European Foundation for the Improvement of Living and Working Conditions

# Advancement of the knowledge society

## Comparing Europe, the US and Japan

## Summary



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## Introduction

The report provides the results on advancement indicators of the knowledge society generated as part of the EUFORIA project as well as associated comparative statistical data collected from a range of different sources.

As yet there is no consistent knowledge society model and framework which could help in identifying and/or developing appropriate knowledge society indicators to measure development and provide a benchmark across different countries, industrial sectors, etc.

This report sought to develop a general indicator framework to guide indicator search activities which most appropriately reflect key dimensions and elements of the knowledge society. In a further step, statistical indicators and data were identified from different sources to provide a quantitative empirical basis of advancement indicators of the knowledge society.

The description of relevant knowledge society advancement indicators is provided, with some brief analysis. These indicators cover all EU Member States and also, where possible, countries like the US and Japan, eastern European countries or OECD countries. Many are based on available statistical information, some of which is already rather dated, and may not have been originally focused on the knowledge society. Where possible, the intention was to identify and present time series data on indicators, which will help in the identification and elaboration of trends.

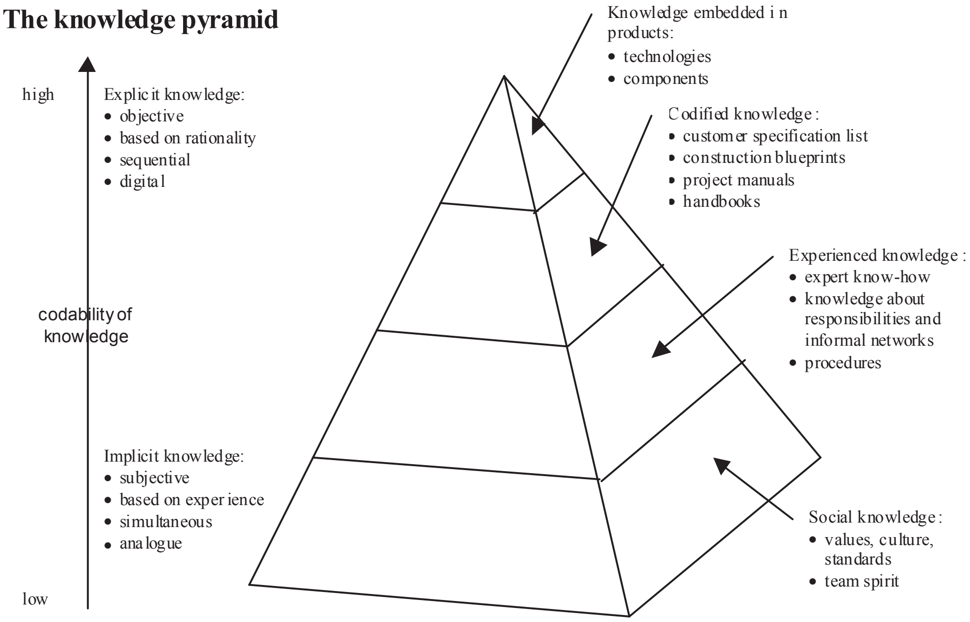
More up-to-date indicators, providing data more directly related to ICT use, intensity, impact and outcomes in a knowledge society, come from completed and ongoing EU-wide projects dealing with new statistical indicators for the information society, funded as part of the EU Information Society Technologies (IST) Programme. An example of such a project is the SIBIS project (Statistical indicators benchmarking the information society) (**www.sibis-eu.org**). These indicators, with their associated statistical data, provided an important empirical base for the subsequent steps in the knowledge society foresight project. It focused on the identification of trends and the analysis of drivers and impacts of the knowledge society in different countries.

## A basic model

Research on the nature of the knowledge society has grown more popular in recent years. Many models have been developed to explain why and how it works. One of the key elements in this research is the question about what kind of knowledge can be coded (e.g. put into words or numbers) and what cannot.

The RETINE project (2001) represented the distinction between codified and tacit knowledge in the so-called knowledge pyramid. This also emphasises that the two complement rather than substitute one another. In fact, they tend to co-evolve: the process of codification generating new tacit knowledge, in a type of virtuous circle from an implicit to an explicit and back to an implicit knowledge dimension.

**The knowledge pyramid**




Source: *Retine (2001), p.13, adapted from Grassmann (1977), p.152*

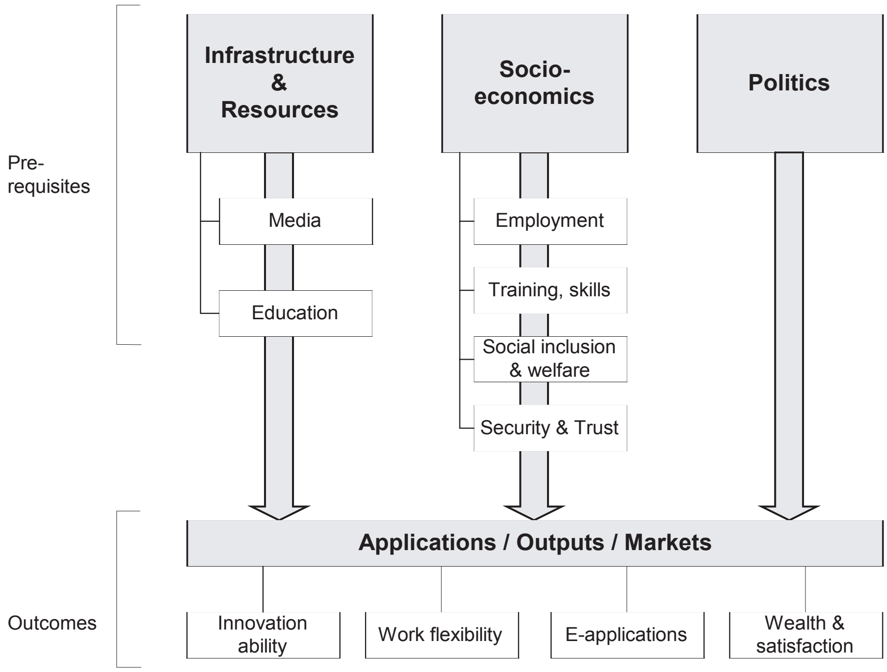
This knowledge pyramid shows that codified and tacit knowledge must not be seen as two separate entities. They are rather the outermost points of a continuum allowing for a dynamic shift between the two types. As a result, every kind of knowledge has at least a share of codability. Regarding the data available for measuring the knowledge society and its advancement, this characteristic is most important.

A model that is to cover the knowledge society must contain indicators on both kinds of knowledge. Data on explicit knowledge (such as media usage or training participation) do not cause any problems as they are easily available and usually cover wide ranges of space as well as of time. It is, however, the nature of tacit knowledge that renders it hard to fathom and equally hard to measure. Accordingly, data on it are difficult to find in today's official statistics. As a consequence, the challenging task is to identify indicators which can be used for the measurement of tacit knowledge.

## Indicator framework

A number of statistics and data for the measurement of the information society or knowledge society exist. Some of this material also lends itself to forecasting developments since it exists as time series data covering different periods of time with appropriate data. However, not all of this information is suitable or of sufficient quality. This therefore requires a) careful selection of indicators and b) sorting of the relevant data. Such a task is ideally guided by the use of an appropriate knowledge society indicator framework. The report suggests the following structure for data use and presentation.

Firstly, all indicators deemed appropriate and which are selected for the project are sorted by whether they measure a prerequisite for the advancement of the knowledge society or whether they measure the outcomes of a knowledge society already in existence. Within this rather rough sorting a finer differentiation has of course to be made. This is presented in the figure below.




Accordingly, the prerequisites are divided into:

- infrastructure and resources, containing data on media penetration and education;
- socio-economics, containing data on individual requirements such as employment, training and skills and relevant issues like social inclusion and security;
- politics, containing data on governmental involvement in the development of the knowledge society.

The outcomes, are divided into:

- innovation ability, measuring patent applications and research and development expenditures;
- work flexibility, containing data on flexible working arrangements such as telework;
- e-applications, such as e-commerce and e-health, containing data on usage and usage barriers, as well as digital literacy;
- wealth and satisfaction, containing data on economic wealth and individual attitude towards work.

A list of all indicators contained in the framework is given below.

Secondly, a further structure is used within all indicators on media and its usage, dividing them into ICT-related indicators and traditional indicators. This is due to the fact that ICT, although widespread, covers only a part of the media landscape and is still not available to all citizens and companies. There are also still considerable differences in the content provided, for example, by Internet and television.

## Advancement indicators

This section provides a list of the indicators used within the above framework.

| 1. Infrastructure and resources | 2. Socio-economics | 3. Politics | 4. Applications, Outputs, Markets |
|---|---|---|---|
| **Media** | **Employment** | | **Innovation ability** |
| Mobile phone subscribers<br>Internet users<br>Internet hosts<br>Personal computers<br>Daily newspapers<br>Television receivers<br>Radio receivers<br>Email users<br>Email use and networking<br>Broadband Internet access<br>Internet access drop-outs | Standardised overall unemployment rate<br>Unemployment rates by level of educational attainment of 25 to 64-year-olds (below upper secondary education)<br>Unemployment rates by level of educational attainment of 25 to 64-year-olds (upper secondary and post-secondary non-tertiary education)<br>Unemployment rates by level of educational attainment of 25 to 64-year-olds (tertiary type B education)<br>Unemployment rates by level of educational attainment of 25 to 64-year-olds (tertiary type A and advanced research programmes) | Governmental expenditure on R&D | Patent applications<br>Total expenditure on R&D<br>Labour productivity<br>Employees in 3rd sector |
| **Education** | **Training and skills** | | **Work flexibility** |
| Pupil / teacher ratio (pre-primary, primary, secondary)<br>Number of teaching hours per year in public institutions, by level of education<br>Everyday computer availability at home<br>Everyday computer availability at school<br>Everyday computer usage at home<br>Everyday computer usage at school<br>General computer availability in schools<br>Computers connected to the Internet | Employees' participation in company-provided courses<br>Training enterprises<br>Enterprises evaluating the effect of CVT courses<br>Employees practising e-learning<br>Employees participating in self-directed learning<br>COQS-index of perceived digital literacy | | AWAI: Adaptability of work arrangements index<br>Spread of telework (all types) from 1999 to 2002<br>Workers practising tele-cooperation |
| | **Social inclusion** | | **E-applications** |
| | GINI-index on income disparity<br>DIDIX: digital divide index | | E-commerce use<br>E-health: search for health related information on the Internet<br>E-health: necessity of foreign language abilities for e-health information search |
| | **Security** | | **Quality of life** |
| | Effects of security concerns on e-commerce | | Gross domestic product (GDP)<br>Perceived job satisfaction<br>Perceived job security |

A complete description of each indicator, together with the source of the associated data, is provided in the annex.

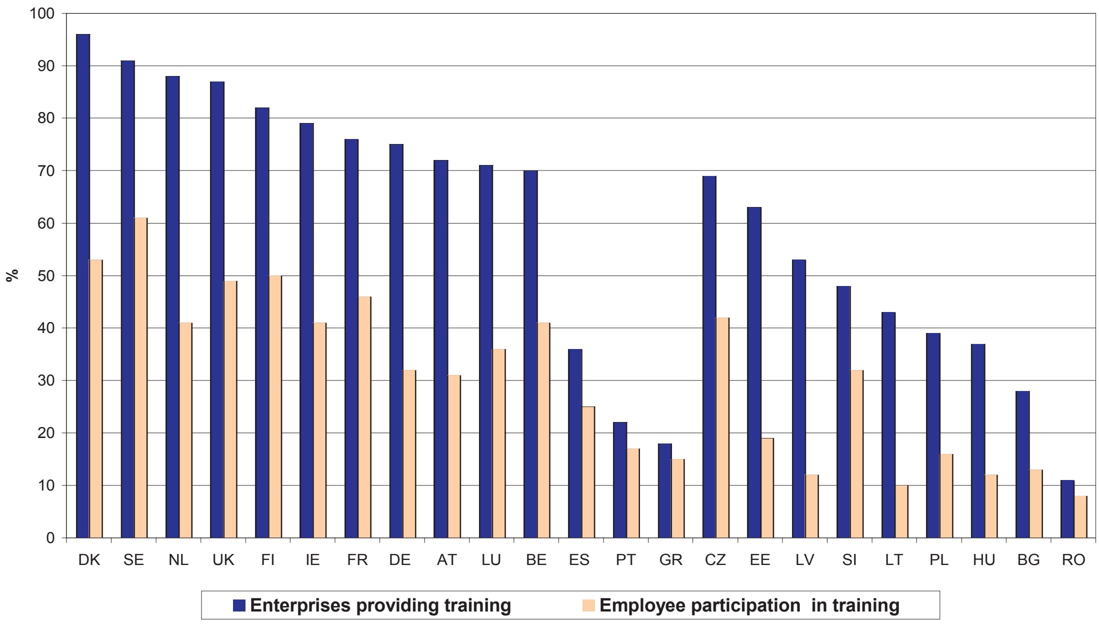
## Indicators - selected results

Rather than going through the large number of indicators used in the report, examples of a ‘prerequisite’ indicator and an ‘outcome’ indicator are presented here. Provision of and participation in training is a prerequisite indicator, dealing with the important issue of training opportunities in working life and the level of participation in training courses by employees. The spread of teleworking, an outcome indicator, describes the use of flexible forms of working in the different Member States. This is seen as measuring the flexibility and adaptability of companies and the workforce as well as labour markets to the changing circumstances in a knowledge society.

### Provision of and participation in training

Modern societies are characterised by rapid change and development of knowledge and technology. After school education and learning become increasingly important. This can best be fulfilled by company training or self-directed learning. In addition, e-learning helps to acquire new knowledge. Company training in general can be described as company training opportunities (training provision), employee participation in such courses, or self-directed learning by employees.

**Provision and participation of training (1999)**




Source: *CTVS 2000*

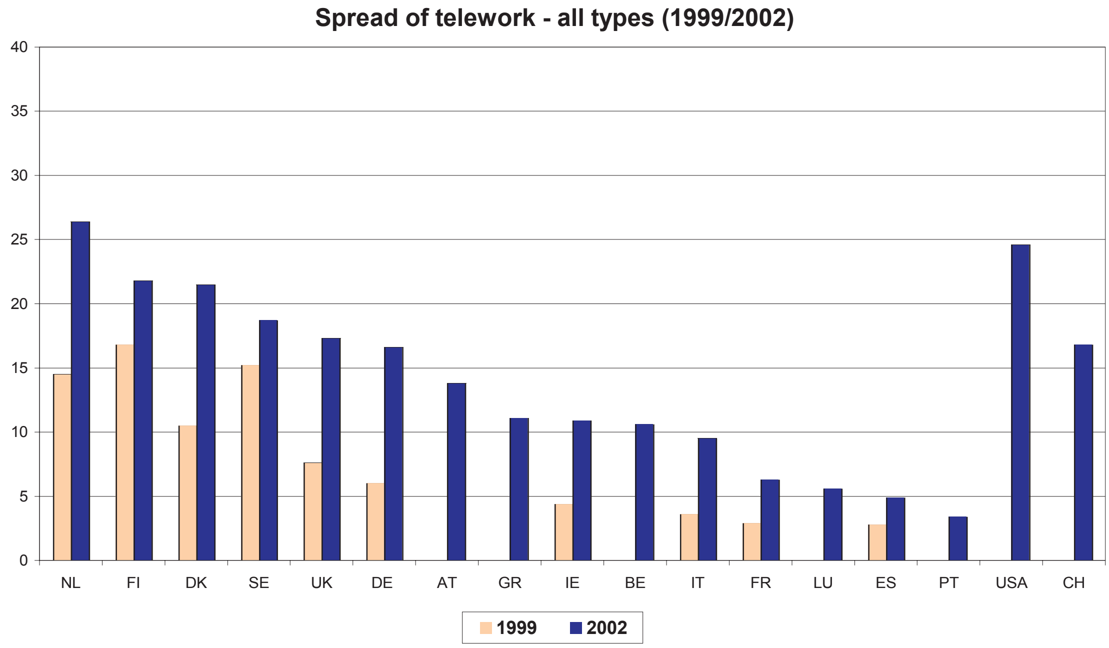
In most of the EU countries training provision is high, with Denmark taking the lead. Almost 100% of Danish employees are offered training opportunities. Greece, Portugal and Spain do not meet the EU-wide high standard. In these three countries, training participation compared with training provision notably exceeds the ratios of other EU Member States, with only half of the employees taking advantage of training possibilities offered to them.

Comparing the 1993 and 1999 figures, it can be seen that training provision and participation rates among all employees have increased, but the provision/participation ratio itself remains constant, i.e. training provision and use has reached higher levels in absolute terms but not in relation to each other.

### Spread of teleworking

Teleworking has begun to spread in the European Union but only a few Member States have reached US levels. The different types of telework are growing in almost every country, with mobile and home-based telework on less than one day per week spreading as fast as the number of self-employed people in SOHOs (small office, home office).




Source: *SIBIS 2002*

However, home-based telework (where the worker spends at least a full day per week at home) remains steady at around 2% of the workforce.

| Spread of telework in EU15 | | |
|---|---|---|
| | **1999** | **2002** |
| home-based telework > = 1 day per week | 2.0% | 2.1% |
| home-based telework < 1 day per week | 2.0% | 5.3% |
| mobile telework | 1.6% | 4.0% |
| self-employed in SOHOs | 0.9% | 3.4% |
| all types | 6.1% | 13.0% |

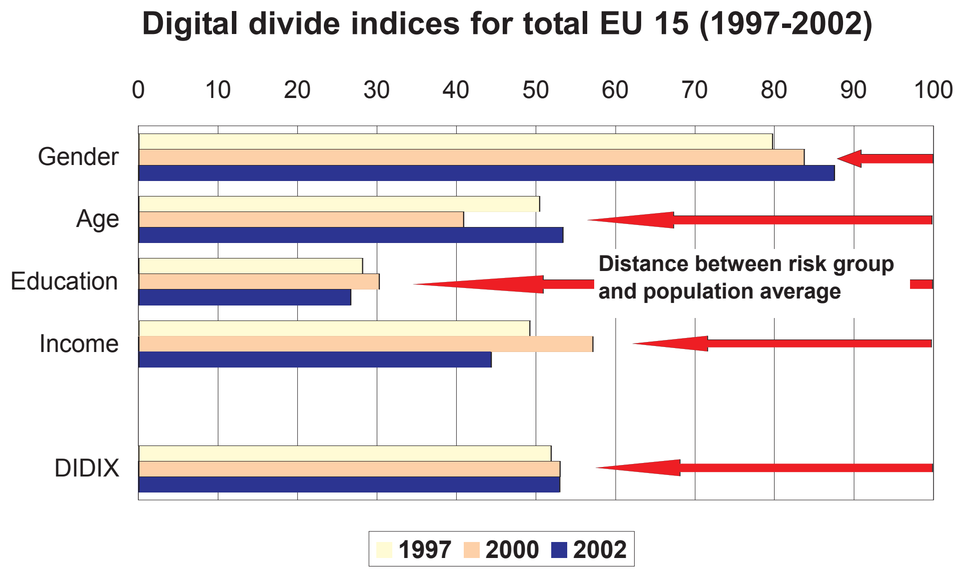
## Compound indicators - selected results

In addition to the use of indicators, so-called indices or compound indicators were used for the description and measurement of the advancement of European societies and economies towards the knowledge society. Two of these are briefly described below.

### Digital divide index

As a means of quickly comparing digital divide symptoms in EU Member States, a digital divide index (DIDIX) was constructed. This index combines the divides by gender, age, education and income in relation to computer use, Internet users and Internet use at home. It measures the relative adoption of ICT by potentially deprived societal groups - relative as compared to the population as a whole[1].

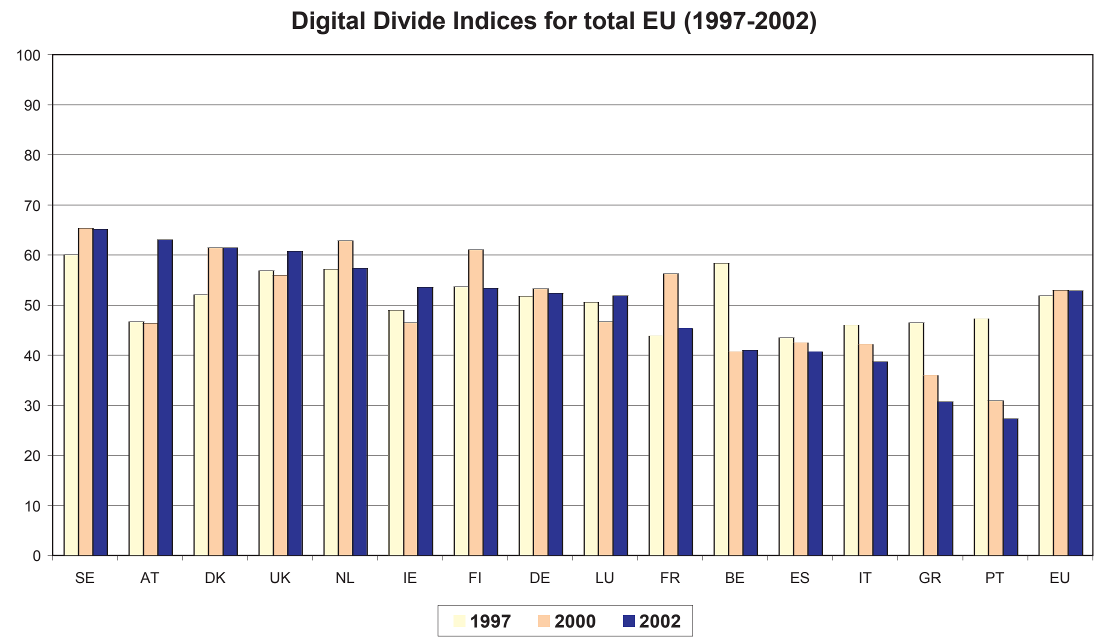
The most apparent digital divide exists in the education dimension. ICT diffusion among people who left school before 16 years of age is only about 25% of that in the whole population. Even allowing for the fact that older people are on average less well educated than younger ones, education appears to exert greater effects than age. The index shows that the overall divide in the EU has changed little, but the gender and age divides are diminishing, the educational divide persists, and the income divide seems to be increasing.




Source: *Empirica 2002*

Comparing indications of changes in national divides, differences between Member States are widening. Sweden, Denmark, Netherlands and the UK are moving toward social equality but, in other countries, especially in Portugal and Greece, the divide is getting wider.

[1] A full understanding of the dynamics of change in digital divides in Europe requires consideration of the relative stages of evolution of the information society in the different Member States. Further discussion of these issues can be found in Selhofer, H. and Huesing, T. The digital divide index - a measure of social inequalities in the adoption of ICT. Paper to IST 2002 Conference, Copenhagen, 4-6 November, 2002.




Source: *Empirica 2002*

## COQS - index of digital literacy

In the knowledge society, where increasingly information and communication with individuals and institutions is digital, the ability to operate in a responsible and critical way on the Internet is essential for taking part in the societal processes of living, working and learning. To be digitally literate is here indicated by the ability to use the Internet for:

- communicating with others, including the ability to use email and chat rooms as well as to create a personal web page;
- obtaining (or downloading) and installing software on a computer, covering installation of new software as well as of supplemental packages to existing programmes (updates, bug fixes, etc);
- questioning information on the Internet, measured as confidence in identifying the source of information on the Internet;
- searching for required information or confidence in using a search engine to find information.

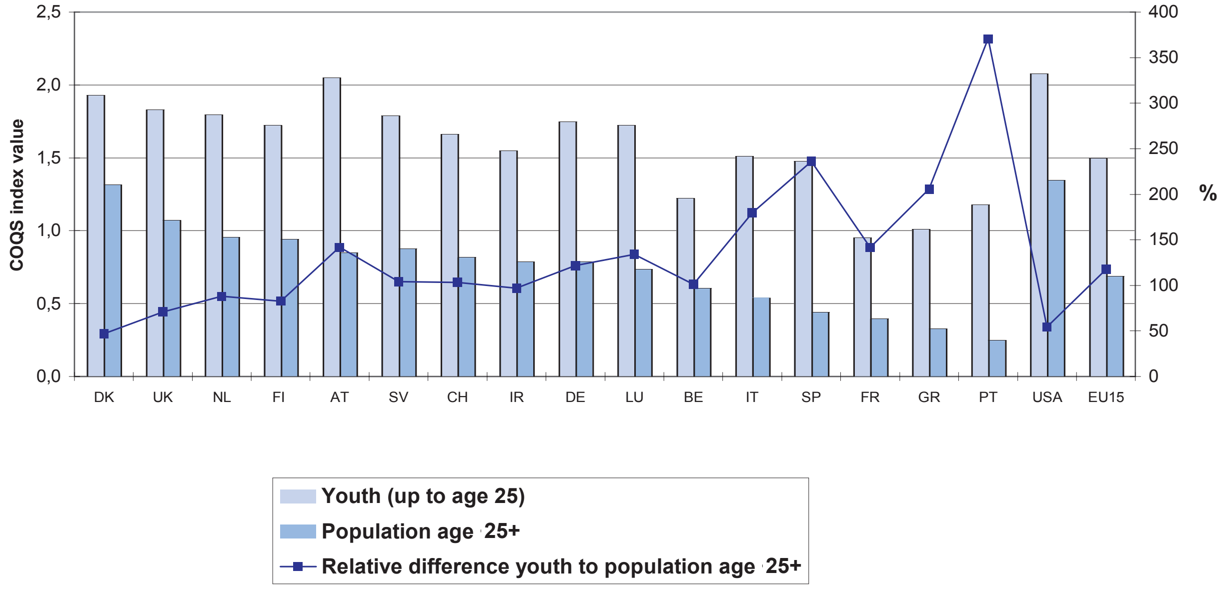
For calculation of the indicator value, scores are assigned to the different response options. For example, for 'Obtain and install digital tools', very confident = 3 points, fairly confident = 1 point, not confident, don't understand the question = 0 points. The national index of digital literacy (COQS) is measured as the average of the four indicators, weighted equally against each other.

According to the COQS, the level of digital literacy in the EU as a whole is still rather low. A clear gender gap and an age gap can be seen. EU women only reach 62% of the average digital literacy of EU men, while young people score notably higher than adults. There are also huge differences in the level of digital literacy between the countries surveyed. Within the EU there is a factor of three between the EU country with the highest (Denmark) and the lowest score (Portugal). In the EU as well as in the US, there is still a way to go towards achieving total digital literacy, which should be an important aim in a knowledge society.

Seen at national levels, the skills of digital literacy are highest among men in all countries. The size of the gender divide varies within the EU, the smallest gap existing in Ireland and Finland. The digital literacy gap can be expected to narrow or even close in the near future. Young people (16-24 years) show a much higher general level of digital literacy than the total population. The national scores among young people are nearly twice as high as adults in most countries. Thus, one can expect high digital literacy levels in European populations in the future.

**Digital literacy index - average national index value in age groups and relative difference between age groups**




Source: *SIBIS 2002*

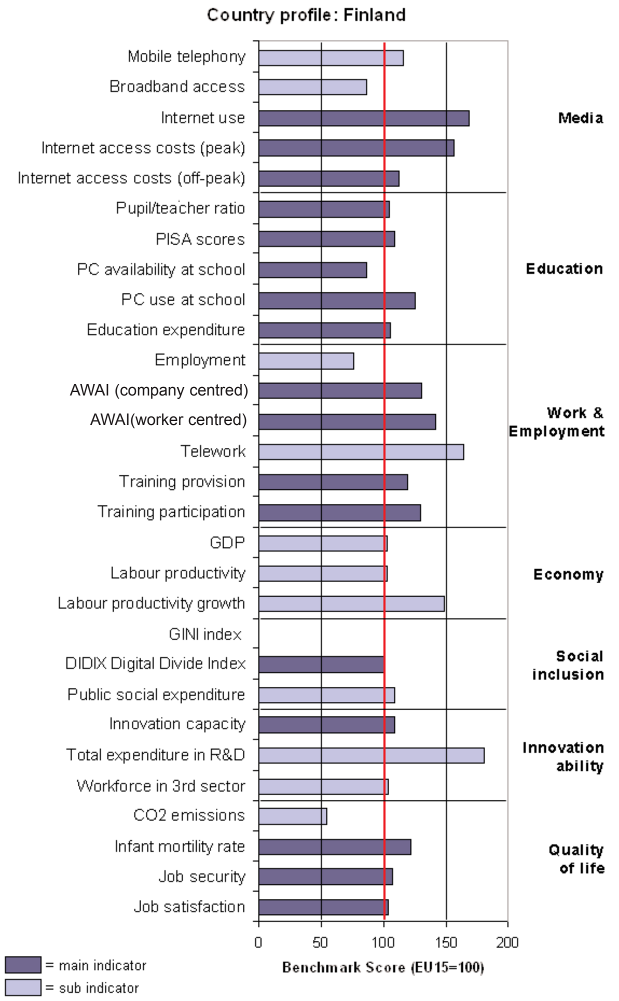
## Country profiles

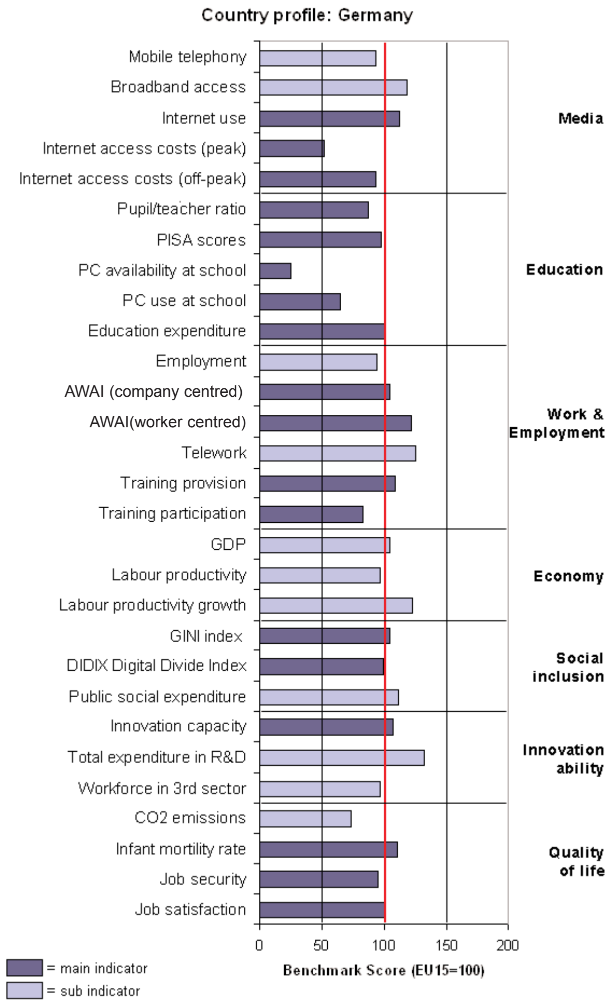
For each of the EU 15 countries, statistical indicators and data have been used to develop knowledge society country profiles, providing a more comprehensive overview of the situation according to 29 relevant knowledge society-related indicators. The indicators have been grouped into areas within the above indicator framework:

- media;
- education;
- work and employment;
- economy;
- social inclusion;
- innovation ability;
- quality of life.

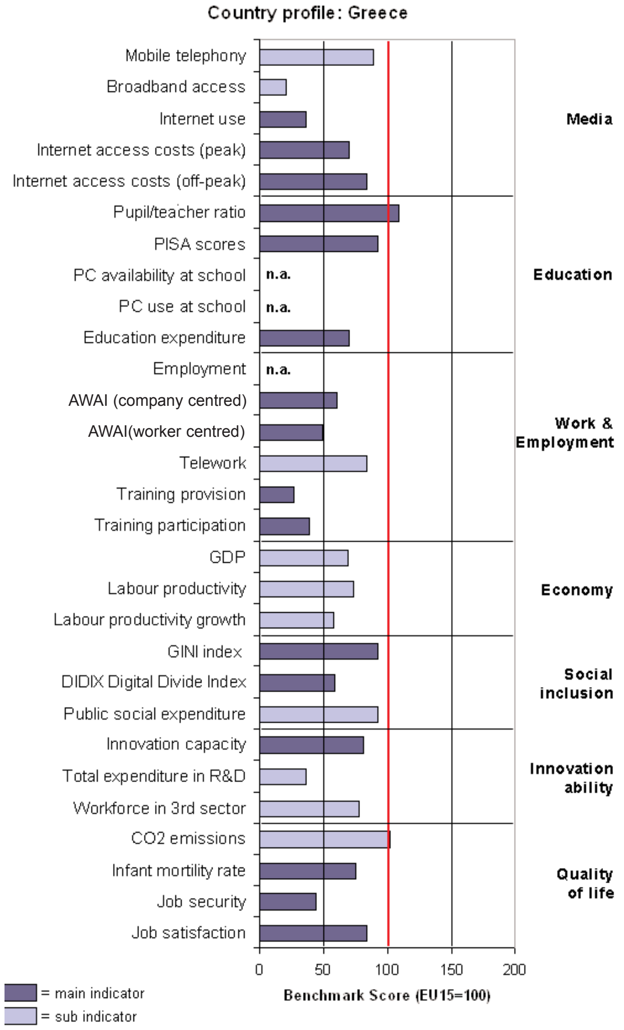
Data for each indicator are presented in a standardised way, i.e. the EU 15 average was set at 100 and the values for each indicator were calculated as a deviation from this. The higher a value, the better a country performs on a specific indicator. In some cases, the values had to be inverted to ensure that a high value carries a positive message. This applies to indicators such as $CO_2$ emissions or infant mortality rates. For these, high values mean low emissions or low infant mortality rates. A differentiation was made between main indicators and sub-indicators to specify an importance and a weight attached to each.

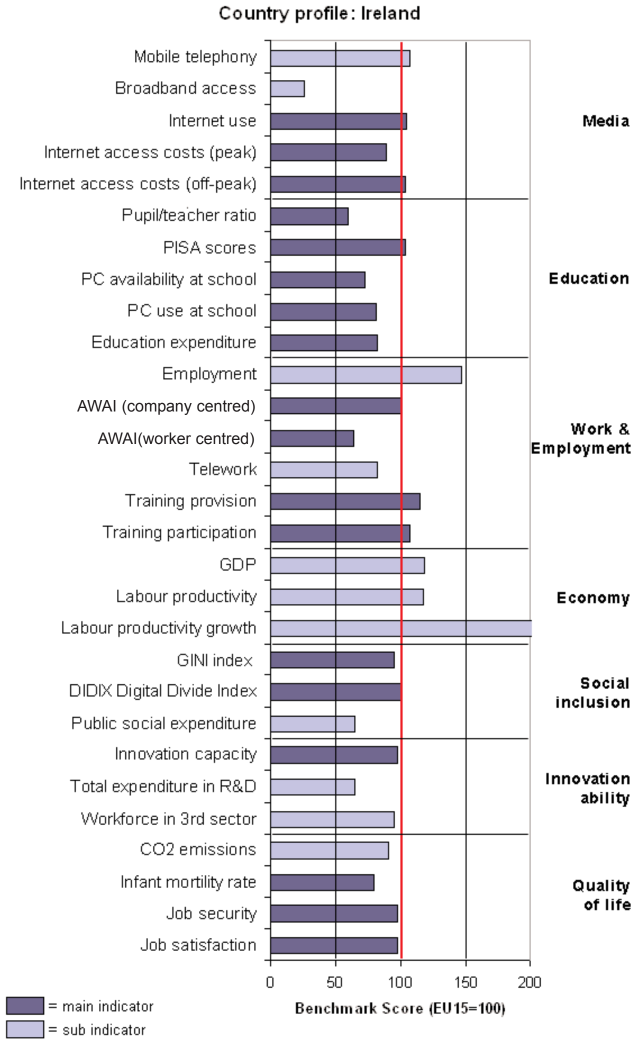
The four sample countries - Finland, Germany, Greece and Ireland - are depicted below.






When comparing the country profiles of the EU Member States, the following becomes apparent for the four countries in which EUFORIA has set up national foresight centres:

- Finland appears to be the European frontrunner in terms of advancement towards the knowledge society with high ratings on almost all indicators, but especially those relating to the use of ICT;
- Germany is an average European performer with some strengths in the infrastructure and innovation ability areas and an emerging flexibility in labour markets, but with serious weaknesses in the educational system and the take-up of ICT;
- Greece rates below the EU 15 average on all indicators and, measured by European standards, has quite a way to go to reach the level of other EU countries. However, it is not necessarily the case that all EU Member States should have the same goals. To give an example: is a full spread of telework as much a desired aim in Greece as it is in Germany?
- Ireland is strong on outcome indicators such as the low level of unemployment, good economy, and exceptional labour productivity growth in the past. However, its pupil-teacher ratio is quite poor and the innovation ability of this country needs to be monitored closely as there are signs that Ireland is lacking in this area.

## Summary and conclusion

The report includes a collection of advancement indicators of a knowledge-based society for EU countries, enhanced where possible by data from the EU acceding and candidate countries, the US and Japan. It is based on available statistical information. For quite a few indicators, the most recent data were taken from the SIBIS project (Statistical indicators benchmarking the information society), a project in the EU's IST Programme. Led by empirica (www.sibis-eu.org), that project carried out a large-scale representative survey in 2002 of the population in all 15 EU Member States, the US and Switzerland, as well as a survey of decision-makers in companies in Finland, France, Germany, Greece, Italy, Spain and the United Kingdom.

The report gives a brief description of the current situation and past developments concerning major dimensions of the European knowledge society, such as economic, social and technological development, quality of work and life, etc. It can be used as a starting point in the foresight process.

### Current situation

It can be said that the knowledge society has arrived in Europe but not everywhere and not for everyone. It has been slow to arrive in some EU Member States. A knowledge society north–south divide can still be observed in Europe, with the Nordic countries and the Netherlands leading on nearly all of the knowledge society indicators. The divide is particularly strong on ICT aspects. The southern countries Portugal, Greece, Spain and partly Italy and France lag far behind the other countries. This digital divide is paralleled by a strong economic north–south divide.

Throughout the EU countries, the DIDIX (digital divide index) also shows a divide in terms of education and income. Concerning age, the gap will close, as young people in today's Europe are digitally literate irrespective of country.

### Key issues

In order to form a complete and balanced knowledge society across Europe, taking in each country and population group, the prerequisites have to be tackled. The education sector plays the most important role, since the basis for a knowledge society has to be built, starting in schools. The development of human capital is and will continue to be one of the driving forces for the knowledge society in the future. Special attention needs to be drawn to the following aspects:

- ICT provision and education. ICT lessons and free access to ICT for pupils in schools and at other public locations at any time will ensure digital literacy, independent of social and income aspects;
- English as a language. A good command of the English language is indispensable to guarantee access to the wealth of information on the Internet as well as enabling communication in a globalised world;
- pupil/teacher ratios. A low pupil/teacher ratio, i.e. a small number of pupils per teacher, can be seen as one indicator for high levels of attention as an effective learning support for pupils. This attention helps to facilitate the training and development of the human and social skills of individuals. These skills are an important factor for participation in a knowledge society that encompasses all life and work-related spheres, such as the ability for teamwork, development of better work–life balances as well as job satisfaction and satisfaction with life in general. However, there are further factors (e.g. the education system structure) which also need to be considered and which are just as well relevant to ensure an active participation of a maximum of European citizens in the knowledge society;
- flexibility, sense of responsibility and self-management. The development of critical and logical thinking, together with the ability to take responsibility, is essential and supports individuals in developing the appropriate skills to survive and actively participate in a knowledge society. These skills include the ability to engage in self-directed learning, independent job searches, and flexibility in all life spheres, to name just a few.

On the workers' side, excelling in these aspects will foster digital literacy, global team working and flexibility and will form the basis for employment, wealth and well-being.

On the company side, rigid regulations still need to open up in a few EU Member States to allow for more flexibility for both companies and workers. Openness to innovation becomes a key factor. This includes the willingness and readiness to practise new forms of working including different forms of teleworking, life-long learning, and greater autonomy for workers.

### Strengths

Looking at competition and innovation, the EU has the potential to find its own way, which is likely to differ to that of its competitors, the US and Japan. Currently, Europe lags behind the US and has to close the gap in terms of ICT use and other knowledge society prerequisites. But the EU brings to bear many advantages which can probably best be described as the availability of 'tacit' knowledge, cultural and societal tradition, well established social partnership models and the existence of further regulatory institutional entities supporting a balanced and socially acceptable development and diffusion of innovation.

The population's ability for thinking and acting critically, independently and responsibly, its cultural variety together with tolerance and a well-developed social sense may result in a better working environment and innovation, which, in the end, is likely to be turned into a competitive advantage. To some extent, this is already reflected by labour productivity and patent applications. In addition, governments can improve innovation ability, not only by creating a good education system but also by investing in R&D and thereby pushing technological advances and other innovations forward much faster. There are already some excellent examples of successful Member States in this area, but some European countries lag behind others, hampering a faster development.

The EU acceding and candidate countries match the EU Member States in terms of traditional education measures. However, a considerable gap exists in the penetration of ICT, vocational training and other knowledge society indicators. In order to facilitate a fast catch-up for these countries, positive trends – some of which are already apparent, such as good computer availability at schools or good training evaluation – need to be sustained. An intensification of a knowledge and human capital transfer (e.g. multinational workshops and training, visiting professors, etc) could be another means of improving educational systems and fostering innovation. These should be seen as parallel activities to financial aids, and likely to have a direct impact on the development of a knowledge society in the different states.

## Future research

### Knowledge society framework

It may be worthwhile for future activities in this area to define more comprehensively the term 'knowledge society' and develop a conceptual framework, basically people's views of a future society. This could then be used as a starting point for further indicator development, measurement and benchmarking activities.

So far, discussions about, and measurement and benchmarking activities relating to, the knowledge society have been characterised by indicators for which data can be obtained in a rather straightforward way, easy to quantify. However, policymakers, researchers and statisticians increasingly recognise that, in order to better understand why some societies and economies are more successful than others on their way towards the knowledge society, soft indicators are needed to measure the softer but equally important aspects which are responsible for success or failure.

### Social capital

In this context, the concepts of 'human capital' and 'social capital' have received particular attention. Both are defined in numerous ways, making them hard to measure, but it is believed that a better understanding of social capital will help define further appropriate indicators of the advancements made by societies on their way towards the knowledge society.

Data for these indicators could then be identified and selected from existing statistical sources, where possible, or obtained in representative surveys of different target groups (e.g. population, companies), ideally in the EU 25, and the US as an external benchmarking reference point. The data and analysis results would contribute significantly to a better understanding of social capital, its contribution to wealth creation, economic competitiveness, job creation etc. It would measure and benchmark achievements at a national or regional level.

Careful attention needs to be paid to cultural differences. An indicator which might fit in a Mediterranean country or an acceding country may need to be constructed differently in other countries; or one needs to carry out further investigations to achieve a common indicator.

Several types of measurement would be required:

- population data (gender, age, ethnicity, occupation, region, …)
- attitudinal data (identifying/belonging, values, trust, satisfaction with life, expectations …)
- participation data (formal institutions: parliament, local government … / informal groups: families, networks of neighbours, clubs and societies …)
- enterprise and clustering data (e.g. entrepreneurship rates, regional density of SMEs, networking within and between big companies).

Initial activities in this area already exist at some national statistical offices, such as ONS Statistics UK, and Statistics New Zealand (ONS 2001).

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**http://millenniumindicators.un.org/unsd/mi/mi_goals.asp**

## Annex: List of knowledge society indicators

| Indicator name | Description | Source |
|---|---|---|
| **Infrastructure and resources** | | |
| **Media** | | |
| Mobile phone subscribers | Users of portable telephones subscribing to an automatic public mobile telephone service which provides access to the Public Switched Telephone Network (PSTN) using cellular technology (per 100 inhabitants) | **Eurostat 2002** |
| Internet users | Persons using the Internet (per 100 inhabitants) | **Eurostat 2002 / United Nations Statistics Division** |
| Internet hosts | Computers that are directly connected to the Internet with their own IP address and full two-way access to other nodes on the network (per 100 inhabitants) | **Eurostat 2002** |
| Personal computers | Includes portables, desktops and personal workstations (per 100 inhabitants) | **Eurostat 2002 / United Nations Statistics Division** |
| Daily newspapers | A newspaper thus defined and issued at least four times a week is considered to be a daily newspaper (per 1,000 inhabitants) | **UNESCO Institute for Statistics 1995** |
| Television receivers | All types of receivers for television broadcasts to the general public, including those connected to a cable distribution system; private sets installed in public places are also included as well as communal receivers (per 1,000 inhabitants) | **UNESCO Institute for Statistics 1995** |
| Radio receivers | All types of receivers for radio broadcasts to the general public, including those connected to a cable distribution system; private sets installed in public places are also included as well as communal receivers (per 1,000 inhabitants) | **UNESCO Institute for Statistics 1995** |
| Email users | Internet users who are sending and receiving emails for work or for private purposes (as % of total population) | **SIBIS 2002** |
| Email use and networking | Internet users who are sending and receiving emails and whose friends also have an email address (as % of total population) | **SIBIS 2002** |
| Broadband Internet access | Number of DSL (Digital Subscriber Lines), cable modem lines, fixed wireless broadband, direct satellite broadband and various forms of ‘fibre to the residence’ (per 100 inhabitants) | **OECD 2001** |
| Internet access drop-outs | Internet users who have decided to disconnect from the Internet (as % of total population) | **SIBIS 2002** |
| **Education** | | |
| Pupil / teacher ratio (pre-primary, primary, secondary) | Average number of pupils (students) per teacher at a specific level of education in a given school year. Teachers are defined as persons whose professional activity involves the transmitting of knowledge, attitudes and skills that are stipulated in a formal curriculum programme to students enrolled in a formal educational institution | **UNESCO Institute for Statistics 2000** |
| Number of teaching hours per year in public institutions, by level of education | Net contact time in hours over the school year in public institutions, by level of education | **OECD 2000** |
| Everyday computer availability at home | Mean percentage of 15-year-olds who reported that computers are available to use at home every day | **OECD 2000** |
| Everyday computer availability at school | Mean percentage of 15-year-olds who reported that computers are available to use at school every day | **OECD 2000** |
| Everyday computer usage at home | Mean percentage of 15-year-olds who reported using computers at home every day | **OECD 2000** |
| Everyday computer usage at school | Mean percentage of 15-year-olds who reported using computers at school every day | **OECD 2000** |
| General computer availability in schools | Percentage of computers in schools available to 15-year-olds, as reported by school principals, weighted by student enrolment | **OECD 2000** |
| Computers connected to the Internet | Percentage of computers connected to the Internet in schools, as reported by school principals, weighted by student enrolment | **OECD 2000** |

 

| Indicator name | Description | Source |
|---|---|---|
| **Socio-economics** | | |
| **Employment** | | |
| Standardised overall unemployment rate | Given as ratio of all employees | **Eurostat 2002** |
| Unemployment rates by level of educational attainment of 25 to 64-year-olds (below upper secondary education) | Upper secondary education is provided at high schools, teacher-training schools at this level, and schools of vocational or technical nature. Secondary education consists of ISCED level three, which students generally begin between 13 and 15 years and finish between 17 and 18 years | **OECD 2000** |
| Unemployment rates by level of educational attainment of 25 to 64-year-olds (upper secondary and post-secondary non-tertiary education) | The students of post-secondary non-tertiary education are typically older than those in upper secondary programmes | **OECD 2000** |
| Unemployment rates by level of educational attainment of 25 to 64-year-olds (tertiary type B education) | Tertiary education is provided at universities, teacher-training colleges, higher professional schools and sometimes distance-learning institutions | **OECD 2000** |
| Unemployment rates by level of educational attainment of 25 to 64-year-olds (tertiary type A and advanced research programmes) | This level is reserved for tertiary programmes which lead to the award of an advanced research qualification. The programmes are therefore devoted to advanced study and original research and are not based on course-work only | **OECD 2000** |
| **Training and skills** | | |
| Employees' participation in company-provided courses | Overall participation in all kinds of company -provided training courses as % of total employees | **CVTS 2000** |
| Training enterprises | Share of enterprises offering training to employees as % of all enterprises | **CVTS 2000** |
| Enterprises evaluating the effect of CVT courses | Enterprises measuring the outcomes of training by all types of methods as % of all enterprises providing CVT courses | **CVTS 2000** |
| Employees practising e -learning | Employees using electronic learning materials (online and offline) for training and learning as % of all employees | **SIBIS 2002** |
| Employees participating in self -directed learning | Employees engaging independently in any kind of training not provided by others as % of total labour force | **SIBIS 2002** |
| COQS-index of perceived digital literacy | Compound indicator on ICT -related skills (further details given below) | **SIBIS 2002** |
| **Social inclusion** | | |
| GINI-index on income disparity | In the GINI index, the value 1 means absolute inequality, in which one person gets everything and all others nothing, and the value 0 means absolute equality, in which everyone gets exactly the same | **NewCronos ILC 1998** |
| DIDIX: Digital divide index | Compound indicator on digital divide regarding several risk groups (further details given below) | **Empirica 2002** |
| **Security** | | |
| Effects of security concerns on e-commerce | Security concerns such as loss, abuse and manipulation of personal data preventing e-commerce use as % of Internet users | **SIBIS 2002** |
| **Politics** | | |
| Governmental expenditure on R&D | Given as % of GDP | **OECD 2001** |

 

| Indicator name | Description | Source |
|---|---|---|
| **Applications, outputs, markets** | | |
| **Innovation ability** | | |
| Patent applications | Number of patents handed in at the European Patent Office (EPO) per million workers | **Eurostat 2002** |
| Expenditure on R&D | Company-internal spending on R&D in all sectors as % of GDP | **Eurostat 2002** |
| Labour productivity | Value added per person employed, 1980-2000 growth rate | **ILO KILM 2001-2002** |
| Employees in third sector | Given as ratio of all employees in all sectors | **Eurostat 2002** |
| **Work flexibility** | | |
| AWAI: Adaptability of work arrangements index | Compound indicator on company- and worker-centred work flexibility (further details given below) | **Empirica 2002** |
| Spread of telework (all types) from 1999 to 2002 | Telework usage spread rate including all types of TW (home-based TW, mobile TW, self-employed in SOHO) | **SIBIS 2002** |
| Workers practising tele-cooperation | Tele-cooperation is defined as communication with external contacts through electronic media (such as email, video conference, electronic data transfer). Given as % of all employees | **SIBIS 2002** |
| **E-applications** | | |
| E-commerce use | Users having privately used the Internet to order a product/service or to conduct online banking or to buy a financial product as % of all Internet users | **SIBIS 2002** |
| E-health: search for health related information on the Internet | Users who searched for any kind of health related information on the Internet as % of Internet users | **SIBIS 2002** |
| E-health: necessity of foreign language abilities for e-health information search | Users who had to rely additionally or solely on websites in other languages than their mother tongue in search for health related information as % of all Internet users | **SIBIS 2002** |
| **Wealth and satisfaction** | | |
| Gross domestic product (GDP) | Given as GDP per capita in market prices (PPP per head) | **Eurostat 2002** |
| Perceived job satisfaction | Employees reporting to be satisfied with their job as % of all employees | **SIBIS 2002** |
| Perceived job security | Employees reporting to have no concerns about their job security as % of all employees | **SIBIS 2002** |

*List of additional knowledge society indicators (used in the country profiles)*

| Indicator Name | Description | Source |
|---|---|---|
| Internet dial-up access costs | Monthly basket of local telephone residential charges (peak and off-peak times) for 20 hours per month in USD PPPs | **Eurostat IS statistics pocketbook 2000** |
| (Combined) PISA score | Average PISA score on the reading literacy, mathematical literacy and scientific literacy scale | **OECD PISA 2000** |
| PC use at school | PISA PC use at school as % of students | **OECD PISA 2000** |
| Public social expenditure | Public social expenditure as % of GDP | **OECD 1998/1999** |
| Innovation capacity | Countries ranking on the innovation subindex of the growth competitiveness index (GCI) created by the World Economic Forum | **WEF GCI 2002** |
| Infant mortality rate | Number of deaths per 1,000 newborn | **Eurostat Yearbook 2002** |

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