. Some of the other regions, such as those in Sweden and the UK come as more of a surprise, given the rather average position of these countries in the national table. Their presence here suggests that there may well be a geographical clustering within these countries, with these occupations strongly concentrated in certain regions, whilst they may well be rather sparse in other regions.

6. Factors Influencing the Global Division of Labour in the Information Economy

From our review of the literature, we developed a number of hypotheses about factors that might influence the international distribution of eWork at a global, as opposed to a European level.

6.1 Relative service sector salaries

The first of these is wage costs for service sector employees. It is often asserted that the search for cheaper labour is a, if not the, most important motivator for companies to relocate their employment overseas. It is plausible to hypothesise that when work is relocated, average service sector salaries in the recipient countries will be relatively lower than in the outsourcing country. This is because it is expected that the cost of performing the functions in the recipient country should generate sufficient savings to offset any extra costs incurred by relocation. In practice, data on relative salaries by sector are unavailable in all the countries. Therefore, initially we aimed to develop an indicator based on salaries as a proportion of output and the size of the labour force. However, we expected to have to use relative GNP per capita as a proxy. The available data on average salaries were examined against the GNP per capita data to check the robustness of this proxy.

6.2 Graduate availability

The availability of qualified workers to perform the requisite functions is potentially a crucial factor. It seems likely that employers will look for areas with large numbers of graduates with the right skills and relatively high levels of graduate unemployment. Again, in practice these data are not widely available. The nearest equivalent we could find was the number of third level graduates per number of 20 to 24 year olds as a measure of the output of those with high level skills.

6.3 Language

Many types of eWork, especially call centre type functions, require linguistic ability, and tasks that require briefing or regular communication are greatly eased by a common native tongue. We therefore hypothesised that a widely spoken global language might be a positive indicator.

Information on the extent to which global languages are spoken in any given country is not easily come by, unfortunately. Here, we used the use of English, French or Spanish as official languages as a proxy, whilst recognising that other global languages such as Japanese, Arabic, Portuguese and Cantonese Chinese may also be of great importance. It was also recognised that global languages may be widely spoken in some countries where they are not official languages, and conversely that official languages may not always be universally used by the population.

6.4 Students studying abroad

A high proportion of students studying abroad seemed likely to correlate positively with a number of factors associated with rendering a location attractive to foreign investors. In particular, this might be a positive attitude to and familiarity with the language and culture of the home-base country of the investing company. In some cases, returning students may even have worked in the employing countries on internships or other forms of student placement and have established links with them. The 'diaspora effect' is often cited as contributing to the success of the export software sector in India.

6.5 Time zone

Anecdotal evidence suggests that differences (or similarities) between the time zones of recipient and outsourcing countries may be very important in the choice of location. However, there are major practical problems entailed in generating an indicator based on time zones. The problem is that sometimes countries are chosen because they are in the same time zone and on other occasions for the opposite reason — that they are eight or twelve hours away and can thus contribute to the development of a 24-hour service that does not require anti-social shift times in any given country. This variation in motivation combined with the wide range of time zones in which the potentially outsourcing countries are based means that a single indicator is not possible, although we did attempt to plot this in our 1999 study.

6.6 Telecommunications infrastructure

Telecommunications infrastructure is obviously important in terms of electronic relocation. Indeed, in an international survey of call centre managers that we carried out in 1999[1], it emerged as the single most important factor in the choice of call centre location. It was cited as one of the top three reasons for choosing their current location by 41 per cent of the managers in the survey.

The available measures for this are mainlines per capita and percentage growth in the number of mainlines over the last five years. The first captures historic relative telecommunications investment while the later captures recent (often digital) investment.

6.7 Quantity of telecommunications traffic

In addition to the capacity of the national telecommunications network, we surmised that it would also be useful to look at the extent to which it is used. ITU data also enabled us to derive indicators for the amount of telecommunications traffic into and out of any given country.

6.8 Telecommunications costs

Although liberalisation of telecommunications is well advanced in most countries and telecommunications costs are falling in real terms, it seemed likely that relatively high telecommunications costs might still constitute a significant barrier to incoming eBusinesses. Accordingly, we also selected from the ITU database indicators for various telecommunications costs. It was recognised, however, that the speed of change in this variable might create some difficulties in ensuring that our analysis captured current, rather than historical patterns.

6.9 Trust or previous contact

Previous research on the motivations behind international linkages, joint ventures and partnerships, indicates the importance of previous contacts and the development of relationships of trust. The formation of trust relationships is eased by common languages, common histories, previous contact and international exposure. It seemed likely that this would continue to be an important factor in influencing the choice of eWork location.

In this study, we used an experimental indicator based on the International Telecommunications Union's (ITU) direction of traffic database to capture the extent of previous telecommunications-

[1] Reported in the 2nd EMERGENCE newsletter, August, 2000

based linkages. The initial indicator was based on the proportion of all OECD country originating international telecommunication minutes a country receives. A range of other similar indicators based on the direction of traffic database were also tested.

This was supplemented by data from Transparency International's International Corruption Index, which rates countries according to their perceived level of corruption.

6.10 Internet access and literacy

Another indicator that in practice may be subsumed under the telecommunications infrastructure is the number of Internet hosts per capita in each country. Given the extremely skewed nature of this distribution we also examined the natural logarithm of this indicator and other variants, deriving an indicator for Internet hosts per capita from data collected by Nua.

6.11 Economic development and 'openness'

Developments in the digital economy are unlikely to take place in isolation from other economic activities. It was hypothesised that indicators of the level of development and openness to the global economy, such as the level of inward direct investment, might also prove to be important. These were also collected and integrated into our e-Indicators database.

6.12 Demographic factors

A number of demographic factors have the potential to influence decisions about inward investment. These include the age of the population (with a young workforce being favoured for some types of work), the population density, the degree of urbanisation and the dependency ratio. Again, data on all these indicators were assembled and integrated into the database.

7. Information Economy Indicators for Countries

Beyond Europe and the harmonised data collection system of Eurostat, it is much more difficult to develop indicators to allow the position of a country in the global division of eWork to be determined. Data on occupations and sectors of employment are rarely collected outside of the OECD countries and the trade data are either not sufficiently disaggregated or fail to cover the areas of interest. This means that a range of proxy measures is required. This chapter, building on the hypotheses developed in Chapter 5, reports on the identification of appropriate indicators and their validation using cluster analysis.

7.1 Coverage versus detail

A major problem with international indicators, especially those covering developing countries, is that many countries' national statistical systems do not collect the data. Data which are collected are often gathered using national classifications which are hard, if not impossible, to relate to international systems of classification. This means that for many indicators there are large numbers of missing values. This in turn means that many 'global' or 'international' studies are actually based on data from only 40 or 60 countries. Given that telecommunication and IT-based services are seen as an important development mechanism, the need for universal indicators is becoming increasingly urgent.

However, when more universally available indicators are selected they tend to be less specific and more tangential. In the selection of indicators for the e-indicators database we have attempted to select those indicators with the widest possible coverage and the least tangential to our objectives.

Another difficulty is that often the data reported by international bodies are many years out of date. In order to maintain as large a country coverage as possible, often we were forced to use data that were at least five years out of date. This in turn raises the problem that the indicators do not take account of recent changes or improvements. In terms of the later cluster analysis, this necessary reliance on old data may explain some of the more surprising and apparently anomalous classifications.

7.2 Data sources

A range of data sources are being used as the basis of these indicators, they include:

- The International Telecommunications Union (ITU) World Telecommunications Indicators database
- The World Bank Economic Development Indicators CD-ROM
- The International Telecommunications Union (ITU) direction of traffic, and
- UNESCO's statistical yearbook

7.2.1 ITU data

The International Telecommunications Union (ITU) World Telecommunications Indicators database was used to provide some of the most important indicators. These included:

- the number of mainline telephone numbers
- minutes of national calls
- minutes of international calls, incoming and outgoing
- levels of investment in telecommunications infrastructure, and
- the number of mobile phones.

There were also a number of derived indicators based on these, mainly those taking account of population estimates and the rate of growth in the various indicators. The full list of the e-indicators, their sources and their coverage is contained in Appendix C.

The International Telecommunications Union (ITU) direction of traffic database was also used to generate an indicator of the number of telecommunication minutes incoming from OECD countries. This was felt to be an indicator of the degree of engagement in the global economy.

7.2.2 World Bank data

The World Bank Economic Development Indicators CD-ROM was used to obtain a range of economic indicators which it is believed are relevant to eWork and the potential for obtaining electronically relocated work. In line with the hypotheses presented in the previous chapter these included: GDP growth; levels of electronic and telecommunications imports and exports; levels of inward direct investment, and; the age dependency ratio.

7.2.3 UNESCO data

UNESCO's statistical yearbook contains data on the number of tertiary level (ISCED level 5 and above) graduates by subject and gender as well as data on the number of non-national tertiary level students hosted by other countries. This source was used to generate further indicators for the database; these included:

- the number of tertiary level graduates per 1,000 population which is a crude indicator of the rate of higher educational output — unfortunately recent estimates of population by age range are not available
- the numbers of students from each country studying in the top eight hosting countries (USA, UK, France, Germany, Japan, Australia, Canada and Belgium)

7.2.4 Other Sources

We took a range of indicators from other sources including:

- a measure of the perceived level of corruption from Transparency International
- a measure of the perceived level of bribe taking, also from Transparency International
- the cost of a one-minute business call to the United States.

7.3 The e-indicators database

In total the e-indicators database that resulted from the collation of these data covers 204 countries (or autonomous telecommunications areas) and includes 171 variables. The full details of the database and the variables it contains are presented in Appendix B.

7.4 Cluster analysis

A standard technique for grouping cases based on a range of variables is cluster analysis. This technique was used to group the countries on a range of variables identified on the basis of the hypotheses of the previous chapter. Given the number of cases, and the extent of missing values, the SPSS K-means Quick Cluster algorithm was used. Unlike many clustering algorithms, this one allows pairwise, rather than casewise, deletion of missing values. Despite this advantage, there is the disadvantage of having to specify the number of clusters that are required. We believed that on the basis of our hypotheses we would require between five and seven clusters. Therefore, each variable combination was tested using five, six and seven clusters as the starting point.

A feature of cluster analysis is that if the data being used have many different ranges and distributions anomalous results can be obtained due to the relative size of the variables (rather than their distributions). Therefore, we followed the usual practice of standardising the variables using z-scores[1].

7.5 The cluster variables

The analysis produced the optimal results using the z scores of the following variables:

- Mainpop8 — the number of main telephone line in operation per 100 inhabitants in 1998
- Main48p — percentage growth in the number of main telephone lines in operation between the years 1994 and 1998
- Grad_pop — The number of tertiary level graduates per 1,000 population in 1996
- All_subj — The most recent number of tertiary level graduates in all subjects
- Corup_b — Corruption perception index, 1999
- Internet — number of Internet hosts in 1998

The significance of each of these variables, their linkage to our hypotheses and their potential interaction is discussed below.

7.5.1 Main telephone lines per capita

The number of main telephone lines per capita is a basic indicator of the extent of the telecommunications infrastructure in a country. Admittedly, the number of main lines per capita gives no indication of the quality of service or the level of digitalisation. However, this indicator is almost universally available and is usually relatively up-to-date as well as providing an indicator of 'telephone-literacy' amongst the population.

7.5.2 Growth in main lines per capita

The growth in the number of mainlines per capita between the years 1994 and 1998 is a basic measure of the rate of telecommunications investment. Obviously, the actual levels of investment would have been a better indicator. However, in practice we found that the ITU data on telecommunications investment were too patchy with many countries not reporting up-to-date figures. Equally, where available, the data on overall telecommunications investment tended not to reflect changes in

[1] Z-scores convert values into the number of standard deviation units the value is above or below the mean value

the level of service for telecommunications users. Small islands tended to have relatively high levels of investment per capita because their international links were disproportionally more expensive. In these small islands the extent of domestic telecommunications investments was better measured by the change in mainlines per capita.

7.5.3 Graduates per capita

The number of tertiary level graduates per head of population is a basic indicator of the level of educational attainment in the country. Other indicators, such as the percentage of the working population with a tertiary level qualification, or the number of graduates as a proportion of the population at the normal age of graduation, were examined. These alternative indicators would have given a more accurate indicator of the educational attainment of the working population. However, outside of the OECD countries very few countries have the necessary data available to generate these indicators.

7.5.4 Number of tertiary level graduates

The absolute numbers of tertiary level graduates gives an indicator of the potential educated human resources entering the economy. Importantly, this indicator, in combination with the previous indicator of the number of graduates per capita, provides a mechanism whereby the absolute size of the countries entered the cluster analysis. As it turned out this implicit population size variable proved to be an important differentiator between the various clusters.

7.5.5 Perceived corruption

The index of perceived corruption is a composite index based on at least three sources produced by Transparency International covering 96 countries[1]. This index measures the degree of corruption within a country as perceived by non-nationals. It is not a measure of the level of corruption practised by nationals outside their own countries. Corruption outside of their own countries is measured by the separate Bribe Payers index. It is known that high levels of perceived corruption deter overseas direct investment and it is assumed that decisions to locate remote work are similarly influenced. Importantly, the index runs from 0 'highly corrupt' to ten 'highly clean', therefore a lower score indicates greater corruption.

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[1] Lambsdorff J G (1999), The Transparency International Corruption Perceptions Index 1999 — Framework Document, Transparency International

7.5.6 Number of Internet hosts

The number of Internet hosts is a basic indicator of the extent of Internet penetration and use in a country. There are problems with simply counting Internet hosts where a small site is counted as equivalent to a large site. Similarly, there are problems with using domain names to allocate Internet hosts to countries, for instance dot com sites, although allocated to the United States are often based in other countries[1]. However, the number of hosts does give a measure of the spread of the Internet for virtually every country in the world.

7.6 The clusters

The clusters have been given names reflecting their characteristics and their eWork potential. The six are:

- **E-leaders**, these countries define the shape of eWork and are likely to be the main source of relocated employment
- **E-capables**, these countries although smaller operate at the same level as the e-leaders but are less likely to define the shape of eWork
- **E-hares**, these countries are relatively small with historically poor telecommunications infrastructure but rapid recent growth in mainlines per capita and may take much of the future relocated employment
- **E-tigers**, these countries are large with relatively well developed infrastructures and available human resources and are often already taking much of the relocated employment however they are also seen as relatively corrupt
- **E-maybes**, these countries are small with relatively well developed infrastructures and human resources as well as being the least corrupt but without the spare capacity to take on relocated employment
- **E-losers**, these countries tend to have neither the telecommunications infrastructure nor the human capital resources to benefit from eWork. At the same time they are perceived as the .most corrupt

Nearly half (47.1 per cent) of the worlds population live in e-tiger countries, while over half the countries, and as many as 28 per cent of the world's population, live in e-loser countries. The e-leaders, although comprising only six countries, represent about a tenth of the world's population. The e-capable countries, and especially the e-maybe countries, are relatively small in population terms, while the e-hare countries represent about a

[1] Zook M (2000), Internet Metrics: Using host and domain counts to map the Internet, Telecommunications Policy, Vol. 24, No 6/7, pp XX

Table 7.1: The clusters and their populations, 1998

Cluster name	No. of countries	Total population (in millions)	% of total population
E-leaders	6	612.5	10.5
E-capable	23	230.1	4.0
E-hare	25	588.2	10.1
E-tiger	17	2739.2	47.1
E-maybe	19	44.9	0.8
E-loser	114	1607	27.6
Total	*204*	*5821.8*	*100.0*

Source: IES cluster analysis of eWork indicators

tenth of the world's population. The picture is summarised in Table 7.1.

Table 7.2 shows that the majority of African and South American countries fall into the e-loser category. At the same time, no e-leader or e-capable countries and only one each of the e-maybe countries can be found in these two continents. Europe has the highest concentration of e-leader and e-capable countries, while North America and Oceania have the highest concentration of e-maybes and Asia the highest concentration of e-tiger countries.

Table 7.3 gives the average values for the various indicators used in the cluster analysis and acts as the basis for the names given to the clusters and the descriptions of the clusters.

7.6.1 E-leaders

The e-leader countries are so named because this cluster includes six of the G-7 countries and represents the major economies of the world. They have the second largest average populations of all the clusters. They have far better telecommunications infrastructures than average and the highest levels of tertiary level graduates per head of population.

Table 7.2: Continental breakdown of the clusters

	Europe	North Americas	South Americas	Africa	Asia	Oceania
E-leader	3	1			1	
E-capable	16				5	2
E-maybe	5	11	1	1		1
E-hare	2	1	3	9	8	2
E-tiger	3	4	1	4	5	
E-loser	14	11	11	39	29	10
Total	*43*	*28*	*16*	*53*	*48*	*16*

Source: IES analysis of eWork indicators database

Table 7.3: The clusters and eWork indicators

Cluster name	Avg. population 1998 (millions)	Avg. mainlines per 100 population 1998	Avg. no. of tertiary level graduates	Avg. graduates per 1,000 Population	Avg. no. of Internet hosts per country 1998	Avg. cost of a business phone call to the US 1999	Avg. growth in mainlines per capita 1994 to 1998	Average Corruption Perception Indicator 1999
e-leader	102.1	56.4	595,168	7,404	10,251,697	1.7	10.3	7.6
e-capable	10.0	52.3	31,755	4,681	256,427	2.9	13.1	7.7
e-hare	23.5	6.9	45,452	1,417	8,541	9.8	136.0	4.1
e-tiger	161.1	15.1	441,232	3,075	66,153	8.2	67.5	3.3
e-maybe	2.4	53.3	684,307	23,054	90,601	5.3	16.3	9.1
e-loser	14.1	10.4	19,970	1,386	12,029	10.1	25.8	3.2
Total	*28.5*	*20.1*	*96,041*	*2,513*	*353,827*	*8.5*	*38.5*	*4.7*

Source: IES analysis of eWork indicators database

They are also perceived as relatively non-corrupt, with an average corruption perception indicator of 7.6. Partially due to the contribution of the United States, the leader countries also have on average by far the greatest number of Internet sites. Importantly, in terms of the future development of the Internet, half of these leader countries are English speaking. Whilst the initial Anglo-Saxon supremacy of the Internet is being challenged by other languages, it is clear that the English language remains dominant.

Another measure of the level of integration of these countries is the low average cost of business telephone calls to the US — at less than a quarter of the global average.

7.6.2 E-capables

The e-capable countries are so called because they have, if anything, even better telecommunication infrastructures than the e-leaders, are considered less corrupt and have similar numbers of graduates per head of population. However, they tend to be smaller economies both in terms of terms of their populations and their economies.

Table 7.4: E-leader countries main e-indicators

	Mainlines per 100 population 1998	Graduates per million population	Number of Internet hosts in 1998	Corruption perception indicator
Australia	52.5	7,518	1,090,468	8.7
France	57.1	6,752	1,233,071	6.6
Germany	56.7	3,872	1,635,067	8.0
Japan	50.3	8,738	2,636,541	6.0
United Kingdom	55.7	8,118	1,739,078	8.6
United States	66.1	9,423	53,175,956	7.5

Source: IES analysis of the EMERGENCE eWork indicators database

Table 7.5: E-capable main e-indicators

	Mainlines per 100 population 1998	Graduates per million population	Number of Internet hosts in 1998	Corruption perception indicator
Austria	49.1	2,418	262,632	7.6
Belgium	50.0	5,942	339,357	5.3
Cyprus	54.5	2,296	6,225	..
Denmark	66.0	6,276	338,239	10.0
Finland	55.3	5,518	461,760	9.8
Greece	52.2	2,553	75,088	4.9
Hong Kong	55.8	..	114,882	7.7
Ireland	43.5	8,383	63,913	7.7
Israel	47.1	2,873	149,490	6.8
Italy	45.3	3,203	301,528	4.7
Macau	40.4	2,553	162	..
Malta	49.9	3,700	6,005	..
Netherlands	59.3	5,065	959,083	9.0
New Zealand	49.0	8,563	271,003	9.4
Norway	66.0	11,847	438,961	8.9
Portugal	41.3	3,736	77,761	6.7
Singapore	56.2	7,306	148,249	9.1
Slovenia	38.0	3,376	23,559	6.0
Spain	41.4	4,108	469,587	6.6
Sweden	67.4	3,985	522,888	9.4
Switzerland	67.4	1,812	269,812	8.9
Taiwan, China	52.4	..	597,036	..
Virgin Islands (US)	54.8	2,780	596	..

Note: .. numbers too small to report reliably

Source: IES analysis of the EMERGENCE eWork indicators database

Although, their corruption perception indicator is, on average, the best for all the clusters, this disguises a wide range. The index ranges from Denmark at ten which is seen as the least corrupt to Italy at 4.7 which is seen as the most corrupt of the cluster.

Otherwise, the relatively high levels of mainlines per capita, and the relatively high levels of graduates per capita combined with their size, are the main distinguishing features of this high-tech, high-skill cluster.

7.6.3 E-hares

The e-hares are an interesting cluster whose main distinguishing characteristic is the very high average growth rates in the number of mainlines per capita. This indicates high levels of investment in telecommunications infrastructure. Apart from this feature, many of those in the e-hare cluster have very similar characteristics to

Table 7.6: E-hare countries main e-indicators

	Mainlines per 100 population 1998	Graduates per million population	Number of Internet hosts in 1998	Corruption perception indicator
Albania	3.0	1,162	215	2.3
Bhutan	1.6	—	542	—
Botswana	6.5	—	2,226	6.1
Cambodia	0.2	—	155	—
Cape Verde	9.8	—	1	—
Chile	20.5	2,536	40,190	6.9
El Salvador	8.0	1,295	975	3.9
Equatorial Guinea	1.3	—	0	—
Ghana	0.8	162	110	3.3
Guinea	0.5	137	1	—
Hungary	33.6	2,511	119,642	5.2
Indonesia	2.7	1,153	21,052	1.7
Liberia	—	—	0	—
Mauritius	21.4	1,572	823	4.9
Mayotte	9.5	—	0	—
Nepal	0.9	—	290	—
Papua New Guinea	—	—	337	—
Peru	6.3	1,176	9,230	4.5
Philippines	3.7	4,678	12,394	3.6
Sri Lanka	2.8	441	1,209	—
Sudan	0.6	277	0	—
Syria	9.5	1,319	1	—
Tonga	—	—	3,992	—
Vietnam	2.6	—	126	2.6
Congo (Democratic Republic of the)	—	—	8	—

Source: IES analysis of the EMERGENCE eWork indicators database

the e-loser countries. Of the cluster, three countries Chile, Hungary and Mauritius, appear to be outliers. They have much higher levels of mainlines and graduates per capita than the cluster mean. Apart from these three outliers, the e-hare countries have on average the lowest levels of mainlines per capita and the lowest average number of Internet hosts. However, on average the e-hares also have a slightly higher level of graduates per capita than the e-loser countries.

Overall, these indicators suggest a cluster where the countries are investing heavily in telecommunications infrastructure to improve what historically were very poor systems. Similarly, they seem to be investing in human resources and therefore creating an environment that seems likely to be conducive to attracting eWork in the future.

Table 7.7: E-tiger main e-indicators

	Mainlines per 100 population 1998	Graduates per million population	Number of Internet hosts in 1998	Corruption perception indicator
China	7.0	873	71,769	3.4
Egypt	6.0	1,786	2,355	3.3
Guatemala	4.8	—	1,772	3.2
India	2.2	1,328	23,445	2.9
Jamaica	18.7	648	367	3.8
Korea (Rep. of)	43.3	8,722	283,459	3.8
Lebanon	19.4	2,456	4,729	—
Libya	9.1	—	3	—
Mali	0.3	—	11	—
Mexico	10.4	1,658	404,873	3.4
Poland	22.8	3,505	171,217	4.2
Russia	19.7	6,406	91,430	2.4
Saint Kitts and Nevis	—	4,575	8	—
Saint Lucia	26.6	—	13	—
Seychelles	24.8	—	2	—
Thailand	8.4	2,218	40,176	3.2
Ukraine	19.1	2,724	28,973	2.6

Source: IES analysis of the EMERGENCE eWork indicators database

7.6.4 E-tigers

As already indicated, the e-tigers have the highest average population; this is partly because they include China and India. These relatively high average populations, and consequently relatively high absolute number of tertiary level graduates, constitute one of the strongest distinguishing features of the e-tigers. Although they have above the global average numbers of graduates per capita the e-tigers do not reach the levels of graduates found in the e-maybe or e-leader countries. However, the high absolute levels do mean that it is easier to find graduates in these countries than elsewhere.

Compared with the e-hares and the e-losers, the e-tigers have higher average numbers of Internet hosts and lower costs for business telephone calls to the US. Apart from the e-hare countries, the e-tigers had the greatest increase in the number of mainlines per capita between 1994 and 1998. However, they did have a corruption perception index as poor as in the e-loser countries. These countries seem likely to be able to generate a critical mass, both in terms of skill supply and in terms of their own internal and rapidly growing economies to stake out significant positions in the new global digital economy.

7.6.5 E-maybes

The main distinguishing feature of the e-maybe countries is their low average population. Some of these countries are small island states; others are larger but with sparse populations. Their mainlines per capita, and growth in mainlines per capita, are comparable with the e-leader and the e-capable countries. However, their small populations combined with high numbers of tertiary level graduates produce exceptionally high levels of graduates per capita. Interestingly, these countries on average (and where the data are available) have the lowest levels of corruption of any cluster.

Overall, these countries have many of the features of the e-capable and e-leader countries. However, their small size, combined with the relatively high cost of telephone calls to the US reflecting their geographically isolated situations, suggests that they are unlikely to gain much from eWork. The presence of Canada in this cluster must be regarded as something of an anomaly, produced by its exceptionally low population density. It is an outlier on most variables. However, compared with the e-leader and e-capable countries where it might otherwise be found, Canada differs in

Table 7.8: E-maybe countries main e-indicators

	Mainlines per 100 population 1998	Number of Internet hosts in 1998	Corruption perception indicator
Antigua and Barbuda	46.8	225	—
Aruba	—	353	—
Bahamas	35.8	4	—
Barbados	42.2	68	—
Bermuda	83.9	2,825	—
Canada	63.5	1,669,664	9.2
Faroe Islands	54.4	722	—
Greenland	44.6	2,235	—
Guadeloupe	44.5	549	—
Guam	—	120	—
Haiti	—	1	—
Iceland	64.6	29,872	9.2
Jersey	75.1	54	—
Liechtenstein	61.8	3,369	—
Luxembourg	69.2	9,614	8.8
Martinique	44.3	329	—
Netherlands Antilles	—	97	—
Puerto Rico	32.7	1,310	—
Reunion	35.6	1	—

Source: IES analysis of the EMERGENCE eWork indicators database

several important respects. Compared with both the e-leader countries and the e-capable countries Canada has more mainlines per capita and more graduates per capita than average. The main distinguishing feature however is that Canada is seen as less corrupt than average and it this feature more than any other than puts it into the e-maybe category. Such examples point to the limitations both of the available data and of the cluster analysis technique and support the case for deeper research and the development of better indicators.

7.6.6 E-losers

The e-losers, worryingly, represent the majority of the world's countries and over a quarter of the world's population, illustrating the extent to which these developments may lead to a deepening digitally driven developmental divide. On average, the countries in this cluster have the lowest number of tertiary level graduates, the lowest numbers of graduates per capita, the highest levels of corruption and the most expensive business calls to the US. However, the e-hares had lower numbers of mainlines per capita, while the e-leader, e-capable and e-maybe countries had lower growth in mainlines per capita. This latter factor, however, is almost certainly due to the fact that teledensity is nearer saturation point in these more developed economies.

It seems apparent that these economies are multiply disadvantaged when it comes to establishing a niche for themselves in the information economy.

Because of the large number of countries involved, details of each e-loser country's main indicators are presented in Appendix A, Table A9.

8. Conclusions

We have attempted in this report to make as much sense as possible of the indicators that currently exist in relation to what they can tell us about eWork location.

Our main conclusion, in summarising what we have learned from this exercise, is that the existing indicators are not adequate to track the dynamics of change in the information economy. They provide insufficient precision to identify the opportunities or risks for any given region, at a level of detail that would enable the development of appropriate and targeted economic development strategies.

We can, however, learn something from these analyses, especially the more nuanced analyses which were possible at the EU regional level thanks to Eurostat data, and it is this: that whichever indicator is selected for eWork, it is clear that the activities represented by this indicator are strongly clustered in certain regions. The hypothesis that ICTs are bringing about a more even geographical distribution of employment is not supported; indeed, if anything the evidence suggests that regional concentration is become more, rather than less, pronounced. This does not, of course, mean that all 'rich' regions develop in the same way or at the same pace, or that the converse is true for 'poor' regions. Some regions in some countries appear to be making much more rapid progress towards developing an information economy than others, even when other factors appear similar. In Europe, for instance, the Netherlands stands out as a country in which many regional labour markets appear to be unusually intensive in terms both of IT employment and eWork.

The global-level analysis also suggests that the picture is by no means static. There does not appear to be an inevitable trajectory whereby those regions that start with more of this type of economic activity are likely to continue to attract more in an undifferentiated way. On the contrary, it appears that regions develop in specific and differentiated ways. Some regions are able to exploit their advantages to carve out particular niches in the new global division of information work and find a 'fast track' for economic development. Others are bypassed by the new opportunities opened up by IST technologies.

8.1 Recommendations

Carrying out the research on which this study is based, enabled us to identify a number of inadequacies in the existing data sources. We conclude this report with some recommendations for ways in which the statistics might be improved in the future.

8.1.1 Sectoral classification

Some excellent work has been carried out by the US Government and by the OECD on refining the existing sectoral classifications to take account of the 'digital' or 'information' economy. It would be extremely helpful to the research and policy communities if these could be further developed, and a new international sectoral classification proposed for adoption by national statistical offices that is both backwardly compatible with existing statistics, and fully comparable internationally. We realise that achieving global adoption of such a scheme will be a slow and challenging process. In the first instance, arriving at an agreement on reclassification between the national statistics offices of the existing EU member states, EU accession states, and EFTA states would constitute a major step in the right direction.

8.1.2 Occupational classification

The convergence and reconstitution of traditional industrial sectors is mirrored by a transformation of traditional occupational profiles and there is an urgent need for internationally comparable definitions of a range of new occupations varying from 'call centre operator' to 'web-master'.

Because of differences in national qualifications systems and nomenclatures, the process of occupational profiling may take different forms in different countries. However, it would seem entirely possible, at least at the EU level, to pool the results of research in different member states in order to inform a discussion leading to an agreement on a common scheme. The aim would be to refine the ISCO classification to produce a much more differentiated set of codes for workers in the information economy.

This would be useful for a variety of different policy purposes, including benchmarking national qualifications, encouraging labour mobility, anticipating skills shortages, and the development of training, employment and regional development policies.

8.1.3 Labour Force Surveys

The inclusion of questions in the UK labour force survey which make it possible to identify home-based and multi-locational teleworkers has proved to be a cost-effective way of producing

robust information, annually updated, on the growth of these forms of work and the characteristics of the workers involved.

The inclusion of such questions in other national labour force surveys, and hence in the European Labour Force Survey (especially when combined with revised sectoral and occupational codes as proposed above) would offer an exceptionally powerful means for monitoring the development of eWork and studying its characteristics.

8.1.4 National accounts and trade statistics

If the revised sectoral classifications proposed above can be agreed and adopted, then it would be helpful if they could be implemented as quickly as possible in the drawing up of national accounts and the presentation of trade statistics. This would make it possible to identify the contribution that the information economy makes to growth and to foreign direct investment, and to track the international flows of eWork.

8.1.5 Qualifications

Considerable progress has already been made within the EU in benchmarking occupational qualifications in the interests of promoting labour mobility and the transferability of skills. As new occupational definitions emerge, it would be helpful if this process could be accompanied by a codification of the relevant national qualifications relating to information technology employment or eWork. This would make it possible to generate genuinely comparable information about the skills of the workforce at a regional level. This would not only be of great use to researchers and policy-makers but would also be an aid to employers or investors searching for locations for new information economy activities.

8.1.6 Pilot studies

The recommendations made so far refer to refinements to or further developments of existing data gathering instruments or procedures. There is also a need to identify entirely new indicators that are not captured by the existing instruments. One means of doing so is the development of hypotheses that can be tested in pilot studies. A productive way forward here might involve triangular forms of collaboration between the European Commission or other international bodies, together with national statistics offices, together with academic or professional researchers. In this way such pilot studies could be developed in ways which experimentally test the collection of new variables, or try out new methods of collection, whilst remaining compatible, and therefore comparable, with existing research instruments and methods.

8.1.7 Speed

Our final plea relates not to any specific type of indicator or method of collection, but to the speed with which data are processed and disseminated. We realise that most international agencies are reliant on national sources for their data, so there is an inherent danger that the speed of the whole is dictated by that of the slowest participant. Nevertheless, the speed of technological change is so rapid that statistics become ever more quickly outdated and may become almost useless for any purpose other than a purely historical one after only a few months, let alone years.

The new technologies do themselves offer a number of means whereby the processes of communication, collection, analysis and dissemination can be speeded up. It would be of great benefit to all parties if all the major international statistics providers could be urged to take advantage of these developments, and make it a priority to make data available as quickly as possible, using the Internet as a means of rapid global distribution.

Appendix A

Table A1: Employees in ITCE occupations by NUTS Level II regions, 1999

NUTS II regional code	Country and Region	ITCE occupations	% ITCE
	Austria		
11	Burgenland	.	.
12	Niederösterreich	11.8	1.7
13	Wien	24.2	3.2
21	Kärnten	.	.
22	Steiermark	6.2	1.2
31	Oberösterreich	5.7	0.9
32	Salzburg	3.4	1.4
33	Tirol	2.8	0.9
34	Vorarlberg	2.2	1.4
	All of Austria	*59.3*	*1.6*
	Belgium		
10	Rég. Bruxelles Cap.	12.0	3.6
20	Antwerpen	7.2	1.1
22	Limburg (B)	.	.
23	Oost-Vlaanderen	11.5	2.0
24	Vlaams Brabant	11.0	2.5
25	West-Vlaanderen	6.1	1.3
31	Brabant Wallon	4.8	3.5
32	Hainaut	6.3	1.5
33	Liège	7.8	2.1
34	Luxembourg (B)	.	.
35	Namur	(4.0)	(2.5)
	All of Belgium	*73.4*	*1.9*
	Germany		
11	Stuttgart	39.0	2.1
12	Karlsruhe	25.7	2.2
13	Freiburg	13.6	1.4
14	Tübingen	10.4	1.3
21	Oberbayem	51.1	2.6
22	Niederbayem	.	.
23	Oberplatz	.	.

NUTS II regional code	Country and Region	ITCE occupations	% ITCE
24	Oberfranken	.	.
25	Mittlefranken	15.7	2.1
26	Unterfranken	.	.
27	Schwaben	8.3	1.0
31	Berlin-West, Stadt	21.3	2.5
32	Berlin-Ost, Stadt	12.3	2.1
40	Brandenburg	9.7	0.9
50	Bremen	.	.
60	Hamburg	23.6	3.0
71	Darmstadt	45.2	2.7
72	Gießen	.	.
73	Kassel	.	.
80	Mecklenburg-Vorpommem	.	.
91	Braunschweig	10.5	1.5
92	Hannover	11.3	1.2
93	Lüneburg	8.3	1.2
94	Wesser-Ems	8.3	0.8
A1	Düsseldorf	28.2	1.3
A2	Köln	32.1	1.8
A3	Münster	12.0	1.1
A4	Detmold	12.4	1.4
A5	Amsberg	17.5	1.1
B1	Koblenz	8.5	1.3
B2	Trier	.	.
B3	Rheinhessen-Pfalz	16.8	1.9
C0	Saarland	6.2	1.4
D0	Sachsen	18.2	0.9
E1	Dessau	.	.
E2	Halle	.	.
E3	Magdeburg	.	.
F0	Schleswig-Holstein	18.3	1.5
G0	Thüringen	.	.
	All of Germany	*544.1*	*1.5*
	Denmark		
0	Denmark	59.1	2.2
	Spain		
11	Galicia	5.6	0.6
12	Principado de Asturias	(2.5)	(0.8)
13	Cantabria	.	.
21	Pais Vasco	10.2	1.3
22	Communidad Foral de Navarra	.	.
23	La Rioja	.	.

NUTS II regional code	Country and Region	ITCE occupations	% ITCE
24	Aragón	.	.
30	Communidad de Madrid	58.1	3.0
41	Castilla y León	(4.9)	(0.6)
42	Castilla-la Mancha	.	.
43	Extremadura	.	.
51	Cataluna	36.4	1.5
52	Communidad Valenciana	12.6	0.9
53	Islas Baleares	.	.
61	Andalucia	12.2	0.6
62	Región de Murcia	.	.
63	Ceuta y Melilla	.	.
70	Canarias	(2.7)	(0.5)
	All of Spain	*156.2*	*1.1*
	Finland		
13	Itä-Suomi	(3.0)	(1.1)
14	Väli-Suomi	(4.2)	(1.4)
15	Pohjois-Suomi	(2.9)	(1.3)
16	Uusimaa	28.8	4.1
17	Etelae-Suomi	14.2	1.8
20	Äland	.	.
	All of Finland	*53.4*	*2.3*
	France		
10	Île de France	207.1	4.2
21	Champagne-Ardenne	.	.
22	Picardie	(4.8)	(0.7)
23	Haute-Normandie	(4.7)	(0.7)
24	Centre	9.5	1.0
25	Basse-Normandie	.	.
26	Borgogne	(4.4)	(0.7)
30	Nord-Pas-de-Calais	17.2	1.3
41	Lorraine	9.3	1.1
42	Alsace	(8.3)	(1.1)
43	Franche-Comté	(3.9)	(0.9)
51	Pays de la Loire	11.4	0.9
52	Bretagne	(6.8)	(0.6)
53	Poitou-Charentes	(5.5)	(0.9)
61	Aquitaine	11.2	1.0
62	Midi-Pyrénées	16.6	1.8
63	Limousin	.	.
71	Rhône-Alpes	37.3	1.7
72	Auvergne	.	.
81	Languedoc-Roussillon	(5.1)	(0.7)

NUTS II regional code	Country and Region	ITCE occupations	% ITCE
82	Provence-Alpes-Côte d'Azur	15.5	1.0
83	Corse	.	.
	All of France	*387.5*	*1.7*
	Greece		
11	Anatoliki Makedonia, Thraki	.	.
12	Kentriki Makedonia	(3.2)	(0.5)
13	Dytiki Makedonia	.	.
14	Thessalia	.	.
21	Ipeiros	.	.
22	Ionia Nisia	.	.
23	Dytiki Ellada	.	.
24	Sterea Ellada	.	.
25	Peloponnisos	.	.
30	Attiki	15.0	1.0
41	Voreio Aigaio	.	.
42	Notio Aigaio	.	.
43	Kriti	.	.
	All of Greece	*22.6*	*0.6*
	Ireland (1)		
		—	—
	Italy		
11	Piemonte	23.5	1.4
12	Valle d'aosta	.	.
13	Liguria	7.9	1.3
20	Lombardia	55.1	1.5
31	Trentino-Alto Adige	(4.6)	(1.2)
32	Veneto	14.8	0.8
33	Friuli-Venezia Giulia	(4.2)	(0.9)
40	Emila-Romagna	20.5	1.2
51	Toscana	9.5	0.7
52	Umbria	.	.
53	Marche	.	.
60	Lazio	43.9	2.4
71	Abruzzo	(3.7)	(0.9)
72	Molise	.	.
80	Campania	12.0	0.8
91	Puglia	7.8	0.7
92	Basilicata	.	.
93	Calabria	.	.
A0	Sicilia	(4.3)	(0.3)
B0	Sardegna	(3.1)	(0.6)
	All of Italy	*222.6*	*1.1*

NUTS II regional code	Country and Region	ITCE occupations	% ITCE
	Luxembourg		
	All of Luxembourg	*(3.6)*	*(2.1)*
	Netherlands		
11	Groningen	(4.9)	(1.9)
12	Friesland	(6.9)	(2.4)
13	Drenthe	.	.
21	Overijssel	(9.9)	(2.0)
22	Gelderland	27.0	3.0
23	Flevoland	(8.0)	(5.3)
31	Utrecht	23.4	4.2
32	Noord-Holland	45.6	3.7
33	Zuid-Holland	60.7	3.8
34	Zeeland	.	.
41	Noord-Brabant	32.7	2.8
42	Limburg (NL)	15.1	2.8
	All of the Netherlands	*240.5*	*3.2*
	Portugal		
11	Norte	(12.5)	(0.8)
12	Centro (P)	.	.
13	Lisboa e Vale do Tejo	23.9	1.6
14	Alentejo	.	.
15	Algarve	.	.
20	Açores	.	.
30	Maderia	.	.
	All of Portugal	*41.7*	*0.9*
	Sweden		
1	Stockholm	40.6	4.9
2	Östra Mellansverige	20.7	3.0
4	Sydsverige	11.8	2.1
6	Norra Mellansverige	8.3	2.2
7	Mellersta Norrland	4.2	2.5
8	Övre Norrland	2.9	1.4
9	Smaaland med Oeama	8.1	2.2
0A	Västsverige	16.8	2.1
	All of Sweden	*113.5*	*2.8*
	United Kingdom		
C1	Tees Valley & Durham	.	.
C2	Northumberland, Tyne & Wear	.	.
D1	Cumbria	.	.
D2	Cheshire	.	.
D3	Greater Manchester	14.6	1.3
D4	Lancashire	.	.

NUTS II regional code	Country and Region	ITCE occupations	% ITCE
D5	Merseyside	.	.
E1	East Riding & North Lincolnshire	.	.
E2	North Yorkshire	.	.
E3	South Yorkshire	.	.
E4	West Yorkshire	14.9	1.6
F1	Derbyshire, Nottinghamshire	15.1	1.7
F2	Leicestershire, Northamptonshire	10.0	1.3
F3	Lincolnshire	.	.
G1	Herefordshire, Worcestershire & Warwickshire	.	.
G2	Shropshire, Staffordshire	.	.
G3	West Midlands	12.7	1.1
H1	East Anglia	15.1	1.5
H2	Bedfordshire, Hertfordshire	25.0	3.1
H3	Essex	10.8	1.4
I1	Inner London	35.4	3.1
I2	Outer London	55.6	2.8
J1	Berkshire, Bucks, Oxfordshire	41.4	3.8
J2	Surrey, East-West Sussex	33.5	2.9
J3	Hampshire, Isle of Wight	19.4	2.3
J4	Kent	.	.
K1	Avon, Gloucestershire, Wiltshire & North Somerset	22.3	2.1
K2	Dorset, Somerset	11.0	2.1
K3	Cornwall & Isles of Scilly	.	.
K4	Devon	.	.
L1	West Wales & the Valleys	.	.
L2	East Wales	.	.
M1	North Eastern Scotland	.	.
M2	Eastern Scotland	13.0	1.5
M3	South Western Scotland	.	.
M4	Highlands, Islands	.	.
N0	Northern Ireland	.	.
	All of the UK	*466.6*	*1.8*

Notes: — data not available, ( ) data may be unreliable; . numbers too small to be reliable; (1) Irish occupational data not sufficiently disaggregated; (2) UK data refers to 1998 and does not include ISCO 312 as result of conversion from national occupational classifications and ISCO.

Source: IES and Eurostat special analysis of Community LFS data

Table A2: ITCE employment by sector for 13 European countries (excludes Ireland and the UK) in 1999

NACE code	Description	Numbers (1,000's)	% of sector	% of ITCE employment
1	Agriculture, hunting and related service activities	.	.	.
2	Forestry, logging and related service activities	.	.	.
5	Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing	.	.	.
10	Mining of coal and lignite; extraction of peat	.	.	.
11	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction	.	.	.
12	Mining of uranium and thorium ores	.	.	.
13	Mining of metal ores	.	.	.
14	Other mining and quarrying	.	.	.
15	Manufacture of food products and beverages	15.8	0.5	0.8
16	Manufacture of tobacco products	.	.	.
17	Manufacture of textiles	.	.	.
18	Manufacture of wearing apparel; dressing and dyeing of fur	.	.	.
19	Tanning and dressing of leather; Manufacture of luggage, handbags, saddlery, harness and footwear	.	.	.
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	.	.	.
21	Manufacture of pulp, paper and paper products	.	.	.
22	Publishing, printing and reproduction of recorded media	29.1	1.9	1.5
23	Manufacture of coke, refined petroleum products and nuclear fuel	.	.	.
24	Manufacture of chemicals and chemical products	33.2	1.9	1.7
25	Manufacture of rubber and plastic products	.	.	.
26	Manufacture of other non-metallic mineral products	.	.	.
27	Manufacture of basic metals	.	.	.
28	Manufacture of fabricated metal products, except machinery and equipment	16.2	0.6	0.8
29	Manufacture of machinery and equipment n.e.c.	35.4	1.2	1.8
30	Manufacture of office machinery and computers	56.0	19.6	2.8
31	Manufacture of electrical machinery and apparatus n.e.c.	24.8	2.3	1.3
32	Manufacture of radio, television and communication equipment and apparatus	37.7	5.4	1.9
33	Manufacture of medical, precision and optical instruments, watches and clocks	19.3	2.9	1.0
34	Manufacture of motor vehicles, trailers and semi-trailers	27.1	1.5	1.4
35	Manufacture of other transport equipment	15.0	2.5	0.8
36	Manufacture of furniture; manufacturing n.e.c.	.	.	.
37	Recycling	.	.	.
40	Electricity, gas, steam and hot water supply	14.5	1.7	0.7
41	Collection, purification and distribution of water	.	.	.
45	Construction	16.4	0.2	0.8

NACE code	Description	Numbers (1,000's)	% of sector	% of ITCE employment
50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	.	.	.
51	Wholesale trade and commission trade, except of motor vehicles and motorcycles	72.2	1.6	3.7
52	Retail trade, except of motor vehicles and motor cycles; repair of personal and household goods	62.5	0.6	3.2
55	Hotels and restaurants	.	.	.
60	Land transport; transport via pipelines	14.9	0.5	0.8
61	Water transport	.	.	.
62	Air transport	.	.	.
63	Supporting and auxiliary transport activities; activities of travel agencies	11.5	0.8	0.6
64	Post and telecommunications	73.4	3.4	3.7
65	Financial intermediation, except insurance and pension funding	76.2	2.9	3.9
66	Insurance and pension funding, except compulsory social security	42.1	3.9	2.1
67	Activities auxiliary to financial intermediation	.	.	.
70	Real estate activities	.	.	.
71	Renting of machinery and equipment without operator and of personal and household goods	.	.	.
72	Computer and related activities	636.6	53.1	32.2
73	Research and development	17.5	3.9	0.9
74	Other business activities	192.5	2.7	9.7
75	Public administration and defence; compulsory social security	92.8	0.9	4.7
80	Education	37.4	0.5	1.9
85	Health and social work	71.5	0.6	3.6
90	Sewage and refuse disposal, sanitation and similar activities	.	.	.
91	Activities of membership organisations n.e.c.	12.0	1.1	0.6
92	Recreational, cultural and sporting activities	101.3	5.0	5.1
93	Other service activities	12.6	0.6	0.6
95	Private households with employed persons	.	.	.
99	Extra-territorial organisations and bodies	.	.	.
Grand Total		*1977.5*		*1.6*

Notes: . Indicates data cells of less than 10,000 that have been suppressed on reliability grounds

Source: IES and Eurostat special analysis of Community Labour Force Survey

Table A3: Numbers of IT sector employment and as a percentage of total employment by region, 1999

NUTS code	Country/Region:	IT Sectors (1,000's)	% of total employment in IT sector
	Austria		
11	Burgenland	.	.
12	Niederösterreich	6.8	1.0
13	Wien	14.0	1.9
21	Kärnten	2.0	0.8
22	Steiermark	3.3	0.6
31	Oberösterreich	3.8	0.6
32	Salzburg	.	.
33	Tirol	2.1	0.7
34	Vorarlberg	.	.
	All of Austria	*35.5*	*1.0*
	Belgium		
10	Rég. Bruxelles Cap.	7.2	2.2
20	Antwerpen	.	.
22	Limburg (B)	.	.
23	Oost-Vlaanderen	(2.9)	(0.5)
24	Vlaams Brabant	8.9	2.0
25	West-Vlaanderen	(4.1)	(0.9)
31	Brabant Wallon	(3.3)	(2.4)
32	Hainaut	(2.5)	(0.6)
33	Liège	(2.9)	(0.8)
34	Luxembourg (B)	.	.
35	Namur	.	.
	All of Belgium	*35.9*	*0.9*
	Germany		
11	Stuttgart	37.7	2.1
12	Karlsruhe	23.4	2.0
13	Freiburg	8.4	0.9
14	Tübingen	8.7	1.1
21	Oberbayem	50.7	2.6
22	Niederbayem	.	.
23	Oberplatz	.	.
24	Oberfranken	.	.
25	Mittlefranken	14.9	2.0
26	Unterfranken	.	.
27	Schwaben	8.4	1.0
31	Berlin-West, Stadt	12.1	1.4
32	Berlin-Ost, Stadt	.	.
40	Brandenburg	.	.
50	Bremen	.	.

NUTS code	Country/Region:	IT Sectors (1,000's)	% of total employment in IT sector
60	Hamburg	12.9	1.7
71	Darmstadt	41.8	2.5
72	Gießen	.	.
73	Kassel	.	.
80	Mecklenburg-Vorpommem	.	.
91	Braunschweig	.	.
92	Hannover	.	.
93	Lüneburg	.	.
94	Wesser-Ems	.	.
A1	Düsseldorf	28.7	1.3
A2	Köln	24.4	1.3
A3	Münster	9.4	0.9
A4	Detmold	9.4	1.1
A5	Amsberg	9.9	0.6
B1	Koblenz	.	.
B2	Trier	.	.
B3	Rheinhessen-Pfalz	13.1	1.5
C0	Saarland	.	.
D0	Sachsen	11.9	0.6
E1	Dessau	.	.
E2	Halle	.	.
E3	Magdeburg	.	.
F0	Schleswig-Holstein	12.0	1.0
G0	Thüringen	.	.
	All of Germany	*421.4*	*1.2*
	Denmark		
0	Denmark	48.9	1.8
	All of Denmark	*48.9*	*1.8*
	Spain		
11	Galicia	.	.
12	Principado de Asturias	.	.
13	Cantabria	.	.
21	Pais Vasco	(4.7)	(0.6)
22	Communidad Foral de Navarra	.	.
23	La Rioja	.	.
24	Aragón	.	.
30	Communidad de Madrid	51.0	2.7
41	Castilla y León	.	.
42	Castilla-la Mancha	.	.
43	Extremadura	.	.
51	Cataluna	26.4	1.1
52	Communidad Valenciana	8.4	0.6

NUTS code	Country/Region:	IT Sectors (1,000's)	% of total employment in IT sector
53	Islas Baleares	.	.
61	Andalucia	(4.9)	(0.2)
62	Región de Murcia	.	.
63	Ceuta y Melilla	.	.
70	Canarias	.	.
	All of Spain	*107.4*	*0.8*
	Finland		
13	Itä-Suomi	.	.
14	Väli-Suomi	.	.
15	Pohjois-Suomi	.	.
16	Uusimaa	21.1	3.0
17	Etelae-Suomi	5.3	0.7
20	Äland	.	.
	All of Finland	*31.4*	*1.4*
	France		
10	Île de France	163.9	3.4
21	Champagne-Ardenne	.	.
22	Picardie	.	.
23	Haute-Normandie	.	.
24	Centre	(4.9)	(0.5)
25	Basse-Normandie	.	.
26	Borgogne	.	.
30	Nord-Pas-de-Calais	8.5	0.6
41	Lorraine	5.8	0.7
42	Alsace	.	.
43	Franche-Comté	.	.
51	Pays de la Loire	10.7	0.8
52	Bretagne	(5.6)	(0.5)
53	Poitou-Charentes	.	.
61	Aquitaine	(8.0)	(0.7)
62	Midi-Pyrénées	16.2	1.7
63	Limousin	.	.
71	Rhône-Alpes	30.2	1.4
72	Auvergne	.	.
81	Languedoc-Roussillon	(5.1)	(0.7)
82	Provence-Alpes-Côte d'Azur	12.4	0.8
83	Corse	.	.
	All of France	*292.0*	*1.3*
	Greece		
11	Anatoliki Makedonia, Thraki	.	.
12	Kentriki Makedonia	.	.
13	Dytiki Makedonia	.	.

NUTS code	Country/Region:	IT Sectors (1,000's)	% of total employment in IT sector
14	Thessalia	.	.
21	Ipeiros	.	.
22	Ionia Nisia	.	.
23	Dytiki Ellada	.	.
24	Sterea Ellada	.	.
25	Peloponnisos	.	.
30	Attiki	8.5	0.6
41	Voreio Aigaio	.	.
42	Notio Aigaio	.	.
43	Kriti	.	.
	All of Greece	*10.7*	*0.3*
	Ireland		
1		4.6	1.2
2		41.2	3.5
	All of Ireland	*45.8*	*2.9*
	Italy		
11	Piemonte	30.6	1.8
12	Valle d'aosta	.	.
13	Liguria	(5.4)	(0.9)
20	Lombardia	70.3	1.9
31	Trentino-Alto Adige	.	.
32	Veneto	12.1	0.7
33	Friuli-Venezia Giulia	(3.6)	(0.8)
40	Emila-Romagna	17.1	1.0
51	Toscana	12.1	0.9
52	Umbria	.	.
53	Marche	.	.
60	Lazio	47.5	2.6
71	Abruzzo	.	.
72	Molise	.	.
80	Campania	11.8	0.8
91	Puglia	(4.6)	(0.4)
92	Basilicata	.	.
93	Calabria	.	.
A0	Sicilia	.	.
B0	Sardegna	.	.
	All of Italy	*232.7*	*1.1*
	Luxembourg		
0	Luxembourg	1.4	0.8
	All of Luxembourg	*1.4*	*0.8*
	The Netherlands		
11	Groningen	.	.

NUTS code	Country/Region:	IT Sectors (1,000's)	% of total employment in IT sector
12	Friesland	.	.
13	Drenthe	.	.
21	Overijssel	(4.8)	(0.9)
22	Gelderland	12.9	1.4
23	Flevoland	.	.
31	Utrecht	15.3	2.8
32	Noord-Holland	19.1	1.6
33	Zuid-Holland	33.5	2.1
34	Zeeland	.	.
41	Noord-Brabant	20.4	1.8
42	Limburg (NL)	11.6	2.2
	All of the Netherlands	*128.0*	*1.7*
	Portugal		
11	Norte	.	.
12	Centro (P)	.	.
13	Lisboa e Vale do Tejo	(8.3)	(0.5)
14	Alentejo	.	.
15	Algarve	.	.
20	Açores	.	.
30	Maderia	.	.
	All of Portugal	*15.1*	*0.3*
	Sweden		
1	Stockholm	30.8	3.7
2	Östra Mellansverige	15.3	2.2
4	Sydsverige	.	.
6	Norra Mellansverige	.	.
7	Mellersta Norrland	.	.
8	Övre Norrland	.	.
9	Smaaland med Oeama	.	.
0A	Västsverige	11.6	1.5
	All of Sweden	*77.2*	*1.9*
	United Kingdom		
C1	Tees Valley & Durham	5.6	1.2
C2	Northumberland, Tyne & Wear	6.2	1.1
D1	Cumbria	1.2	0.5
D2	Cheshire	5.5	1.2
D3	Greater Manchester	18.3	1.6
D4	Lancashire	7.7	1.3
D5	Merseyside	4.0	0.8
E1	East Riding & North Lincolnshire	2.8	0.7
E2	North Yorkshire	2.9	0.8
E3	South Yorkshire	7.1	1.3

NUTS code	Country/Region:	IT Sectors (1,000's)	% of total employment in IT sector
E4	West Yorkshire	12.1	1.3
F1	Derbyshire, Nottinghamshire	13.2	1.4
F2	Leicestershire, Northamptonshire	9.0	1.2
F3	Lincolnshire	1.2	0.4
G1	Herefordshire, Worcestershire & Warwickshire	11.3	1.9
G2	Shropshire, Staffordshire	12.9	1.9
G3	West Midlands	9.7	0.9
H1	East Anglia	15.1	1.5
H2	Bedfordshire, Hertfordshire	29.2	3.6
H3	Essex	9.8	1.3
I1	Inner London	27.8	2.4
I2	Outer London	49.7	2.5
J1	Berkshire, Bucks, Oxfordshire	60.7	5.6
J2	Surrey, East-West Sussex	38.2	3.3
J3	Hampshire, Isle of Wight	23.8	2.8
J4	Kent	7.6	1.1
K1	Avon, Gloucestershire, Wiltshire & North Somerset	30.7	2.9
K2	Dorset, Somerset	11.0	2.1
K3	Cornwall & Isles of Scilly	1.4	0.6
K4	Devon	3.2	0.7
L1	West Wales & the Valleys	4.1	0.6
L2	East Wales	2.7	0.6
M1	North Eastern Scotland	0.4	0.2
M2	Eastern Scotland	14.2	1.6
M3	South Western Scotland	28.5	2.9
M4	Highlands, Islands	1.3	0.6
N0	Northern Ireland	3.7	0.6
	All of the UK	*493.4*	*1.9*

Note: ( ) data may be unreliable; . numbers too small to be reliable

Source: IES and a special Eurostat analysis of the Community Labour Force Survey

Table A4.: Numbers of potential teleworkers and potential teleworkers as a percentage of total employment by NUTS level II region, 1999

		Male		Female		Both	
NUTS Code	Region	Number	% of empt	Number	% of empt	Number	% of empt
	Austria						
11	Burgenland	9,131	12.9	5,870	11.3	15,000	12.2
12	Niederösterreich	60,331	15.5	42,095	14.1	102,426	14.9
13	Wien	96,004	23.7	75,148	21.6	171,152	22.8
21	Kärnten	19,751	14.5	15,321	14.8	35,073	14.6
22	Steiermark	44,572	15.0	27,642	12.0	72,215	13.7
31	Oberösterreich	56,107	16.2	34,481	12.9	90,588	14.7
32	Salzburg	22,716	17.2	14,523	13.2	37,238	15.4
33	Tirol	27,863	16.1	18,168	14.2	46,032	15.3
34	Vorarlberg	17,113	18.3	9,147	14.3	26,259	16.7
	Austria Total	*353,588*	*17.3*	*242,396*	*15.1*	*595,984*	*16.4*
	Belgium						
10	Rég, Bruxelles Cap,	43,594	23.4	30,972	20.9	74,566	22.3
20	Antwerpen	60,626	16.0	27,522	10.2	88,148	13.6
22	Limburg (B)	21,123	11.1	8,244	6.6	29,366	9.3
23	Oost-Vlaanderen	51,646	16.0	30,796	12.7	82,443	14.6
24	Vlaams Brabant	61,153	25.4	45,097	22.4	106,251	24.0
25	West-Vlaanderen	36,225	13.8	25,109	12.2	61,333	13.1
31	Brabant Wallon	19,242	24.8	10,928	18.4	30,170	22.0
32	Hainaut	23,141	9.1	9,006	5.5	32,148	7.7
33	Liège	33,293	15.0	14,732	9.7	48,025	12.9
34	Luxembourg (B)	5,463	9.9	(3,842)	(9.9)	9,305	9.9
35	Namur	13,397	14.1	6,828	10.0	20,225	12.4
	Belgium Total	*368,903*	*16.2*	*213,076*	*12.7*	*581,979*	*14.7*
	Germany						
11	Stuttgart	177,569	17.3	196,025	24.6	373,594	20.5
12	Karlsruhe	120,380	18.1	121,880	24.0	242,260	20.7
13	Freiburg	87,735	16.5	95,314	22.9	183,049	19.3
14	Tübingen	74,093	16.5	74,813	21.3	148,906	18.6
21	Oberbayem	234,909	21.6	243,274	27.2	478,183	24.1
22	Niederbayem	48,133	15.4	45,928	19.1	94,061	17.0
23	Oberplatz	41,962	14.9	37,979	17.8	79,941	16.2
24	Oberfranken	45,750	16.4	49,026	21.6	94,777	18.7
25	Mittlefranken	81,589	19.0	78,111	23.7	159,700	21.1
26	Unterfranken	54,520	15.8	57,032	22.6	111,552	18.7
27	Schwaben	80,882	17.6	77,842	22.0	158,724	19.5
31	Berlin-West, Stadt	90,472	19.8	95,102	24.0	185,574	21.8
32	Berlin-Ost, Stadt	49,051	15.7	80,128	28.3	129,180	21.7
40	Brandenburg	61,847	10.0	109,670	21.0	171,518	15.1
50	Bremen	24,573	16.3	28,650	23.7	53,223	19.6

NUTS Code	Region	Male		Female		Both	
		Number	% of empt	Number	% of empt	Number	% of empt
60	Hamburg	105,904	25.1	110,052	30.7	215,956	27.7
71	Darmstadt	205,143	21.6	220,041	29.8	425,184	25.2
72	Gießen	44,514	17.6	39,817	21.2	84,331	19.1
73	Kassel	48,720	16.1	47,860	20.8	96,579	18.1
80	Mecklenburg-Vorpommem	45,885	11.0	75,980	22.6	121,865	16.2
91	Braunschweig	58,587	14.6	67,761	22.8	126,348	18.1
92	Hannover	99,108	19.3	99,427	25.2	198,535	21.8
93	Lüneburg	70,830	17.3	77,165	25.5	147,995	20.8
94	Wesser-Ems	95,713	16.2	92,296	21.6	188,009	18.5
A1	Düsseldorf	229,048	18.2	219,620	24.1	448,668	20.7
A2	Köln	203,887	19.4	185,271	24.5	389,159	21.5
A3	Münster	101,370	16.4	96,272	21.8	197,641	18.7
A4	Detmold	81,163	16.1	78,452	21.0	159,615	18.2
A5	Amsberg	138,257	15.3	149,229	23.6	287,486	18.7
B1	Koblenz	57,018	15.4	65,818	23.8	122,836	19.0
B2	Trier	20,647	16.4	16,167	18.4	36,814	17.2
B3	Rheinhessen-Pfalz	92,461	18.3	85,750	22.5	178,211	20.1
C0	Saarland	40,774	16.3	40,398	22.1	81,172	18.7
D0	Sachsen	123,837	11.9	223,754	25.6	347,591	18.1
E1	Dessau	12,083	9.7	21,571	21.4	33,653	15.0
E2	Halle	24,217	12.8	35,153	22.8	59,370	17.3
E3	Magdeburg	26,081	9.4	56,990	25.2	83,071	16.5
F0	Schleswig-Holstein	132,132	19.5	131,725	25.2	263,857	21.9
G0	Thüringen	64,409	10.9	107,888	21.9	172,297	15.9
	Germany Total	*3395,251*	*16.8*	*3735,230*	*24.0*	*7130,480*	*19.9*
	Denmark						
0		332,648	22.9	202,903	16.3	535,551	19.9
	Denmark Total	*332,648*	*22.9*	*202,903*	*16.3*	*535,551*	*19.9*
	Spain						
11	Galicia	57,080	10.1	28,721	8.0	85,800	9.3
12	Principado de Asturias	17,409	8.6	16,722	14.6	34,130	10.8
13	Cantabria	7,982	7.0	8,097	15.0	16,078	9.6
21	Pais Vasco	70,858	15.1	53,204	18.1	124,062	16.3
22	Communidad Foral de Navarra	15,294	11.9	11,525	15.7	26,819	13.2
23	La Rioja	7,371	11.8	(3,941)	(12.3)	11,312	12.0
24	Aragón	35,756	12.6	24,880	16.7	60,636	14.0
30	Communidad de Madrid	222,641	18.8	173,451	23.6	396,092	20.6
41	Castilla y León	56,464	10.3	38,701	13.8	95,165	11.5
42	Castilla-la Mancha	28,586	7.3	15,873	9.5	44,460	8.0
43	Extremadura	15,711	7.4	8,002	8.4	23,713	7.7
51	Cataluna	219,891	15.3	126,972	13.6	346,863	14.6
52	Communidad Valenciana	129,235	14.4	81,759	15.6	210,995	14.8

NUTS Code	Region	Male Number	Male % of empt	Female Number	Female % of empt	Both Number	Both % of empt
53	Islas Baleares	21,815	12.0	16,250	13.9	38,065	12.8
61	Andalucia	139,788	10.1	71,678	10.7	211,466	10.3
62	Región de Murcia	26,309	10.4	11,336	8.9	37,645	9.9
63	Ceuta y Melilla	(3,233)	(11.4)	.	.	(4,806)	(11.8)
70	Canarias	40,242	11.1	27,381	12.7	67,623	11.7
	Spain Total	*1115,665*	*12.8*	*720,066*	*14.5*	*1835,732*	*13.4*
	Finland						
13	Itä-Suomi	16,645	11.8	17,322	13.8	33,967	12.7
14	Väli-Suomi	21,657	13.8	20,593	15.3	42,250	14.5
15	Pohjois-Suomi	16,747	13.6	12,838	12.2	29,585	12.9
16	Uusimaa	104,405	29.3	95,790	27.3	200,195	28.3
17	Etelae-Suomi	61,224	14.3	68,564	17.9	129,787	16.0
20	Äland	.	.	.	.	.	.
	Finland Total	*221,500*	*18.3*	*215,772*	*19.5*	*437,271*	*18.9*
	France						
10	Île de France	593,508	22.9	620,478	27.0	1213,986	24.9
21	Champagne-Ardenne	24,676	9.2	34,717	16.6	59,393	12.4
22	Picardie	40,187	10.7	47,510	16.2	87,697	13.1
23	Haute-Normandie	48,647	11.9	50,604	16.4	99,251	13.9
24	Centre	49,832	9.7	67,103	16.1	116,935	12.6
25	Basse-Normandie	32,203	11.9	29,329	12.8	61,532	12.3
26	Borgogne	36,149	10.2	42,283	15.5	78,432	12.5
30	Nord-Pas-de-Calais	102,712	13.0	85,359	15.5	188,071	14.1
41	Lorraine	61,794	12.4	55,245	14.9	117,039	13.4
42	Alsace	57,357	14.0	50,471	14.9	107,828	14.4
43	Franche-Comté	28,374	11.1	24,571	12.7	52,945	11.8
51	Pays de la Loire	91,738	12.6	81,510	14.2	173,248	13.3
52	Bretagne	72,966	11.3	75,704	14.2	148,670	12.6
53	Poitou-Charentes	41,604	12.2	40,918	14.3	82,522	13.2
61	Aquitaine	85,894	13.6	94,494	18.2	180,388	15.6
62	Midi-Pyrénées	72,936	14.1	70,635	16.3	143,571	15.1
63	Limousin	14,084	10.7	18,535	15.8	32,619	13.1
71	Rhône-Alpes	187,964	15.1	171,191	17.3	359,155	16.1
72	Auvergne	32,208	12.0	31,082	15.0	63,290	13.3
81	Languedoc-Roussillon	50,217	12.9	50,602	16.7	100,819	14.6
82	Provence-Alpes-Côte d'Azur	111,794	13.2	117,029	17.5	228,823	15.1
83	Corse	(4,063)	(9.1)	(4,093)	(14.8)	(8,156)	(11.3)
	France Total	*1840,907*	*14.7*	*1863,463*	*18.4*	*3704,370*	*16.3*
	Greece						
11	Anatoliki Makedonia, Thraki	8,799	7.1	5,258	6.3	14,058	6.8
12	Kentriki Makedonia	34,614	8.2	30,897	12.8	65,512	9.8
13	Dytiki Makedonia	.	.	.	.	4,724	5.4

NUTS Code	Region	Male		Female		Both	
		Number	% of empt	Number	% of empt	Number	% of empt
14	Thessalia	8,240	5.1	7,491	8.6	15,730	6.3
21	Ipeiros	(3,610)	(5.9)	(3,142)	(8.5)	6,752	6.9
22	Ionia Nisia	.	.	(2,510)	(9.7)	4,537	6.5
23	Dytiki Ellada	7,639	5.6	6,727	8.6	14,367	6.7
24	Sterea Ellada	6,209	5.6	(3,978)	(7.2)	10,187	6.1
25	Peloponnisos	6,636	5.4	5,162	6.9	11,798	6.0
30	Attiki	114,567	12.4	113,695	19.4	228,262	15.1
41	Voreio Aigaio	.	.	.	.	(2,966)	(5.6)
42	Notio Aigaio	5,444	8.3	(4,188)	(11.4)	9,631	9.4
43	Kriti	8,556	6.8	9,174	10.3	17,730	8.2
	Greece Total	*210,751*	*8.8*	*195,503*	*13.5*	*406,254*	*10.6*
	Italy						
11	Piemonte	167,518	16.3	140,617	21.1	308,135	18.2
12	Valle d'aosta	(4,133)	(13.9)	(3,971)	(18.7)	8,104	15.9
13	Liguria	64,882	18,6	43,599	18.7	108,480	18.6
20	Lombardia	454,640	19.7	375,813	25.5	830,453	22.0
31	Trentino-Alto Adige	39,579	16.8	29,385	18.8	68,964	17.6
32	Veneto	191,763	16.8	140,716	19.9	332,478	18.0
33	Friuli-Venezia Giulia	47,175	16.9	35,648	19.2	82,823	17.8
40	Emila-Romagna	180,843	18.5	158,790	22.4	339,633	20.1
51	Toscana	154,416	19.2	107,596	20.2	262,012	19.6
52	Umbria	30,448	16.1	21,339	17.6	51,787	16.7
53	Marche	56,153	16.5	44,486	19.4	100,639	17.7
60	Lazio	212,715	18.2	153,880	22.8	366,595	19.9
71	Abruzzo	35,041	12.3	24,409	16.8	59,450	13.8
72	Molise	(6,550)	(9.6)	(3,907)	(11.0)	10,456	10.1
80	Campania	144,252	13.2	54,670	12.2	198,922	12.9
91	Puglia	95,019	11.4	37,467	11.6	132,487	11.4
92	Basilicata	10,818	9.4	(6,272)	(10.8)	17,090	9.8
93	Calabria	39,405	10.8	17,263	11.2	56,668	10.9
A0	Sicilia	104,997	11.2	54,083	15.0	159,080	12.2
B0	Sardegna	32,948	9.7	21,742	13.1	54,691	10.8
	Italy Total	*2073,294*	*16.1*	*1475,653*	*19.9*	*3548,947*	*17.5*
	Luxembourg						
0		22,082	20.6	13,382	19.5	35,463	20.2
	Luxembourg Total	*22,082*	*20.6*	*13,382*	*19.5*	*35,463*	*20.2*
	Netherlands						
11	Groningen	30,024	20.2	20,432	19.4	50,456	19.9
12	Friesland	25,880	15.3	22,992	19.2	48,872	16.9
13	Drenthe	20,503	17.7	13,956	15.9	34,459	16.9
21	Overijssel	53,468	18.1	41,101	19.9	94,568	18.8
22	Gelderland	110,661	21.2	90,974	23.4	201,635	22.1

NUTS Code	Region	Male		Female		Both	
		Number	% of empt	Number	% of empt	Number	% of empt
23	Flevoland	22,383	25.5	16,820	26.8	39,203	26.1
31	Utrecht	83,895	26.8	61,819	25.7	145,714	26.3
32	Noord-Holland	167,746	24.8	145,202	26.5	312,948	25.6
33	Zuid-Holland	210,093	22.8	170,184	24.8	380,277	23.6
34	Zeeland	14,486	14.8	10,418	15.6	24,904	15.1
41	Noord-Brabant	131,877	19.7	99,430	20.7	231,307	20.1
42	Limburg (NL)	53,164	16.9	40,677	18.2	93,841	17.5
	Netherlands Total	*924,179*	*21.3*	*734,005*	*22.8*	*1658,184*	*22.0*
	Portugal						
11	Norte	100,364	10.9	84,374	11.4	184,737	11.1
12	Centro (P)	50,182	11.6	44,537	11.6	94,719	11.6
13	Lisboa e Vale do Tejo	121,071	14.8	152,030	21.6	273,102	17.9
14	Alentejo	(7,932)	(6.7)	(8,826)	(10.5)	16,758	8.3
15	Algarve	(8,273)	(9.2)	(13,257)	(19.1)	21,530	13.5
20	Açores	.	.	.	.	(10,803)	(11.6)
30	Maderia	.	.	.	.	(10,973)	(10.0)
	Portugal Total	*298,415*	*11.9*	*314,208*	*15.2*	*612,623*	*13.4*
	Sweden						
1	Stockholm	125,910	31.0	124,628	29.3	250,538	30.2
2	Östra Mellansverige	70,762	19.3	52,824	16.5	123,586	18.0
4	Sydsverige	61,187	21.0	48,315	18.5	109,503	19.8
6	Norra Mellansverige	34,125	17.5	22,516	12.4	56,641	15.0
7	Mellersta Norrland	10,689	12.1	17,977	22.3	28,665	17.0
8	Övre Norrland	19,875	18.9	12,797	12.1	32,672	15.5
9	Smaaland med Oeama	36,845	18.1	21,892	12.9	58,737	15.7
0A	Västsverige	81,145	19.2	74,433	19.9	155,578	19.5
	Sweden Total	*440,538*	*21.2*	*375,381*	*19.5*	*815,920*	*20.4*
	UK						
C1	Tees Valley & Durham	37,436	14.3	42,308	20.2	79,744	16.9
C2	Northumberland, Tyne & Wear	55,524	17.0	50,032	19.8	105,556	18.2
D1	Cumbria	.	.	17,193	16.9	26,492	12.2
D2	Cheshire	52,922	21.0	54,950	26.4	107,871	23.4
D3	Greater Manchester	125,521	20.5	121,458	23.9	246,979	22.1
D4	Lancashire	51,822	15.3	56,931	21.2	108,753	17.9
D5	Merseyside	50,583	18.1	53,669	22.9	104,252	20.3
E1	East Riding & North Lincolnshire	31,495	15.2	36,562	22.1	68,056	18.3
E2	North Yorkshire	36,557	17.9	31,001	19.0	67,558	18.4
E3	South Yorkshire	52,755	18.2	48,058	20.0	100,813	19.0
E4	West Yorkshire	112,233	21.3	108,655	25.3	220,889	23.1
F1	Derbyshire, Nottinghamshire	88,708	17.6	87,924	21.3	176,631	19.3
F2	Leicestershire, Northamptonshire	93,638	21.9	80,551	24.2	174,189	22.9
F3	Lincolnshire	19,246	12.2	22,106	17.4	41,351	14.5

		Male		Female		Both	
NUTS Code	**Region**	**Number**	**% of empt**	**Number**	**% of empt**	**Number**	**% of empt**
G1	Herefordshire, Worcestershire & Warwickshire	72,996	21.5	59,356	22.3	132,352	21.8
G2	Shropshire, Staffordshire	71,259	18.5	73,803	24.0	145,062	21.0
G3	West Midlands	121,462	19.4	97,278	20.1	218,740	19.7
H1	East Anglia	113,684	20.1	99,834	22.3	213,518	21.1
H2	Bedfordshire, Hertfordshire	124,112	27.4	102,254	29.4	226,367	28.3
H3	Essex	110,132	26.0	77,307	23.9	187,439	25.1
I1	Inner London	224,858	35.8	163,191	31.9	388,049	34.1
I2	Outer London	319,148	28.9	270,647	30.0	589,794	29.4
J1	Berkshire, Bucks, Oxfordshire	183,780	30.8	143,024	29.5	326,804	30.3
J2	Surrey, East-West Sussex	179,216	27.8	151,658	28.9	330,874	28.3
J3	Hampshire, Isle of Wight	106,532	22.9	94,491	25.3	201,023	24.0
J4	Kent	82,352	21.1	80,699	25.6	163,051	23.1
K1	Avon, Gloucestershire, Wiltshire & North Somerset	135,640	23.5	121,866	26.3	257,507	24.8
K2	Dorset, Somerset	56,730	19.3	55,872	24.1	112,602	21.4
K3	Cornwall & Isles of Scilly	18,908	15.8	15,680	15.7	34,588	15.8
K4	Devon	35,130	13.4	46,753	20.9	81,882	16.9
L1	West Wales & the Valleys	52,717	13.1	65,685	19.9	118,403	16.2
L2	East Wales	42,227	17.5	42,734	20.9	84,961	19.0
M1	North Eastern Scotland	17,794	14.6	19,154	20.0	36,948	17.0
M2	Eastern Scotland	92,218	19.5	98,786	23.9	191,005	21.6
M3	South Western Scotland	91,577	17.7	97,008	21.5	188,585	19.5
M4	Highlands, Islands	16,262	14.9	17,384	19.9	33,646	17.1
N0	Northern Ireland	34,061	9.2	38,946	13.2	73,007	11.0
	UK Total	*3120,537*	*21.4*	*2844,806*	*24.0*	*5965,343*	*22.6*

Notes: ( ) data may be unreliable; . numbers too small to be reliable; UK data apply to 1998 rather than 1999

Source: IES and a special analysis of the Community Labour Force Survey

Table A5.: Numbers of potential mobile teleworkers and potential mobile teleworkers as a percentage of total employment by NUTS level II regions, 1999

NUTS code		Male		Female		Both	
		Numbers	% of empt	Numbers	% of empt	Numbers	% of empt
	Austria						
11	Burgenland	5,065	7.1	2,442	4.7	7,507	6.1
12	Niederösterreich	38,832	10.0	16,999	5.7	55,832	8.1
13	Wien	54,072	13.4	36,542	10.5	90,615	12.1
21	Kärnten	10,192	7.5	5,974	5.8	16,166	6.7
22	Steiermark	25,786	8.7	11,924	5.2	37,710	7.2
31	Oberösterreich	36,102	10.4	14,067	5.3	50,169	8.2
32	Salzburg	12,821	9.7	5,225	4.7	18,046	7.4
33	Tirol	17,474	10.1	8,756	6.8	26,230	8.7
34	Vorarlberg	10,825	11.6	4,046	6.3	14,871	9.4
	Austria Total	*211,169*	*10.3*	*105,976*	*6.6*	*317,146*	*8.7*
	Belgium						
10	Rég. Bruxelles Cap.	25,484	13.7	15,698	10.6	41,182	12.3
20	Antwerpen	47,570	12.6	17,740	6.6	65,310	10.1
22	Limburg (B)	17,639	9.3	4,949	4.0	22,589	7.2
23	Oost-Vlaanderen	33,413	10.4	12,275	5.1	45,688	8.1
24	Vlaams Brabant	41,356	17.2	14,402	7.1	55,758	12.6
25	West-Vlaanderen	23,232	8.9	9,248	4.5	32,480	6.9
31	Brabant Wallon	13,617	17.6	5,004	8.4	18,621	13.6
32	Hainaut	12,793	5.0	(4,103)	(2.5)	16,895	4.0
33	Liège	17,787	8.0	5,204	3.4	22,991	6.2
34	Luxembourg (B)	(2,735)	(5.0)	.	.	(3,612)	(3.9)
35	Namur	8,445	8.9	.	.	10,690	6.5
	Belgium Total	*244,071*	*10.7*	*91,746*	*5.5*	*335,817*	*8.5*
	Germany						
11	Stuttgart	114,261	11.1	99,676	12.5	213,938	11.7
12	Karlsruhe	72,497	10.9	61,110	12.0	133,607	11.4
13	Freiburg	55,855	10.5	47,806	11.5	103,661	10.9
14	Tübingen	46,208	10.3	42,755	12.1	88,963	11.1
21	Oberbayem	133,268	12.3	107,062	12.0	240,330	12.1
22	Niederbayem	27,975	8.9	20,108	8.3	48,083	8.7
23	Oberplatz	26,072	9.3	18,933	8.9	45,005	9.1
24	Oberfranken	24,867	8.9	25,727	11.3	50,594	10.0
25	Mittlefranken	48,408	11.3	37,657	11.4	86,065	11.4
26	Unterfranken	32,222	9.4	28,407	11.2	60,629	10.2
27	Schwaben	56,974	12.4	37,898	10.7	94,872	11.7
31	Berlin-West, Stadt	53,005	11.6	46,185	11.6	99,190	11.6
32	Berlin-Ost, Stadt	28,419	9.1	33,743	11.9	62,162	10.4
40	Brandenburg	42,881	6.9	43,154	8.3	86,035	7.5
50	Bremen	16,269	10.8	15,618	12.9	31,887	11.7

NUTS code		Male		Female		Both	
		Numbers	% of empt	Numbers	% of empt	Numbers	% of empt
60	Hamburg	65,093	15.4	55,850	15.6	120,943	15.5
71	Darmstadt	106,106	11.2	90,846	12.3	196,952	11.7
72	Gießen	25,750	10.2	20,656	11.0	46,406	10.5
73	Kassel	27,921	9.2	23,231	10.1	51,152	9.6
80	Mecklenburg-Vorpommem	28,707	6.9	31,593	9.4	60,300	8.0
91	Braunschweig	33,696	8.4	30,980	10.4	64,677	9.3
92	Hannover	61,431	11.9	43,045	10.9	104,476	11.5
93	Lüneburg	47,047	11.5	37,308	12.4	84,355	11.9
94	Wesser-Ems	57,328	9.7	47,270	11.0	104,598	10.3
A1	Düsseldorf	141,648	11.2	103,223	11.3	244,871	11.3
A2	Köln	115,049	10.9	84,685	11.2	199,734	11.0
A3	Münster	66,138	10.7	56,640	12.8	122,778	11.6
A4	Detmold	54,636	10.8	38,942	10.4	93,578	10.7
A5	Amsberg	85,697	9.5	80,647	12.8	166,343	10.8
B1	Koblenz	36,449	9.9	37,168	13.5	73,617	11.4
B2	Trier	11,020	8.7	8,111	9.2	19,131	8.9
B3	Rheinhessen-Pfalz	52,893	10.5	40,709	10.7	93,602	10.6
C0	Saarland	23,888	9.5	18,849	10.3	42,737	9.9
D0	Sachsen	87,332	8.4	99,781	11.4	187,112	9.8
E1	Dessau	8,539	6.9	8,047	8.0	16,587	7.4
E2	Halle	14,680	7.8	11,973	7.8	26,653	7.8
E3	Magdeburg	14,163	5.1	23,192	10.3	37,355	7.4
F0	Schleswig-Holstein	80,593	11.9	70,204	13.4	150,797	12.5
G0	Thüringen	44,929	7.6	43,596	8.8	88,524	8.2
	Germany Total	*2,069,914*	*10.3*	*1,772,383*	*11.4*	*3,842,297*	*10.7*
	Denmark						
0		219,516	15.1	89,969	7.2	309,485	11.5
	Denmark Total	*219,516*	*15.1*	*89,969*	*7.2*	*309,485*	*11.5*
	Spain						
11	Galicia	30,533	5.4	10,850	3.0	41,382	4.5
12	Principado de Asturias	8,130	4.0	(4,441)	(3.9)	12,570	4.0
13	Cantabria	5,018	4.4	.	.	7,052	4.2
21	Pais Vasco	44,285	9.5	15,334	5.2	59,619	7.8
22	Communidad Foral de Navarra	7,785	6.0	(2,766)	(3.8)	10,551	5.2
23	La Rioja	(4,363)	(7.0)	.	.	5,293	5.6
24	Aragón	16,845	5.9	(4,426)	(3.0)	21,271	4.9
30	Communidad de Madrid	112,614	9.5	40,413	5.5	153,027	8.0
41	Castilla y León	27,119	4.9	10,404	3.7	37,523	4.5
42	Castilla-la Mancha	16,116	4.1	(4,696)	(2.8)	20,812	3.7
43	Extremadura	8,374	3.9	(3,126)	(3.3)	11,500	3.7
51	Cataluna	135,890	9.4	43,304	4.6	179,193	7.6

NUTS code		Male		Female		Both	
		Numbers	% of empt	Numbers	% of empt	Numbers	% of empt
52	Communidad Valenciana	79,798	8.9	27,597	5.3	107,395	7.6
53	Islas Baleares	12,027	6.6	(4,830)	(4.1)	16,858	5.6
61	Andalucia	73,861	5.3	18,485	2.8	92,346	4.5
62	Región de Murcia	14,931	5.9	(4,053)	(3.2)	18,984	5.0
63	Ceuta y Melilla	.	.	.	.	.	.
70	Canarias	21,859	6.1	9,939	4.6	31,798	5.5
	Spain Total	*621,048*	*7.1*	*207,932*	*4.2*	*828,979*	*6.1*
	Finland						
13	Itä-Suomi	12,841	9.1	8,021	6.4	20,862	7.8
14	Väli-Suomi	15,343	9.7	9,587	7.1	24,930	8.5
15	Pohjois-Suomi	12,097	9.8	6,818	6.5	18,915	8.3
16	Uusimaa	75,943	21.3	52,291	14.9	128,234	18.1
17	Etelae-Suomi	46,606	10.9	36,372	9.5	82,978	10.2
20	Äland	.	.	.	.	.	.
	Finland Total	*163,653*	*13.5*	*113,389*	*10.3*	*277,042*	*12.0*
	France						
10	Île de France	354,774	13.7	326,851	14.2	681,625	14.0
21	Champagne-Ardenne	18,384	6.9	18,148	8.7	36,532	7.6
22	Picardie	30,981	8.2	24,386	8.3	55,367	8.3
23	Haute-Normandie	33,980	8.3	28,274	9.2	62,254	8.7
24	Centre	31,438	6.1	37,074	8.9	68,512	7.4
25	Basse-Normandie	21,489	8.0	15,697	6.8	37,186	7.4
26	Borgogne	26,029	7.3	21,781	8.0	47,810	7.6
30	Nord-Pas-de-Calais	70,365	8.9	42,722	7.8	113,087	8.5
41	Lorraine	43,204	8.7	27,801	7.5	71,005	8.2
42	Alsace	34,410	8.4	22,813	6.7	57,223	7.6
43	Franche-Comté	19,611	7.7	13,961	7.2	33,572	7.5
51	Pays de la Loire	68,364	9.4	39,238	6.8	107,602	8.3
52	Bretagne	52,099	8.1	39,859	7.5	91,958	7.8
53	Poitou-Charentes	31,452	9.2	18,762	6.6	50,214	8.0
61	Aquitaine	61,645	9.7	50,072	9.6	111,717	9.7
62	Midi-Pyrénées	47,986	9.3	37,811	8.7	85,797	9.0
63	Limousin	11,704	8.9	10,094	8.6	21,798	8.7
71	Rhône-Alpes	121,869	9.8	93,577	9.4	215,446	9.6
72	Auvergne	22,000	8.2	16,867	8.1	38,867	8.2
81	Languedoc-Roussillon	35,690	9.2	28,981	9.5	64,671	9.3
82	Provence-Alpes-Côte d'Azur	79,958	9.4	61,025	9.1	140,983	9.3
83	Corse	(3,666)	(8.2)	.	.	(5,344)	(7.4)
	France Total	*1,221,098*	*9.8*	*977,472*	*9.6*	*2,198,570*	*9.7*
	Greece						
11	Anatoliki Makedonia, Thraki	4,829	3.9	(2,575)	(3.1)	7,404	3.6
12	Kentriki Makedonia	19,692	4.6	11,157	4.6	30,849	4.6

NUTS code		Male		Female		Both	
		Numbers	% of empt	Numbers	% of empt	Numbers	% of empt
13	Dytiki Makedonia	.	.	.	.	.	.
14	Thessalia	(3,446)	(2.1)	(3,446)	(4.0)	6,891	2.8
21	Ipeiros	.	.	.	.	(3,476)	(3.5)
22	Ionia Nisia	.	.	.	.	.	.
23	Dytiki Ellada	(3,991)	(2.9)	(2,851)	(3.6)	6,841	3.2
24	Sterea Ellada	(2,717)	(2.4)	.	.	(4,269)	(2.6)
25	Peloponnisos	.	.	.	.	4,740	2.4
30	Attiki	64,077	7.0	42,124	7.2	106,201	7.0
41	Voreio Aigaio	.	.	.	.	.	.
42	Notio Aigaio	.	.	.	.	.	.
43	Kriti	(4,123)	(3.3)	(3,299)	(3.7)	7,422	3.5
	Greece Total	*111,885*	*4.7*	*73,426*	*5.1*	*185,311*	*4.8*
	Italy						
11	Piemonte	99,696	9.7	38,351	5.8	138,047	8.1
12	Valle d'aosta	.	.	.	.	.	.
13	Liguria	35,395	10.1	13,994	6.0	49,389	8.5
20	Lombardia	267,740	11.6	121,207	8.2	388,946	10.3
31	Trentino-Alto Adige	22,360	9.5	(5,631)	(3.6)	27,990	7.1
32	Veneto	115,183	10.1	40,640	5.7	155,822	8.4
33	Friuli-Venezia Giulia	25,904	9.3	8,013	4.3	33,918	7.3
40	Emila-Romagna	115,770	11.9	48,388	6.8	164,159	9.7
51	Toscana	86,346	10.7	34,330	6.4	120,676	9.0
52	Umbria	16,321	8.7	(4,517)	(3.7)	20,838	6.7
53	Marche	33,665	9.9	8,228	3.6	41,892	7.3
60	Lazio	99,644	8.5	42,900	6.4	142,544	7.7
71	Abruzzo	19,050	6.7	7,997	5.5	27,046	6.3
72	Molise	.	.	.	.	(3,870)	3.7
80	Campania	64,829	5.9	9,527	2.1	74,356	4.8
91	Puglia	52,397	6.3	12,469	3.9	64,866	5.6
92	Basilicata	(5,300)	(4.6)	.	.	(6,980)	(4.0)
93	Calabria	17,724	4.8	.	.	21,896	4.2
A0	Sicilia	46,604	5.0	12,765	3.5	59,369	4.6
B0	Sardegna	16,401	4.8	(5,607)	(3.4)	22,008	4.3
	Italy Total	*1,145,222*	*8.9*	*422,544*	*5.7*	*1,567,765*	*7.7*
	Luxembourg						
0		10,254	9.6	3,627	5.3	13,881	7.9
	Luxembourg Total	*10,254*	*9.6*	*3,627*	*5.3*	*13,881*	*7.9*
	Netherlands						
11	Groningen	15,442	10.4	(6,462)	(6.1)	21,904	8.6
12	Friesland	14,384	8.5	(6,194)	(5.2)	20,579	7.1
13	Drenthe	12,168	10.5	(5,729)	(6.5)	17,897	8.8
21	Overijssel	33,013	11.2	14,832	7.2	47,846	9.5

NUTS code		Male		Female		Both	
		Numbers	% of empt	Numbers	% of empt	Numbers	% of empt
22	Gelderland	67,321	12.9	42,451	10.9	109,772	12.1
23	Flevoland	10,728	12.2	.	.	13,982	9.3
31	Utrecht	45,000	14.4	16,008	6.7	61,008	11.0
32	Noord-Holland	91,003	13.4	61,361	11.2	152,364	12.4
33	Zuid-Holland	115,323	12.5	68,752	10.0	184,075	11.4
34	Zeeland	8,204	8.4	.	.	11,682	7.1
41	Noord-Brabant	79,972	11.9	36,277	7.5	116,249	10.1
42	Limburg (NL)	30,314	9.7	12,027	5.4	42,341	7.9
	Netherlands Total	*522,873*	*12.1*	*276,825*	*8.6*	*799,699*	*10.6*
	Portugal						
11	Norte	53,709	5.8	24,465	3.3	78,174	4.7
12	Centro (P)	23,848	5.5	.	.	31,100	3.8
13	Lisboa e Vale do Tejo	45,155	5.5	25,093	3.6	70,248	4.6
14	Alentejo	.	.	.	.	.	.
15	Algarve	.	.	.	.	7,666	4.8
20	Açores	.	.	.	.	.	.
30	Maderia	.	.	.	.	.	.
	Portugal Total	*133,077*	*5.3*	*64,466*	*3.1*	*197,543*	*4.3*
	Sweden						
1	Stockholm	81,405	20.1	66,488	15.6	147,892	17.8
2	Östra Mellansverige	47,306	12.9	21,094	6.6	68,400	10.0
4	Sydsverige	47,992	16.4	24,460	9.3	72,452	13.1
6	Norra Mellansverige	23,504	12.1	.	.	32,401	8.6
7	Mellersta Norrland	.	.	.	.	15,811	9.4
8	Övre Norrland	14,220	13.5	.	.	18,937	9.0
9	Smaaland med Oeama	27,712	13.6	12,448	7.3	40,160	10.7
0A	Västsverige	62,185	14.7	39,542	10.6	101,727	12.8
	Sweden Total	*312,043*	*15.0*	*185,737*	*9.7*	*497,780*	*12.5*
	UK						
C1	Tees Valley & Durham	24,577	9.4	14,820	7.1	39,397	8.4
C2	Northumberland, Tyne & Wear	40,505	12.4	23,069	9.1	63,574	11.0
D1	Cumbria	.	.	.	.	12,308	5.7
D2	Cheshire	36,178	14.3	32,605	15.7	68,783	14.9
D3	Greater Manchester	89,910	14.7	55,131	10.9	145,041	13.0
D4	Lancashire	38,608	11.4	29,220	10.9	67,828	11.2
D5	Merseyside	32,579	11.6	24,435	10.4	57,014	11.1
E1	East Riding & North Lincolnshire	22,176	10.7	11,827	7.1	34,003	9.1
E2	North Yorkshire	25,175	12.3	14,588	8.9	39,762	10.8
E3	South Yorkshire	32,813	11.3	23,758	9.9	56,571	10.7
E4	West Yorkshire	81,600	15.5	48,317	11.2	129,917	13.6
F1	Derbyshire, Nottinghamshire	59,355	11.8	40,220	9.7	99,575	10.9

NUTS code		Male		Female		Both	
		Numbers	% of empt	Numbers	% of empt	Numbers	% of empt
F2	Leicestershire, Northamptonshire	71,184	16.7	37,612	11.3	108,796	14.3
F3	Lincolnshire	12,306	7.8	.	.	20,845	7.3
G1	Herefordshire, Worcestershire & Warwickshire	55,987	16.5	31,165	11.7	87,152	14.4
G2	Shropshire, Staffordshire	55,340	14.4	25,789	8.4	81,129	11.7
G3	West Midlands	87,914	14.1	40,094	8.3	128,008	11.6
H1	East Anglia	79,751	14.1	43,506	9.7	123,257	12.2
H2	Bedfordshire, Hertfordshire	88,244	19.5	48,281	13.9	136,526	17.1
H3	Essex	77,842	18.4	34,480	10.7	112,322	15.0
I1	Inner London	137,111	21.9	86,508	16.9	223,619	19.6
I2	Outer London	195,764	17.8	123,663	13.7	319,427	15.9
J1	Berkshire, Bucks, Oxfordshire	117,489	19.7	76,158	15.7	193,647	17.9
J2	Surrey, East-West Sussex	119,744	18.6	78,475	15.0	198,219	17.0
J3	Hampshire, Isle of Wight	74,357	16.0	42,873	11.5	117,230	14.0
J4	Kent	67,021	17.1	40,206	12.7	107,227	15.2
K1	Avon, Gloucestershire, Wiltshire & North Somerset	87,762	15.2	51,537	11.1	139,300	13.4
K2	Dorset, Somerset	38,408	13.0	23,548	10.1	61,955	11.8
K3	Cornwall & Isles of Scilly	13,741	11.5	.	.	19,096	8.7
K4	Devon	23,895	9.1	18,843	8.4	42,738	8.8
L1	West Wales & the Valleys	36,747	9.2	25,498	7.7	62,245	8.5
L2	East Wales	21,851	9.0	16,256	7.9	38,107	8.5
M1	North Eastern Scotland	13,803	11.3	.	.	22,092	10.1
M2	Eastern Scotland	61,223	12.9	41,445	10.0	102,668	11.6
M3	South Western Scotland	59,056	11.4	40,577	9.0	99,633	10.3
M4	Highlands, Islands	12,653	11.6	.	.	18,855	9.6
N0	Northern Ireland	16,130	4.3	.	.	25,623	3.8
	UK Total	*2,114,045*	*14.5*	*1,289,445*	*10.9*	*3,403,490*	*12.9*

Notes: ( ) data may be unreliable, . numbers too small to be reliable; UK data apply to 1998 rather than 1999

Source: IES and a special analysis of the Community Labour Force Survey

Table A6.: Numbers of potential call centre workers and potential call centre workers as a percentage of total employment by NUTS level II region, 1999

		Male		Female		Both	
NUTS code	**Region**	**Numbers**	**% of empt**	**Numbers**	**% of empt**	**Numbers**	**% of empt**
	Austria						
11	Burgenland	5,343	7.5	3,720	7.2	9,063	7.4
12	Niederösterreich	32,326	8.3	27,253	9.1	59,579	8.7
13	Wien	47,313	11.7	44,123	12.7	91,436	12.2
21	Kärnten	12,404	9.1	10,305	9.9	22,709	9.5
22	Steiermark	23,870	8.0	17,558	7.7	41,428	7.9
31	Oberösterreich	33,687	9.7	24,364	9.1	58,051	9.4
32	Salzburg	13,258	10.0	10,901	9.9	24,159	10.0
33	Tirol	16,369	9.5	12,186	9.5	28,555	9.5
34	Vorarlberg	11,445	12.2	6,367	10.0	17,812	11.3
	Austria Total	*196,014*	*9.6*	*156,776*	*9.8*	*352,790*	*9.7*
	Belgium						
10	Rég. Bruxelles Cap.	15,555	8.4	15,936	10.7	31,491	9.4
20	Antwerpen	17,007	4.5	9,328	3.5	26,335	4.1
22	Limburg (B)	5,644	3.0	5,028	4.0	10,672	3.4
23	Oost-Vlaanderen	23,321	7.2	23,564	9.7	46,885	8.3
24	Vlaams Brabant	18,694	7.8	29,558	14.7	48,252	10.9
25	West-Vlaanderen	16,188	6.2	16,213	7.9	32,401	6.9
31	Brabant Wallon	5,838	7.5	5,426	9.1	11,264	8.2
32	Hainaut	11,478	4.5	4,951	3.0	16,429	3.9
33	Liège	15,469	7.0	11,045	7.3	26,513	7.1
34	Luxembourg (B)	(2,584)	(4.7)	(3,077)	(7.9)	5,661	6.0
35	Namur	6,014	6.3	4,770	7.0	10,783	6.6
	Belgium Total	*137,791*	*6.0*	*128,895*	*7.7*	*266,686*	*6.7*
	Germany						
11	Stuttgart	107,483	10.4	141,446	17.8	248,929	13.6
12	Karlsruhe	69,578	10.5	84,810	16.7	154,387	13.2
13	Freiburg	56,445	10.6	67,758	16.3	124,203	13.1
14	Tübingen	44,796	9.9	52,855	15.0	97,651	12.2
21	Oberbayem	133,250	12.3	171,056	19.1	304,307	15.4
22	Niederbayem	35,009	11.2	33,818	14.0	68,827	12.4
23	Oberplatz	24,035	8.5	23,943	11.2	47,978	9.7
24	Oberfranken	31,849	11.4	34,270	15.1	66,120	13.1
25	Mittlefranken	51,957	12.1	52,837	16.1	104,794	13.8
26	Unterfranken	34,236	9.9	41,446	16.4	75,682	12.7
27	Schwaben	49,036	10.7	59,930	17.0	108,966	13.4
31	Berlin-West, Stadt	45,866	10.1	56,510	14.3	102,377	12.0
32	Berlin-Ost, Stadt	24,416	7.8	55,390	19.5	79,806	13.4
40	Brandenburg	32,450	5.3	80,419	15.4	112,869	9.9
50	Bremen	15,666	10.4	17,880	14.8	33,545	12.4

		Male		Female		Both	
NUTS code	**Region**	**Numbers**	**% of empt**	**Numbers**	**% of empt**	**Numbers**	**% of empt**
60	Hamburg	57,451	13.6	72,869	20.3	130,320	16.7
71	Darmstadt	118,895	12.5	155,482	21.0	274,377	16.3
72	Gießen	26,367	10.4	25,226	13.4	51,594	11.7
73	Kassel	29,936	9.9	32,775	14.2	62,711	11.8
80	Mecklenburg-Vorpommem	29,063	7.0	57,004	16.9	86,067	11.4
91	Braunschweig	33,941	8.5	46,246	15.6	80,187	11.5
92	Hannover	67,857	13.2	72,188	18.3	140,045	15.4
93	Lüneburg	43,083	10.5	52,955	17.5	96,038	13.5
94	Wesser-Ems	62,950	10.7	61,280	14.3	124,230	12.2
A1	Düsseldorf	137,274	10.9	149,219	16.4	286,493	13.2
A2	Köln	112,944	10.7	122,918	16.2	235,863	13.0
A3	Münster	53,205	8.6	63,773	14.4	116,977	11.0
A4	Detmold	49,622	9.8	51,491	13.8	101,113	11.5
A5	Amsberg	88,562	9.8	98,518	15.6	187,081	12.2
B1	Koblenz	32,827	8.9	42,420	15.4	75,248	11.7
B2	Trier	13,429	10.6	10,734	12.2	24,163	11.3
B3	Rheinhessen-Pfalz	57,087	11.3	61,653	16.2	118,741	13.4
C0	Saarland	22,604	9.0	25,296	13.8	47,899	11.1
D0	Sachsen	68,168	6.5	162,226	18.5	230,394	12.0
E1	Dessau	6,872	5.5	16,640	16.5	23,512	10.5
E2	Halle	14,167	7.5	27,265	17.7	41,432	12.1
E3	Magdeburg	15,314	5.5	40,272	17.8	55,587	11.1
F0	Schleswig-Holstein	81,312	12.0	89,886	17.2	171,199	14.2
G0	Thüringen	39,720	6.7	77,884	15.8	117,603	10.8
	Germany Total	*2,018,723*	*10.0*	*2,590,592*	*16.6*	*4,609,315*	*12.9*
	Denmark						
0		173,368	12.0	149,502	12.0	322,870	12.0
	Denmark Total	*173,368*	*12.0*	*149,502*	*12.0*	*322,870*	*12.0*
	Spain						
11	Galicia	40,773	7.2	21,100	5.9	61,874	6.7
12	Principado de Asturias	11,903	5.9	13,704	12.0	25,607	8.1
13	Cantabria	5,443	4.8	7,045	13.0	12,488	7.4
21	Pais Vasco	46,863	10.0	42,051	14.3	88,914	11.7
22	Communidad Foral de Navarra	10,375	8.0	8,609	11.7	18,984	9.4
23	La Rioja	5,438	8.7	(3,352)	(10.4)	8,790	9.3
24	Aragón	25,630	9.0	21,019	14.1	46,649	10.8
30	Communidad de Madrid	126,129	10.6	134,571	18.3	260,701	13.6
41	Castilla y León	37,737	6.9	27,579	9.8	65,316	7.9
42	Castilla-la Mancha	18,778	4.8	12,782	7.6	31,561	5.7
43	Extremadura	12,447	5.8	5,494	5.8	17,941	5.8
51	Cataluna	139,782	9.7	97,451	10.4	237,233	10.0

NUTS code	Region	Male		Female		Both	
		Numbers	% of empt	Numbers	% of empt	Numbers	% of empt
52	Communidad Valenciana	92,952	10.4	65,510	12.5	158,462	11.2
53	Islas Baleares	13,373	7.4	12,916	11.0	26,289	8.8
61	Andalucia	97,521	7.0	56,116	8.4	153,637	7.5
62	Región de Murcia	19,465	7.7	8,091	6.3	27,556	7.2
63	Ceuta y Melilla	.	.	.	.	(3,015)	(7.4)
70	Canarias	24,839	6.9	18,646	8.6	43,485	7.5
	Spain Total	*731,121*	*8.4*	*557,381*	*11.3*	*1288,502*	*9.4*
	Finland						
13	Itä-Suomi	5,639	4.0	11,027	8.8	16,666	6.2
14	Väli-Suomi	7,303	4.6	14,081	10.5	21,384	7.3
15	Pohjois-Suomi	6,247	5.1	7,944	7.5	14,190	6.2
16	Uusimaa	27,176	7.6	59,190	16.9	86,366	12.2
17	Etelae-Suomi	23,310	5.5	45,691	11.9	69,001	8.5
20	Äland	.	.	.	.	.	.
	Finland Total	*70,165*	*5.8*	*138,453*	*12.5*	*208,618*	*9.0*
	France						
10	Île de France	242,579	9.4	346,262	15.1	588,841	12.1
21	Champagne-Ardenne	16,616	6.2	23,596	11.3	40,212	8.4
22	Picardie	26,994	7.2	34,110	11.6	61,104	9.1
23	Haute-Normandie	32,033	7.9	32,293	10.5	64,326	9.0
24	Centre	32,099	6.3	42,653	10.2	74,752	8.0
25	Basse-Normandie	19,220	7.1	19,556	8.5	38,776	7.8
26	Borgogne	21,988	6.2	29,460	10.8	51,448	8.2
30	Nord-Pas-de-Calais	61,145	7.8	57,430	10.4	118,575	8.9
41	Lorraine	44,013	8.8	36,709	9.9	80,722	9.3
42	Alsace	37,814	9.2	36,687	10.8	74,501	9.9
43	Franche-Comté	17,893	7.0	15,548	8.0	33,441	7.5
51	Pays de la Loire	53,258	7.3	55,211	9.6	108,469	8.3
52	Bretagne	44,388	6.9	41,811	7.8	86,199	7.3
53	Poitou-Charentes	25,863	7.6	28,688	10.0	54,551	8.7
61	Aquitaine	46,083	7.3	55,524	10.7	101,607	8.8
62	Midi-Pyrénées	35,855	7.0	37,589	8.7	73,444	7.7
63	Limousin	9,293	7.0	9,952	8.5	19,245	7.7
71	Rhône-Alpes	113,048	9.1	104,652	10.6	217,700	9.7
72	Auvergne	19,284	7.2	16,846	8.1	36,130	7.6
81	Languedoc-Roussillon	29,041	7.5	29,843	9.8	58,884	8.5
82	Provence-Alpes-Côte d'Azur	67,563	8.0	76,037	11.3	143,600	9.5
83	Corse	.	.	.	.	(5,114)	(7.1)
	France Total	*998,759*	*8.0*	*1132,882*	*11.2*	*2131,641*	*9.4*
	Greece						
11	Anatoliki Makedonia, Thraki	4,614	3.7	(3,327)	(4.0)	7,941	3.8
12	Kentriki Makedonia	19,677	4.6	20,860	8.6	40,537	6.1

		Male		Female		Both	
NUTS code	**Region**	**Numbers**	**% of empt**	**Numbers**	**% of empt**	**Numbers**	**% of empt**
13	Dytiki Makedonia	.	.	.	.	.	.
14	Thessalia	4,944	3.0	(4,494)	(5.2)	9,438	3.8
21	Ipeiros	.	.	.	.	(3,610)	(3.7)
22	Ionia Nisia	.	.	.	.	(3,089)	(4.4)
23	Dytiki Ellada	(4,219)	(3.1)	(4,219)	(5.4)	8,437	3.9
24	Sterea Ellada	(4,463)	(4.0)	(2,911)	(5.3)	7,374	4.4
25	Peloponnisos	(4,319)	(3.5)	(3,055)	(4.1)	7,374	3.7
30	Attiki	70,765	7.7	76,874	13.1	147,638	9.8
41	Voreio Aigaio	.	.	.	.	.	.
42	Notio Aigaio	(4,188)	(6.4)	(3,769)	(10.2)	7,956	7.7
43	Kriti	5,669	4.5	6,494	7.3	12,163	5.7
	Greece Total	*127,771*	*5.3*	*131,927*	*9.1*	*259,698*	*6.8*
	Italy						
11	Piemonte	140,732	13.7	127,998	19.2	268,730	15.9
12	Valle d'aosta	.	.	.	.	(6,614)	(13.0)
13	Liguria	56,049	16.0	36,761	15.7	92,810	15.9
20	Lombardia	388,766	16.9	332,354	22.6	721,121	19.1
31	Trentino-Alto Adige	33,540	14.2	26,856	17.2	60,397	15.4
32	Veneto	163,260	14.3	126,110	17.8	289,370	15.6
33	Friuli-Venezia Giulia	38,578	13.8	31,619	17.0	70,196	15.1
40	Emila-Romagna	153,882	15.8	146,762	20.7	300,644	17.8
51	Toscana	128,219	16.0	92,380	17.3	220,599	16.5
52	Umbria	27,214	14.4	18,470	15.2	45,684	14.7
53	Marche	46,559	13.7	40,115	17.5	86,674	15.2
60	Lazio	178,739	15.3	129,532	19.2	308,271	16.7
71	Abruzzo	31,401	11.0	21,431	14.8	52,832	12.3
72	Molise	(5,550)	(8.2)	.	.	8,970	8.7
80	Campania	124,049	11.4	46,145	10.3	170,195	11.0
91	Puglia	83,154	10.0	30,843	9.6	113,997	9.8
92	Basilicata	8,903	7.7	(5,326)	(9.2)	14,230	8.2
93	Calabria	33,917	9.3	15,737	10.2	49,654	9.5
A0	Sicilia	91,936	9.8	46,636	12.9	138,572	10.6
B0	Sardegna	27,621	8.1	18,975	11.4	46,596	9.2
	Italy Total	*1765,197*	*13.7*	*1300,957*	*17.6*	*3066,154*	*15.1*
	Luxembourg						
0		16,769	15.7	11,925	17.4	28,695	16.4
	Luxembourg Total	*16,769*	*15.7*	*11,925*	*17.4*	*28,695*	*16.4*
	Netherlands						
11	Groningen	18,976	12.8	14,187	13.4	33,163	13.1
12	Friesland	16,240	9.6	17,377	14.5	33,617	11.6
13	Drenthe	11,953	10.3	(8,885)	(10.1)	20,838	10.2
21	Overijssel	34,862	11.8	30,890	14.9	65,752	13.1

NUTS code	Region	Male		Female		Both	
		Numbers	% of empt	Numbers	% of empt	Numbers	% of empt
22	Gelderland	60,866	11.7	61,927	15.9	122,794	13.5
23	Flevoland	12,637	14.4	14,940	23.8	27,577	18.3
31	Utrecht	46,918	15.0	50,630	21.0	97,549	17.6
32	Noord-Holland	93,523	13.8	106,553	19.5	200,076	16.3
33	Zuid-Holland	128,122	13.9	130,116	18.9	258,237	16.0
34	Zeeland	10,927	11.2	(8,801)	(13.2)	19,729	12.0
41	Noord-Brabant	74,360	11.1	81,939	17.0	156,299	13.6
42	Limburg (NL)	33,230	10.6	33,632	15.0	66,862	12.4
	Netherlands Total	*542,615*	*12.5*	*559,877*	*17.4*	*1102,491*	*14.6*
	Portugal						
11	Norte	76,905	8.3	71,841	9.7	148,746	8.9
12	Centro (P)	41,516	9.6	41,438	10.8	82,955	10.2
13	Lisboa e Vale do Tejo	86,518	10.6	134,645	19.1	221,163	14.5
14	Alentejo					13,885	6.9
15	Algarve			(9,898)	(14.3)	15,915	10.0
20	Açores					(9,906)	(10.6)
30	Maderia					(9,925)	(9.0)
	Portugal Total	*226,599*	*9.1*	*275,895*	*13.4*	*502,494*	*11.0*
	Sweden						
1	Stockholm	70,189	17.3	82,657	19.5	152,846	18.4
2	Östra Mellansverige	35,260	9.6	35,245	11.0	70,505	10.3
4	Sydsverige	38,294	13.1	32,164	12.3	70,458	12.7
6	Norra Mellansverige	20,060	10.3	18,662	10.2	38,722	10.3
7	Mellersta Norrland	.	.	12,934	16.0	17,107	10.1
8	Övre Norrland	11,637	11.1	9,041	8.6	20,678	9.8
9	Smaaland med Oeama	21,828	10.7	14,203	8.4	36,031	9.6
0A	Västsverige	48,082	11.4	50,150	13.4	98,232	12.3
	Sweden Total	*249,523*	*12.0*	*255,057*	*13.3*	*504,580*	*12.6*
	UK						
C1	Tees Valley & Durham	19,945	7.6	30,646	14.6	50,591	10.7
C2	Northumberland, Tyne & Wear	26,334	8.1	39,576	15.7	65,910	11.4
D1	Cumbria	.	.	11,508	11.3	16,442	7.6
D2	Cheshire	20,036	7.9	34,366	16.5	54,402	11.8
D3	Greater Manchester	50,515	8.3	89,768	17.7	140,283	12.5
D4	Lancashire	23,807	7.0	37,936	14.1	61,743	10.2
D5	Merseyside	22,038	7.9	39,588	16.9	61,626	12.0
E1	East Riding & North Lincolnshire	14,433	7.0	25,659	15.5	40,092	10.8
E2	North Yorkshire	12,204	6.0	15,750	9.6	27,954	7.6
E3	South Yorkshire	22,752	7.8	36,474	15.2	59,226	11.2
E4	West Yorkshire	55,101	10.5	87,636	20.4	142,737	14.9
F1	Derbyshire, Nottinghamshire	38,106	7.6	56,892	13.8	94,998	10.4

		Male		Female		Both	
NUTS code	**Region**	**Numbers**	**% of empt**	**Numbers**	**% of empt**	**Numbers**	**% of empt**
F2	Leicestershire, Northamptonshire	43,273	10.1	54,775	16.5	98,048	12.9
F3	Lincolnshire	.	.4.3	15,592	12.3	22,449	7.9
G1	Herefordshire, Worcestershire & Warwickshire	26,209	7.7	44,812	16.8	71,021	11.7
G2	Shropshire, Staffordshire	27,129	7.1	56,273	18.3	83,402	12.1
G3	West Midlands	52,319	8.4	79,562	16.5	131,880	11.9
H1	East Anglia	50,248	8.9	87,204	19.5	137,452	13.6
H2	Bedfordshire, Hertfordshire	54,738	12.1	80,249	23.1	134,988	16.9
H3	Essex	51,333	12.1	68,761	21.3	120,094	16.1
I1	Inner London	72,071	11.5	80,489	15.7	152,560	13.4
I2	Outer London	130,406	11.8	207,588	23.0	337,994	16.9
J1	Berkshire, Bucks, Oxfordshire	54,636	9.2	89,699	18.5	144,334	13.4
J2	Surrey, East-West Sussex	55,837	8.7	104,662	20.0	160,500	13.7
J3	Hampshire, Isle of Wight	45,175	9.7	69,812	18.7	114,987	13.7
J4	Kent	32,383	8.3	55,867	17.7	88,249	12.5
K1	Avon, Gloucestershire, Wiltshire & North Somerset	59,927	10.4	95,515	20.6	155,443	14.9
K2	Dorset, Somerset	24,221	8.2	35,161	15.1	59,382	11.3
K3	Cornwall & Isles of Scilly	.	.	11,178	11.2	19,425	8.9
K4	Devon	12,794	4.9	35,584	15.9	48,377	10.0
L1	West Wales & the Valleys	21,041	5.2	48,016	14.5	69,056	9.4
L2	East Wales	14,236	5.9	26,045	12.7	40,282	9.0
M1	North Eastern Scotland	.	.	11,257	11.7	19,302	8.9
M2	Eastern Scotland	37,806	8.0	68,103	16.5	105,910	12.0
M3	South Western Scotland	38,894	7.5	66,164	14.7	105,058	10.9
M4	Highlands, Islands	.	.	13,909	15.9	22,299	11.4
N0	Northern Ireland	17,038	4.6	39,575	13.4	56,613	8.5
	UK Total	*1,263,458*	*8.7*	*2,051,650*	*17.3*	*3,315,108*	*12.5*

Notes: ( ) data may be unreliable, . numbers too small to be reliable; UK data apply to 1998 rather than 1999

Source: IES and a special analysis of the Community Labour Force Survey

Table A7: IT sector employment — numbers and as a percentage of total employment by region, 1999

NUTS code	Country/Region	NACE 73 Research & Development		NACE 74 Other business activities	
		(1,000's)	% of total	(1,000's)	% of total
	Austria				
11	Burgenland	.	.	4.5	3.7
12	Niederösterreich	.	.	24.3	3.5
13	Wien	.	.	57.9	7.7
21	Kärnten	.	.	8.5	3.5
22	Steiermark	.	.	17.5	3.3
31	Oberösterreich	.	.	25.8	4.2
32	Salzburg	.	.	10.7	4.4
33	Tirol	.	.	13.4	4.5
34	Vorarlberg	.	.	6.6	4.2
	All of Austria	*5.1*	*0.1*	*169.3*	*4.6*
	Belgium				
10	Rég. Bruxelles Cap.	.	.	37.7	11.3
20	Antwerpen	.	.	48.4	7.5
22	Limburg (b)	.	.	14.3	4.6
23	Oost-Vlaanderen	.	.	31.1	5.5
24	Vlaams Brabant	.	.	24.9	5.6
25	West-Vlaanderen	.	.	20.2	4.3
31	Brabant Wallon	.	.	9.5	6.9
32	Hainaut	.	.	11.6	2.8
33	Liège	.	.	20.0	5.4
34	Luxembourg (b)	.	.	(3.0)	(3.2)
35	Namur	.	.	5.4	3.3
	All of Belgium	*7.6*	*0.2*	*226.2*	*5.7*
	Germany				
11	Stuttgart	.	.	89.0	4.9
12	Karlsruhe	13.9	.1.2	58.7	5.0
13	Freiburg	.	.	40.8	4.3
14	Tübingen	.	.	35.2	4.4
21	Oberbayem	.	.	144.6	7.3
22	Niederbayem	.	.	19.0	3.4
23	Oberplatz	.	.	19.8	4.0
24	Oberfranken	.	.	23.0	4.5
25	Mittlefranken	.	.	43.8	5.8
26	Unterfranken	.	.	26.7	4.5
27	Schwaben	.	.	37.4	4.6
31	Berlin-West, Stadt	.	.	71.7	8.4
32	Berlin-Ost, Stadt	.	.	56.9	9.6
40	Brandenburg	.	.	56.1	4.9
50	Bremen	.	.	18.5	6.8

NUTS code	Country/Region	NACE 73 Research & Development (1,000's)	NACE 73 Research & Development % of total	NACE 74 Other business activities (1,000's)	NACE 74 Other business activities % of total
60	Hamburg	.	.	72.6	9.3
71	Darmstadt	.	.	131.8	7.8
72	Gießen	.	.	20.4	4.6
73	Kassel	.	.	19.3	3.6
80	Mecklenburg-Vorpommem	.	.	22.9	3.0
91	Braunschweig	.	.	34.7	5.0
92	Hannover	.	.	48.3	5.3
93	Lüneburg	.	.	37.9	5.3
94	Wesser-Ems	.	.	37.8	3.7
A1	Düsseldorf	.	.	131.9	6.1
A2	Köln	10.4	0.6.	115.2	6.4
A3	Münster	.	.	48.5	4.6
A4	Detmold	.	.	40.4	4.6
A5	Amsberg	.	.	75.6	4.9
B1	Koblenz	.	.	32.1	5.0
B2	Trier	.	.	9.3	4.4
B3	Rheinhessen-Pfalz	.	.	42.9	4.8
C0	Saarland	.	.	20.7	4.8
D0	Sachsen	8.1	0.4.	120.2	6.3
E1	Dessau	.	.	.	.
E2	Halle	.	.	15.1	4.4
E3	Magdeburg	.	.	17.3	3.4
F0	Schleswig-Holstein	.	.	61.6	5.1
G0	Thüringen	.	.	31.5	2.9
	All of Germany	*120.2*	*0.3*	*1936.5*	*5.4*
	Denmark				
0	Denmark	13.5	0.5	146.6	5.4
	All of Denmark	*13.5*	*0.5*	*146.6*	*5.4*
	Spain				
11	Galicia	.	.	31.7	3.4
12	Principado de Asturias	.	.	13.8	4.4
13	Cantabria	.	.	6.7	4.0
21	Pais Vasco	.	.	47.6	6.3
22	Communidad Foral de Navarra	.	.	9.9	4.9
23	La Rioja	.	.	(3.3)	(3.5)
24	Aragón	.	.	22.6	5.2
30	Communidad de Madrid	(4.6)	(0.2)	170.1	8.9
41	Castilla y León	.	.	37.9	4.6
42	Castilla-la Mancha	.	.	16.3	2.9
43	Extremadura	.	.	11.4	3.7
51	Cataluna	.	.	147.0	6.2
52	Communidad Valenciana	.	.	71.8	5.0

NUTS code	Country/Region	NACE 73 Research & Development (1,000's)	% of total	NACE 74 Other business activities (1,000's)	% of total
53	Islas Baleares	.	.	12.7	4.3
61	Andalucia	.	.	92.2	4.5
62	Región de Murcia	.	.	13.6	3.6
63	Ceuta y Melilla	.	.	.	.
70	Canarias	.	.	27.3	4.7
	All of Spain	*19.4*	*0.1*	*737.8*	*5.4*
	Finland				
13	Itä-Suomi	.	.	10.5	3.9
14	Väli-Suomi	.	.	13.0	4.4
15	Pohjois-Suomi	.	.	9.3	4.1
16	Uusimaa	.	.	60.8	8.6
17	Etelae-Suomi	(2.6)	(0.3)	42.1	5.2
20	Äland	.	.	.	.
	All of Finland	*16.6*	*0.7*	*135.7*	*5.9*
	France				
10	Île de France	51.6	1.1	475.1	9.7
21	Champagne-Ardenne	.	.	20.9	4.4
22	Picardie	.	.	33.6	5.0
23	Haute-Normandie	.	.	37.3	5.2
24	Centre	(7.0)	(0.8)	46.9	5.0
25	Basse-Normandie	.	.	22.6	4.5
26	Borgogne	.	.	21.5	3.4
30	Nord-Pas-de-Calais	.	.	71.2	5.3
41	Lorraine	(4.9)	(0.6)	41.4	4.7
42	Alsace	.	.	36.4	4.8
43	Franche-Comté	.	.	17.8	4.0
51	Pays de la Loire	(4.4)	(0.3)	63.3	4.9
52	Bretagne	(5.6)	(0.5)	49.0	4.2
53	Poitou-Charentes	.	.	26.0	4.2
61	Aquitaine	(8.1)	(0.7)	62.4	5.4
62	Midi-Pyrénées	13.1	1.4	41.0	4.3
63	Limousin	.	.	(6.7)	2.7
71	Rhône-Alpes	22.6	1.0	136.6	6.1
72	Auvergne	.	.	18.4	3.9
81	Languedoc-Roussillon	(4.2)	(0.6)	36.3	5.2
82	Provence-Alpes-Côte d'Azur	(7.1)	(0.5)	89.0	5.9
83	Corse	.	.	(3.5)	(4.8)
	All of France	*143.2*	*0.6*	*1356.8*	*6.0*
	Greece				
11	Anatoliki Makedonia, Thraki	.	.	5.2	2.5
12	Kentriki Makedonia	.	.	31.6	4.8
13	Dytiki Makedonia	.	.	(2.5)	(2.8)

NUTS code	Country/Region	NACE 73 Research & Development (1,000's)	NACE 73 Research & Development % of total	NACE 74 Other business activities (1,000's)	NACE 74 Other business activities % of total
14	Thessalia	.	.	9.4	3.8
21	Ipeiros	.	.	(2.6)	(2.7)
22	Ionia Nisia	.	.	.	.
23	Dytiki Ellada	.	.	5.9	2.8
24	Sterea Ellada	.	.	(4.4)	(2.6)
25	Peloponnisos	.	.	5.2	2.6
30	Attiki	(3.6)	(0.2)	98.0	6.5
41	Voreio Aigaio	.	.	.	.
42	Notio Aigaio	.	.	.	.
43	Kriti	.	.	6.5	3.0
	All of Greece	*5.1*	*0.1*	*176.3*	*4.6*
	Ireland				
1		.	.	12.2	3.2
2		.	.	77.2	6.5
	All of Ireland	*.*	*.*	*89.4*	*5.7*
	Italy				
11	Piemonte	(4.4)	0.3	81.1	4.8
12	Valle d'aosta	.	.	.	.
13	Liguria	.	.	39.8	6.8
20	Lombardia	12.1	0.3	237.4	6.3
31	Trentino-Alto Adige	.	.	13.4	3.4
32	Veneto	.	.	86.6	4.7
33	Friuli-Venezia Giulia	.	.	20.3	4.4
40	Emila-Romagna	.	.	81.2	4.8
51	Toscana	.	.	65.8	4.9
52	Umbria	.	.	13.5	4.4
53	Marche	.	.	27.6	4.8
60	Lazio	10.8	0.6	123.2	6.7
71	Abruzzo	.	.	20.0	4.7
72	Molise	.	.	(5.1)	(4.9)
80	Campania	.	.	74.9	4.9
91	Puglia	.	.	43.0	3.7
92	Basilicata	.	.	(4.1)	(2.4)
93	Calabria	.	.	20.9	4.0
A0	Sicilia	.	.	53.6	4.1
B0	Sardegna	.	.	19.1	3.8
	All of Italy	*43.1*	*0.2*	*1032.9*	*5.1*
	Luxembourg				
0	Luxembourg	(0.8)	(0.4)	9.9	5.6
	All of Luxembourg	*(0.8)*	*(0.4)*	*9.9*	*5.6*
	The Netherlands				
11	Groningen	.	.	23.0	9.1

NUTS code	Country/Region	NACE 73 Research & Development (1,000's)	NACE 73 Research & Development % of total	NACE 74 Other business activities (1,000's)	NACE 74 Other business activities % of total
12	Friesland	.	.	14.4	5.0
13	Drenthe	.	.	12.8	6.3
21	Overijssel	.	.	33.0	6.6
22	Gelderland	(7.8)	(0.9)	57.7	6.3
23	Flevoland	.	.	14.5	9.6
31	Utrecht	.	.	50.1	9.0
32	Noord-Holland	(6.5)	(0.5)	127.0	10.4
33	Zuid-Holland	13.6	0.8	155.1	9.6
34	Zeeland	.	.	10.0	6.1
41	Noord-Brabant	.	.	86.1	7.5
42	Limburg (NL)	.	.	37.7	7.0
	All of the Netherlands	*37.4*	*0.5*	*621.4*	*8.2*
	Portugal				
11	Norte	.	.	42.8	2.6
12	Centro (P)	.	.	17.3	2.1
13	Lisboa e Vale do Tejo	.	.	95.4	6.3
14	Alentejo	.	.	.	.
15	Algarve	.	.	.	.
20	Açores	.	.	.	.
30	Maderia	.	.	.	.
	All of Portugal	*.*	*.*	*166.1*	*3.6*
	Sweden				
1	Stockholm	.	.	86.1	10.4
2	Östra Mellansverige	.	.	44.2	6.4
4	Sydsverige	.	.	31.9	5.8
6	Norra Mellansverige	.	.	19.4	5.1
7	Mellersta Norrland	.	.	10.6	6.3
8	Övre Norrland	.	.	.	.
9	Smaaland med Oeama	.	.	15.0	4.0
0A	Västsverige	.	.	39.9	5.0
	All of Sweden	*29.2*	*0.7*	*255.4*	*6.4*
	United Kingdom (1)				
C1	Tees Valley & Durham	.	.	20.6	4.4
C2	Northumberland, Tyne & Wear	.	.	31.8	5.5
D1	Cumbria	.	.	.	
D2	Cheshire	.	.	30.3	6.6
D3	Greater Manchester	.	.	68.4	6.1
D4	Lancashire	.	.	33.8	5.6
D5	Merseyside	.	.	26.2	5.1
E1	East Riding & North Lincolnshire	.	.	22.5	6.1
E2	North Yorkshire	.	.	17.3	4.7
E3	South Yorkshire	.	.	38.3	7.2

NUTS code	Country/Region	NACE 73 Research & Development (1,000's)	NACE 73 Research & Development % of total	NACE 74 Other business activities (1,000's)	NACE 74 Other business activities % of total
E4	West Yorkshire	.	.	64.3	6.7
F1	Derbyshire, Nottinghamshire	.	.	45.5	5.0
F2	Leicestershire, Northamptonshire	.	.	44.0	5.8
F3	Lincolnshire	.	.	13.6	4.8
G1	Herefordshire, Worcestershire & Warwickshire	.	.	37.7	6.2
G2	Shropshire, Staffordshire	.	.	31.5	4.6
G3	West Midlands	.	.	66.5	6.0
H1	East Anglia	.	.	61.6	6.1
H2	Bedfordshire, Hertfordshire	10.0	1.2	61.5	7.7
H3	Essex	.	.	56.5	7.6
I1	Inner London	.	.	164.5	14.4
I2	Outer London	.	.	193.8	9.7
J1	Berkshire, Bucks, Oxfordshire	19.1	1.8	103.3	9.6
J2	Surrey, East-West Sussex	.	.	86.7	7.4
J3	Hampshire, Isle of Wight	.	.	58.0	6.9
J4	Kent	.	.	41.7	5.9
K1	Avon, Gloucestershire, Wiltshire & North Somerset	.	.	68.5	6.6
K2	Dorset, Somerset	.	.	26.2	5.0
K3	Cornwall & Isles of Scilly	.	.	12.4	5.7
K4	Devon	.	.	26.2	5.4
L1	West Wales & the Valleys	.	.	32.3	4.4
L2	East Wales	.	.	21.7	4.9
M1	North Eastern Scotland	.	.	12.9	5.9
M2	Eastern Scotland	.	.	48.4	5.5
M3	South Western Scotland	.	.	55.5	5.7
M4	Highlands, Islands	.	.	.	.
N0	Northern Ireland	.	.	20.6	3.1
	All of the UK	*103.6*	*0.4*	*1759.6*	*6.7*

Notes: . indicates data too small to publish; ( ) data may be unreliable; UK data apply to 1998, not 1999

Source: IES and a special Eurostat analysis of the Community Labour Force Survey

Table A8: Educational attainment of the population aged 25-59 by region, 1997

NUTS code	Country/Region	Low < ISCED 3	Medium ISCED 3	High ISCED 5,6,7
	Austria			
11	Burgenland	35	59	6
12	Niederösterreich	25	68	7
13	Wien	22	63	15
21	Kärnten	20	75	6
22	Steiermark	24	70	6
31	Oberösterreich	28	65	7
32	Salzburg	23	67	10
33	Tirol	25	67	7
34	Vorarlberg	32	61	7
	All of Austria	*25*	*66*	*9*
	Belgium			
10	Rég. Bruxelles Cap.	38	27	35
20	Antwerpen	41	33	26
22	Limburg (B)	45	33	22
23	Oost-Vlaanderen	38	37	25
24	Vlaams Brabant	34	35	31
25	West-Vlaanderen	39	37	24
31	Brabant Wallon	26	29	45
32	Hainaut	45	32	23
33	Liège	39	35	27
34	Luxembourg (B)	40	35	25
35	Namur	39	33	28
	All of Belgium	*39*	*34*	*27*
	Germany			
11	Stuttgart	23	54	24
12	Karlsruhe	20	57	23
13	Freiburg	21	56	23
14	Tübingen	22	54	24
21	Oberbayem	20	52	27
22	Niederbayem	23	59	18
23	Oberplatz	24	57	19
24	Oberfranken	23	59	18
25	Mittlefranken	20	58	23
26	Unterfranken	23	56	21
27	Schwaben	22	59	19
	Berlin	15	52	33
40	Brandenburg	7	62	31
50	Bremen	22	58	20
60	Hamburg	20	56	24
71	Darmstadt	19	54	26
72	Gießen	19	59	22

NUTS code	Country/Region	Low < ISCED 3	Medium ISCED 3	High ISCED 5,6,7
73	Kassel	22	58	20
80	Mecklenburg-Vorpommem	9	62	29
91	Braunschweig	18	61	21
92	Hannover	18	61	21
93	Lüneburg	20	61	18
94	Wesser-Ems	20	61	19
A1	Düsseldorf	22	60	18
A2	Köln	21	54	25
A3	Münster	19	62	19
A4	Detmold	18	63	19
A5	Amsberg	20	60	19
B1	Koblenz	21	60	19
B2	Trier	20	61	19
B3	Rheinhessen-Pfalz	22	58	20
C0	Saarland	20	63	17
D0	Sachsen	5	64	31
E1	Dessau	7	67	25
E2	Halle	8	65	27
E3	Magdeburg	8	63	28
F0	Schleswig-Holstein	19	61	20
G0	Thüringen	6	63	30
	All of Germany	*18*	*59*	*23*
	Denmark			
0	Denmark	20	54	26
	All of Denmark	*20*	*54*	*26*
	Spain			
11	Galicia	70	13	17
12	Principado de Asturias	65	15	20
13	Cantabria	62	16	21
21	Pais Vasco	53	19	28
22	Communidad Foral de Navarra	59	15	26
23	La Rioja	64	13	22
24	Aragon	61	16	23
30	Communidad de Madrid	55	17	27
41	Castilla y León	63	15	21
42	Castilla-la Mancha	74	11	15
43	Extremadura	75	10	15
51	Cataluna	63	17	19
52	Communidad Valenciana	67	15	17
53	Islas Baleares	69	16	14
61	Andalucia	71	13	16
62	Región de Murcia	66	15	19
63	Ceuta y Melilla	61	20	18

NUTS code	Country/Region	Low < ISCED 3	Medium ISCED 3	High ISCED 5,6,7
70	Canarias	68	15	17
	All of Spain	*65*	*15*	*20*
	Finland			
13	Itä-Suomi	28	54	18
14	Väli-Suomi	29	53	18
15	Pohjois-Suomi	23	57	20
16	Uusimaa	25	48	27
17	Etelae-Suomi	29	51	20
20	Äland	32	54	15
	All of Finland	*27*	*51*	*21*
	France			
10	Île de France	34	38	29
21	Champagne-Ardenne	43	41	16
22	Picardie	46	40	14
23	Haute-Normandie	42	42	16
24	Centre	42	44	14
25	Basse-Normandie	42	42	16
26	Borgogne	38	46	16
30	Nord-Pas-de-Calais	46	41	13
41	Lorraine	30	44	16
42	Alsace	34	48	18
43	Franche-Comté	40	44	16
51	Pays de la Loire	38	47	14
52	Bretagne	38	48	19
53	Poitou-Charentes	38	47	15
61	Aquitaine	32	50	18
62	Midi-Pyrénées	32	47	21
63	Limousin	35	50	15
71	Rhône-Alpes	34	45	22
72	Auvergne	38	45	17
81	Languedoc-Roussillon	40	42	18
82	Provence-Alpes-Côte d'Azur	38	45	17
83	Corse	64	26	10
	All of France	*37*	*43*	*19*
	Greece			
11	Anatoliki Makedonia, Thraki	65	23	12
12	Kentriki Makedonia	51	31	18
13	Dytiki Makedonia	61	26	13
14	Thessalia	64	22	14
21	Ipeiros	65	21	15
22	Ionia Nisia	67	24	10
23	Dytiki Ellada	68	23	9
24	Sterea Ellada	65	25	11

NUTS code	Country/Region	Low < ISCED 3	Medium ISCED 3	High ISCED 5,6,7
25	Peloponnisos	62	26	11
30	Attiki	37	42	22
41	Voreio Aigaio	61	27	12
42	Notio Aigaio	66	25	9
43	Kriti	58	28	14
	All of Greece	*51*	*32*	*17*
	Ireland			
	All of Ireland	*49*	*28*	*23*
	Italy			
11	Piemonte	60	32	8
12	Valle d'aosta	60	33	7
13	Liguria	54	36	10
20	Lombardia	57	34	9
31	Trentino-Alto Adige	53	39	7
32	Veneto	61	32	7
33	Friuli-Venezia Giulia	55	36	9
40	Emila-Romagna	55	35	10
51	Toscana	60	32	9
52	Umbria	52	39	8
53	Marche	58	33	9
60	Lazio	50	38	12
71	Abruzzo	55	35	9
72	Molise	58	34	9
80	Campania	61	30	9
91	Puglia	65	27	8
92	Basilicata	63	29	7
93	Calabria	60	31	10
A0	Sicilia	64	28	8
B0	Sardegna	68	25	7
	All of Italy	*49*	*28*	*23*
	Luxembourg			
0	Luxembourg	52	27	20
	All of Luxembourg	*52*	*27*	*20*
	The Netherlands			
11	Groningen	35	44	22
12	Friesland	38	45	17
13	Drenthe	35	47	18
21	Overijssel	35	46	19
22	Gelderland	35	42	23
23	Flevoland	37	45	18
31	Utrecht	28	38	34
32	Noord-Holland	30	42	28
33	Zuid-Holland	34	41	25

NUTS code	Country/Region	Low < ISCED 3	Medium ISCED 3	High ISCED 5,6,7
34	Zeeland	37	47	16
41	Noord-Brabant	34	42	24
42	Limburg (NL)	40	41	19
	All of the Netherlands	*34*	*42*	*24*
	Portugal			
11	Norte	80	10	10
12	Centro (P)	81	9	10
13	Lisboa e Vale do Tejo	68	17	16
14	Alentejo	82	9	8
15	Algarve	83	11	5
20	Açores	84	9	6
30	Maderia	85	10	5
	All of Portugal	*76*	*12*	*12*
	Sweden			
1	Stockholm	17	45	38
2	Östra Mellansverige	24	50	26
4	Sydsverige	25	48	27
6	Norra Mellansverige	24	55	21
7	Mellersta Norrland	24	53	23
8	Övre Norrland	20	55	26
9	Smaaland med Oeama	30	47	23
0A	Västsverige	24	49	26
	All of Sweden	*23*	*49*	*28*
	United Kingdom			
C1	Tees Valley & Durham	47	34	19
C2	Northumberland, Tyne & Wear	50	31	19
D1	Cumbria	40	41	19
D2	Cheshire	42	32	26
D3	Greater Manchester	48	31	21
D4	Lancashire	45	34	21
D5	Merseyside	50	31	20
E1	Lincolnshire	50	33	18
E2	North Yorkshire	40	34	26
E3	South Yorkshire	50	32	19
E4	West Yorkshire	46	33	21
F1	Derbyshire, Nottinghamshire	46	32	22
F2	Leicestershire, Northamptonshire	48	32	20
F3	Lincolnshire	50	33	18
G1	Herefordshire, Worcestershire & Warwickshire	43	28	29
G2	Shropshire, Staffordshire	47	34	19
G3	West Midlands	54	29	17
H1	East Anglia	45	34	21
H2	Bedfordshire, Hertfordshire	39	34	27

NUTS code	Country/Region	Low < ISCED 3	Medium ISCED 3	High ISCED 5,6,7
H3	Essex	52	32	17
I1	Greater London	45	24	31
J1	Berkshire, Bucks, Oxfordshire	39	31	30
J2	Surrey, East-West Sussex	40	32	28
J3	Hampshire, Isle of Wight	43	34	23
J4	Kent	46	33	21
K1	Avon, Gloucestershire, Wiltshire & North Somerset	40	33	27
K2	Dorset, Somerset	40	36	24
K3	Cornwall, Devon	42	37	21
K4	Clwyd, Dyfed, Gwynedd, Powys	47	32	22
K5	Gwent, Mid-South-West Glamorgan	51	29	20
K6	Borders-Central-Fife-Lothian-Tayside	37	37	26
K7	Dumfries & Galloway, Strathclyde	40	38	22
K8	Highlands, Islands	34	39	28
K9	Grampian	35	36	29
K10	Northern Ireland	44	36	20
	All of the UK	*45*	*32*	*23*

Source: IES and a special Eurostat analysis of the Community Labour Force Survey

Table A9: E-loser countries main e-indicators

	Mainlines per 100 population 1998	Graduates per million population	Number of Internet hosts in 1998	Corruption perception indicator
Afghanistan	0.1	132	.	.
Algeria	4.9	1,447	200	.
American Samoa	21.4	.	166	.
Andorra	44.1	0	567	.
Angola	0.6	36	6	.
Argentina	19.7	1,188	142,470	.
Armenia	15.7	.	2,313	2.5
Azerbaijan	8.9	3,735	603	1.7
Bahrain	24.5	2,513	1,117	.
Bangladesh	0.3	588	1	.
Belarus	24.3	3,590	883	3.4
Belize	13.8	.	276	.
Benin	0.7	178	27	.
Bolivia	5.7	601	948	2.5
Bosnia and Herzegovina	9.1	.	2,232	.
Brazil	12.1	1,510	446,444	4.1
Brunei Darussalam	24.7	.	1,399	.
Bulgaria	32.9	.	16,832	3.3
Burkina Faso	0.4	360	211	.
Burundi	0.3	192	1	.
Cameroon	0.6	.	5	1.5
Central African Rep.	0.3	201	7	.
Chad	0.1	87	5	.
Colombia	16.1	2,265	40,565	2.9
Comoros	0.9	.	33	.
Congo	0.8	435	3	.
Costa Rica	17.2	2,974	7,471	5.1
Cote d'Ivoire	1.2	.	629	.
Croatia	34.8	2,253	14,535	2.7
Cuba	3.5	2,896	169	.
Czech Republic	36.4	2,755	122,253	4.6
Dem. People's Rep. of Korea	4.7	.	0	.
Djibouti	1.3	.	40	.
Dominica	.	2,814	181	.
Dominican Rep.	9.3	.	6,574	.
Ecuador	8.1	1,045	1,922	2.4
Eritrea	0.7	71	6	.
Estonia	34.4	2,113	30,103	5.7
Ethiopia	0.3	94	81	.
Fiji	9.8	723	359	.
French Guiana	27.7	.	125	.

	Mainlines per 100 population 1998	Graduates per million population	Number of Internet hosts in 1998	Corruption perception indicator
French Polynesia	23.2	.	867	.
Gabon	.	702	2	.
Gambia	2.1	.	12	.
Georgia	11.5	4,244	898	2.3
Grenada	29.8	.	3	.
GuineaBissau	0.7	.	15	.
Guyana	7.0	1,872	16	.
Honduras	4.0	300	119	1.8
Iran (Islamic Rep. of)	11.2	971	564	.
Iraq	3.1	.	5	.
Jordan	8.3	4,894	612	4.4
Kazakhstan	10.9	6,225	3,750	2.3
Kenya	1.0	411	602	2.0
Kiribati	3.4	.	42	.
Kuwait	23.6	2,025	4,069	.
Kyrgyzstan	7.6	.	3,535	2.2
Lao P.D.R.	0.6	347	0	.
Latvia	30.1	2,678	18,877	3.4
Lesotho	1.0	549	50	.
Lithuania	30.0	.	14,193	3.8
Madagascar	0.3	393	337	.
Malawi	0.3	352	1	4.1
Malaysia	20.1	1,071	59,012	5.1
Maldives	7.2	.	228	.
Marshall Islands	6.2	.	2	.
Mauritania	0.6	609	59	.
Micronesia (Fed. States of)	8.0	.	295	.
Moldova	15.0	4,696	1,267	2.6
Mongolia	3.8	2,466	50	4.3
Morocco	5.5	1,014	2,034	4.1
Mozambique	0.4	19	162	3.5
Myanmar	0.5	788	4	.
Namibia	6.9	1,173	2,043	5.3
New Caledonia	23.9	.	157	.
Nicaragua	3.0	535	1,028	3.1
Niger	0.2	.	32	.
Nigeria	0.4	289	77	1.6
Oman	9.2	908	678	.
Pakistan	1.9	741	4,735	2.2
Panama	15.1	2,218	1,235	.
Paraguay	5.5	760	1,660	2.0
Qatar	26.0	2,085	31	.

	Mainlines per 100 population 1998	Graduates per million population	Number of Internet hosts in 1998	Corruption perception indicator
Romania	16.2	1,506	36,294	3.3
Rwanda	0.2	93	259	.
Sao Tome and Principe	2.2	.	447	.
Saudi Arabia	14.3	2,212	2,828	.
Senegal	1.5	607	306	3.4
Sierra Leone	0.4	.	75	.
Slovak Republic	28.6	1,756	28,183	3.7
Solomon Islands	1.9	.	210	.
Somalia	0.2	.	2	.
South Africa	12.5	3,634	167,635	5.0
St. Vincent and the Grenadines	18.8	.	0	.
Suriname	16.3	369	0	.
Swaziland	3.0	1,086	661	.
Tajikistan	3.7	1,720	221	.
Tanzania	0.4	.	218	1.9
T.F.Y.R. Macedonia	22.0	1,330	1,487	.
Togo	0.7	306	120	.
Trinidad and Tobago	20.6	774	4,852	.
Tunisia	8.1	1,321	33	5.0
Turkey	25.4	2,055	78,878	3.6
Turkmenistan	8.2	.	444	.
Uganda	0.3	381	139	2.2
United Arab Emirates	38.9	737	19,718	.
Uruguay	25.0	1,769	25,385	4.4
Uzbekistan	6.5	.	200	1.8
Vanuatu	2.8	.	150	.
Venezuela	11.7	1,534	14,281	2.6
Western Samoa	4.9	.	7	.
Yemen	1.5	655	28	.
Yugoslavia	21.8	1,630	10,544	2.0
Zambia	0.9	475	537	3.5

Note: . numbers too small to be reliable

Source: IES analysis of the EMERGENCE eWork indicators database

Appendix B

Contents of the e-indicators database

Code	Description	Year	No. of Valid Cases	Source
COUNTRY	Name of the country		204	(1)
AGE_DEP5	Age dependency ratio 1995	1995	187	(2)
AGE_DEP6	Age dependency ratio 1996	1996	187	(2)
AGE_DEP7	Age dependency ratio 1997	1997	187	(2)
AIR_5	Air Transport, Freight	1995	155	(2)
AIR_6	Air Transport, Freight	1996	154	(2)
AIR_7	Air Transport, Freight	1997	0	(2)
ALL_SUB	Most recent data for number of tertiary level graduates	—	126	(6)
ALLEDPOP	Number of tertiary level graduates per 1,000 1996 population	1996	126	(6),(1)
CITY_0	Population in largest City	1990	200	(2)
CITY_1	Population in largest City	1991	198	(2)
CITY_2	Population in largest City	1992	199	(2)
CITY_3	Population in largest City	1993	202	(2)
CITY_4	Population in largest City	1994	202	(2)
CITY_5	Population in largest City	1995	202	(2)
CITY_6	Population in largest City	1996	202	(2)
CITY_7	Population in largest City	1997	202	(2)
CITY_8	Population in largest City	1998	202	(2)
CORUP_A	Bribe Payers Index	1999	94	(4)
CORUP_B	Corruption Perceptions Index	1999	96	(5)
COST_US	Cost of one minute of a business phone call to the US	1999	195	(7)
FDI_5	Gross Foreign Direct Investment (Current US $)	1995	128	(2)
FDI_6	Gross Foreign Direct Investment (Current US $)	1996	112	(2)
FDI_7	Gross Foreign Direct Investment (Current US $)	1997	94	(2)
GDP_0	Gross domestic product (US$)	1990	174	(2)
GDP_1	Gross domestic product (US$)	1991	173	(2)
GDP_2	Gross domestic product (US$)	1992	179	(2)
GDP_3	Gross domestic product (US$)	1993	183	((2))
GDP_4	Gross domestic product (US$)	1994	182	(2)
GDP_5	Gross domestic product (US$)	1995	178	(2)

Code	Description	Year	No. of Valid Cases	Source
GDP_6	Gross domestic product (US$)	1996	165	(2)
GDP_7	Gross domestic product (US$)	1997	154	(2)
GDP_8	Gross domestic product (US$)	1998	112	(2)
GDP_GR5	Annual Growth in Gross Domestic Product	1995	165	(2)
GDP_GR6	Annual Growth in Gross Domestic Product	1996	157	(2)
GDP_GR7	Annual Growth in Gross Domestic Product	1997	146	(2)
GNP_5	GNP at market prices (constant 1995 US$)	1995	166	(2)
GNP_6	GNP at market prices (constant 1995 US$)	1996	159	(2)
GNP_7	GNP at market prices (constant 1995 US$)	1997	154	(2)
GNP_CAP6	GNP at market prices (constant 1995 US$) per capita	1996	159	(2)
GRAD_POP	Tertiary level graduates per million population	1996	131	(6),(1)
HOUSE_0	Households	1990	172	(2)
HOUSE_1	Households	1991	191	(2)
HOUSE_2	Households	1992	192	(2)
HOUSE_3	Households	1993	194	(2)
HOUSE_4	Households	1994	194	(2)
HOUSE_5	Households	1995	196	(2)
HOUSE_6	Households	1996	197	(2)
HOUSE_7	Households	1997	197	(2)
HOUSE_8	Households	1998	197	(2)
HT_X_5	Hi Tec Exports	1995	105	(2)
HT_X_6	Hi Tec Exports	1996	91	(2)
HT_X_7	Hi Tec Exports	1997	71	(2)
INT_INC0	International incoming telephone traffic (minutes)	1990	76	(1)
INT_INC1	International incoming telephone traffic (minutes)	1991	95	(1)
INT_INC2	International incoming telephone traffic (minutes)	1992	110	(1)
INT_INC3	International incoming telephone traffic (minutes)	1993	151	(1)
INT_INC4	International incoming telephone traffic (minutes)	1994	157	(1)
INT_INC5	International incoming telephone traffic (minutes)	1995	163	(1)
INT_INC6	International incoming telephone traffic (minutes)	1996	161	(1)
INT_INC7	International incoming telephone traffic (minutes)	1997	156	(1)
INT_INC8	International incoming telephone traffic (minutes)	1998	112	(1)
INT_OUT0	International outgoing telephone traffic (minutes)	1990	147	(1)
INT_OUT1	International outgoing telephone traffic (minutes)	1991	158	(1)
INT_OUT2	International outgoing telephone traffic (minutes)	1992	177	(1)
INT_OUT3	International outgoing telephone traffic (minutes)	1993	178	(1)
INT_OUT4	International outgoing telephone traffic (minutes)	1994	186	(1)
INT_OUT5	International outgoing telephone traffic (minutes)	1995	185	(1)
INT_OUT6	International outgoing telephone traffic (minutes)	1996	187	(1)
INT_OUT7	International outgoing telephone traffic (minutes)	1997	183	(1)

Code	Description	Year	No. of Valid Cases	Source
INT_OUT8	International outgoing telephone traffic (minutes)	1998	171	(1)
INTERNET	Number of Internet hosts	1998	203	(1)
INTPOP	Number of Internet hosts per capita	1998	66	(1),(2)
LF_5	Labour Force	1995	170	(2)
LF_6	Labour Force	1996	170	(2)
LF_7	Labour Force	1997	170	(2)
LNINTER	Natural logarithm of the number of Internet hosts	1998	204	(2)
LNINTPOP	Natural logarithm of the number of Internet hosts per capita		58	(2)
M_TEL_0	Imports of telecommunication equipment (US$)	1990	112	(1)
M_TEL_1	Imports of telecommunication equipment (US$)	1991	111	(1)
M_TEL_2	Imports of telecommunication equipment (US$)	1992	98	(1)
M_TEL_3	Imports of telecommunication equipment (US$)	1993	89	(1)
M_TEL_4	Imports of telecommunication equipment (US$)	1994	90	(1)
MAINGR48	Growth in mainline per 100 inhabitants between 1994 and 1998	—	191	(1)
MAINPOP3	Main telephone lines per 100 inhabitants	1993	204	(1)
MAINPOP4	Main telephone lines per 100 inhabitants	1994	204	(1)
MAINPOP5	Main telephone lines per 100 inhabitants	1995	204	(1)
MAINPOP6	Main telephone lines per 100 inhabitants	1996	203	(1)
MAINPOP7	Main telephone lines per 100 inhabitants	1997	198	(1)
MAINPOP8	Main telephone lines per 100 inhabitants	1998	193	(1)
MAINPOP9	Main telephone lines per 100 inhabitants	1999	59	(1)
MATHS_A	Maths and computer science graduates (latest data)	—	93	(1)
MATHS_F	Female maths and computer science graduates (latest data)	—	67	
MOBIL_5	Number of mobile phones per 1,000	1995	191	(1)
MOBIL_6	Number of mobile phones per 1,000	1996	189	(1)
MOBIL_7	Number of mobile phones per 1,000	1997	160	(1)
NAT_CAL0	Total national telephone traffic (calls)	1990	36	(1)
NAT_CAL1	Total national telephone traffic (calls)	1991	35	(1)
NAT_CAL2	Total national telephone traffic (calls)	1992	37	(1)
NAT_CAL3	Total national telephone traffic (calls)	1993	36	(1)
NAT_CAL4	Total national telephone traffic (calls)	1994	35	(1)
NAT_CAL5	Total national telephone traffic (calls)	1995	39	(1)
NAT_CAL6	Total national telephone traffic (calls)	1996	36	(1)
NAT_CAL7	Total national telephone traffic (calls)	1997	37	(1)
NAT_CAL8	Total national telephone traffic (calls)	1998	29	(1)
NATCAL90	Number of national long distance telephone calls	1990	61	(1)
NATCAL91	Number of national long distance telephone calls	1991	66	(1)
NATCAL92	Number of national long distance telephone calls	1992	86	(1)
NATCAL93	Number of national long distance telephone calls	1993	74	(1)
NATCAL94	Number of national long distance telephone calls	1994	62	(1)

Code	Description	Year	No. of Valid Cases	Source
NATCAL95	Number of national long distance telephone calls	1995	62	(1)
NATCAL96	Number of national long distance telephone calls	1996	53	(1)
NATCAL97	Number of national long distance telephone calls	1997	48	(1)
NATCAL98	Number of national long distance telephone calls	1998	39	(1)
NUM_LOC0	Number of local telephone (calls)	1990	40	(1)
NUM_LOC1	Number of local telephone (calls)	1991	43	(1)
NUM_LOC2	Number of local telephone (calls)	1992	50	(1)
NUM_LOC3	Number of local telephone (calls)	1993	43	(1)
NUM_LOC4	Number of local telephone (calls)	1994	36	(1)
NUM_LOC5	Number of local telephone (calls)	1995	39	(1)
NUM_LOC6	Number of local telephone (calls)	1996	34	(1)
NUM_LOC7	Number of local telephone (calls)	1997	33	(1)
NUM_LOC8	Number of local telephone (calls)	1998	29	(1)
OECD_POP	Number of Telecommunications minutes from OECD countries per capita	1994	199	(1)
OECD1994	Number of Telecommunications minutes from OECD countries	1994	199	(1)
PCS_0	Number of personal computers	1991	61	(1)
PCS_1	Number of personal computers	1992	62	(1)
PCS_2	Number of personal computers	1993	67	(1)
PCS_3	Number of personal computers	1994	76	(1)
PCS_4	Number of personal computers	1995	89	(1)
PCS_5	Number of personal computers	1996	106	(1)
PCS_6	Number of personal computers	1997	101	(1)
PCS_7	Number of personal computers	1998	105	(1)
PCS_8	Number of personal computers	1990	137	(1)
POP_0	Population	1991	203	(2)
POP_1	Population	1992	203	(2)
POP_3	Population	1993	204	(2)
POP_4	Population	1994	204	(2)
POP_5	Population	1995	204	(2)
POP_6	Population	1996	204	(2)
POP_7	Population	1997	204	(2)
POP_8	Population	1998	204	(2)
POP_DEN5	Population Density — people per square km	1995	189	(2)
POP_DEN6	Population Density — people per square km	1996	189	(2)
POP_DEN7	Population Density — people per square km	1997	0	(2)
TERT_5	School enrolment, tertiary (% gross)	1995	154	(2)
TERT_6	School enrolment, tertiary (% gross)	1996	153	(2)
TERT_7	School enrolment, tertiary (% gross)	1997	8	(2)
TOP8	Number of students studying in the top eight student hosting countries	1996	179	(6)
TOP8POP	Number of students studying in the top eight student hosting countries	1996	179	(6)

Code	Description	Year	No. of Valid Cases	Source
	per capita			
UNEM_5	Unemployment – total percentage of labour force	1995	83	(2)
UNEM_6	Unemployment – total percentage of labour force	1996	74	(2)
UNEM_7	Unemployment – total percentage of labour force	1997	47	(2)
WAGE_5	Wages and salaries (% of total expenditure)	1995	82	(2)
WAGE_6	Wages and salaries (% of total expenditure)	1996	65	(2)
WAGE_7	Wages and salaries (% of total expenditure)	1997	40	(2)
X_TEL_0	Exports of telecommunication equipment (US$)	1990	89	(1)
X_TEL_1	Exports of telecommunication equipment (US$)	1991	91	(1)
X_TEL_2	Exports of telecommunication equipment (US$)	1992	90	(1)
X_TEL_3	Exports of telecommunication equipment (US$)	1993	82	(1)
X_TEL_4	Exports of telecommunication equipment (US$)	1994	86	(1)

Sources: (1) ITU Telecommunications Indicators, 2000
(2) World Bank World Development Indicators, 1999
(3) ITU Direction of Traffic Database, 1995
(4) Transparency International 1999 Bribe Payers Index
(5) Transparency International 1999 Corruption Perceptions Index
(6) UNESCO 1999 Statistical Yearbook
(7) www.eto.org.uk/eustats/netdist.htm