



SIBIS

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Statistical Indicators Benchmarking the Information Society

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eEurope Benchmarking Framework

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DELIVERABLE SUMMARY SHEET

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Abstract

The main objective of this deliverable is to provide the conceptual and methodological framework for the SIBIS project, and in particular for the development of statistical indicators on the information society in the nine topics covered by the project. The deliverable is the result of research in conducted in WP1. It consists of five components:

1. a general introduction to the SIBIS project with some considerations about definitions, indicators and benchmarking methods to be applied
2. exposés of the nine topics of interest, outlining the major issues and concepts relevant for information society policies and benchmarking
3. a glossary of technical terms relevant to the information society
4. Annex 1: a collection and assessment of relevant information society policy documents in each of the nine topics
5. Annex 2: a collection of statistical sources available with a review of current concepts of statistical indicators on the information society in each of the nine topics

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EXECUTIVE SUMMARY

Objective and rationale of the deliverable

The main objective of this deliverable is to provide the conceptual and methodological framework for the SIBIS project, and in particular for the development of statistical indicators on the information society in the nine topics covered by the project. The report has been developed to guide the work of the SIBIS project through all subsequent phases. As an indispensable starting point, the functions of the "eEurope Benchmarking Framework" are:

- to ensure a common understanding of appropriate definitions across project partners as well as maximal useful compatibility with European statistical standards and definitions
- to help define the scope of the survey work and Topic Research (WP2) and Topic Reports (WP5)
- to agree on basic methodologies for survey and other empirical work and define verifiable quality criteria to be met in subsequent workpackages.

Organisation of the document

The work performed in WP1 and published in this report includes an assessment of eEurope political and reference documents with the aim of achieving an initial set of domains and issues of key importance for EU policy today and in the near future, as well as giving hints as to where fresh data collection is of greatest importance (cf. WP2 and WP3). The starting point for SIBIS was the eEurope action lines.

Due to the broad range of areas affected by the transition to an information society, the development of indicators to benchmark performance and measure progress in this area was built around 9 relevant topics. These are:

- Telecommunication and Access
- Internet for Research
- Security and Trust
- Education
- Work, Employment and Skills
- Social Inclusion
- e-Commerce
- e-Government
- Health

For each topic, one partner served as the lead, carrying out the research and developing the review documents, while another partner provided feedback and quality control.

This deliverable is the result of research in WP1. It consists of five components:

1. an **introduction to the SIBIS project** with general considerations about definitions, indicators and benchmarking methods
2. an **introduction to the nine topics** of interest that outlines major issues and concepts relevant for information society policies in the specific topic
3. a **glossary** of technical terms used in these topics relevant to the information society
4. **Annex 1**: with a collection and assessment of relevant policy documents and analytical approaches on the information society, organised by topic
5. **Annex 2**: a first collection of statistical sources available with a review of current concepts of statistical indicators on the information society in each of the nine topics

The **first section** opens with a general discussion of statistical indicators followed by an explanation of the need for SIBIS. Concepts are then defined that apply to each of the topics. Lastly, the scope of future work is reviewed along with issues of quality assurance. The core of the analysis section is the discussion of each topic.

In the **introduction to the nine topics**, each topic is presented in a similar manner. A framework is defined for assessing the area. This provides the reader with general background on the topic of interest. Next, the stakeholders are identified and their interactions are explained. Based on this foundation, statistical measures and variables of interest are treated. Finally, the topic discussion closes with a proposed methodology to gain reliable and robust indicators that apply to it. Throughout the analysis, the assessment of relevant policy documents and the review of statistical indicators are referenced where applicable.

The **glossary of technical terms** grew out of the need to provide consistent definitions related to the information society. The terms were collected in the process of building the assessment of relevant policy documents and in the review of existing indicators. It is expected that the glossary will continue to evolve during the course of the project. The glossary is currently organised by topic.

The **assessment of relevant policy documents** (Annex 1) and analytical approaches develops a topic structure, contributes input and provides guidance to the analysis section and to WP2 (Topic Research and Indicator Development). For each topic the partners identified relevant policy documents published by the EC or other relevant institutions at EC level (e.g. Eurostat), by the OECD, and by governmental and other relevant institutions in as many countries as possible (including the USA and Japan). These documents were then analysed. In addition to their current use, they will serve to develop a detailed structure and outline of the contents of the Topic Research and Indicator Development (WP2) and Topic Reports (WP5).

Finally, current and emerging **statistical sources** (Annex 2) were identified for inclusion in eEurope indicators. These are relevant statistical documents published by the EC or other relevant institutions at EC level (e.g. Eurostat), at the supranational level like the OECD, and from governmental and other relevant institutions (e.g. national statistical offices/agencies) in as many countries as possible. This section provides an overview of relevant documents and (market) research results from commercial research firms and other sources. The information gleaned for this section was used to support the presentation in the analysis section and will also be taken account of in topic research (WP2).

MAIN DELIVERABLE**SECTION I: INTRODUCTION TO METHODS AND CONCEPTS****1 The SIBIS project – introduction to methods and concepts****1.1 Benchmarking Framework**

With the recent explosive growth of the Internet and its transformation of the way we live, the European Council set objectives for “Europe to become the most competitive and dynamic economy in the world.”¹ The initial objective set in 1999 was to bring Europe on-line. A complement to this was to formulate work strategies in the information society. In the document, the European Commission states broad objectives, seeks to define challenges in achieving them, and presents actions in response to the challenges. One outcome of the objectives was the formulation of the eEurope 2002 Action Plan by the European Council, which seeks to “ensure that the targets set [...] are reached by defining the necessary measures.”² These necessary measures are the indicators that SIBIS seeks to define and measure.

1.2 The Need for SIBIS

The arrival of the information society presents important public policy issues for governments around the world. Because a central focus of virtually all governments is improving their national economies and the lives for their citizens, the potential benefits of the spread of ICTs are very attractive. Particularly attractive are the increases in productivity associated with the application of these ICTs, the higher value-added and reduced natural resource dependence of knowledge intensive industries, and the ability to deliver services such as education and health care via ICTs – all of which hold promise of increasing national economic growth and raising national standards of living. But just as the development of an information society holds promise of increasing prosperity, it also has attendant risks. That is, while the transformative ability of ICTs can be significantly beneficial, there is no guarantee that the benefits of the transformation will be evenly distributed across a nation’s population or among nations.

Because the proliferation of ICTs has the potential to transform virtually every industry, companies which excel in an economic activity may face heightened competition from other companies at home or abroad. Indeed, if those competitors have applied the new ICTs much more effectively than their peers, the competitive position of the other firms may be permanently eroded or destroyed. The transition to the information society can be similarly dislocating for individual members of the labour force. Because of the knowledge and educational requirements for effectively utilising the new technologies, individuals may suddenly discover that their skills are less valuable in an information society. This can be

¹ eEurope 2002, An Information Society For All, Action Plan prepared by The European Commission for the European Council in Feira, 19-20 June 2000. p. 2.

² *ibid.* p. 2.

particularly dislocating for those portions of the population which have the greatest difficulty for a variety of reasons in obtaining the education or retraining needed to compete in a changing labour market.³ The speed with which these societal changes are occurring can make it even more difficult for these segments of the population to adjust and magnifies the gap between the “ICT haves” and the “ICT have nots,” be they individuals, businesses, or nations.

Concern over the potential dislocations caused by the advent of the information society are evident in the discussions of many European governments on the topic and the goals of the eEurope initiative. Specifically, the central goals of the European Commission with respect to the information society are to:

- Bring every citizen, home, school, business, and administration on-line;
- Create a digitally literate and entrepreneurial Europe; and
- Ensure a socially inclusive Information Society.⁴

These objectives recognise the need for nations to understand and mitigate the disruptive effects of the arrival of the information society, while they simultaneously seek to realise the economic benefits of the new technological capabilities. Simultaneously achieving both goals requires that purposeful steps be taken to facilitate the development of the information society and to mitigate the potential dislocation of individuals, groups, or firms due to its arrival. Because much of the activity involved in the development of the information society is controlled by the private sector, efforts by governments to shape or control the evolution and impact of the information society must be carried out in close co-ordination with those entities most intimately involved in these matters.

For governmental organisations to affect and monitor appropriate policies regarding the information society, they must have reliable data upon which to base their decisions and to monitor the results. Such data must provide details and insights into the physical and technological infrastructure of the information society, as well as how the information society affects individuals, groups, firms, industries, economies, etc. These data must also be able to be updated readily so that the effects of policy decisions can be regularly evaluated to determine progress toward goals and to direct adjustments in policies. Ideally, these data should also provide insights into the causal connections between technological changes, social shifts, and policy changes, so that policies can be designed and implemented with a greater awareness of their impacts and outcomes. To be of greatest use, these data must be statistical indicators that are beyond challenge.

1.3 General Background

The rapid and broad spread of information and communication technologies (ICTs) is generating continuing waves of social change throughout Europe and the world. The proliferation of ICTs and their connection via the Internet has caused major shifts in opportunity and activities at various levels of the population. From the individual accessing information resources on his or her home computer, to the small firm reengineering its business model to take advantage of e-commerce, to the multinational firm enjoying easier access to global markets, to government organisations changing how their interactions with their constituents, the spread of ICTs has made a broad range of activities possible that heretofore would have been difficult, if not wholly impossible.

³ European Commission, “Green Paper - Living and Working in the Information Society: People First,” 1996 (<http://www.hamburg.de/English/StadtPol/Europe/peopl1st.htm>)

⁴ http://europa.eu.int/comm/information_society/eeurope/objectives/index_en.htm

The broad transforming power of ICTs is rooted in the fact that making fundamental changes in the basic communication forms and methods of society has the potential to affect almost every type of human or organisational interaction from the very personal to global, macroeconomic levels. The ease of use and the easy availability of information on the Internet have changed the way that individuals interact with each other and with social institutions. New communicating units that combine the strengths of the telephone, facsimile, and computational systems have facilitated basic shifts in the way that work is done and organisations are structured. Changes in the dynamics of information flow and control present new challenges to governmental units, and concomitantly, create new ways for governmental units as well as private organisations to better understand and serve the needs of their clients. At their most basic level, ICTs drastically reduce the cost of obtaining information and increase the ability of humans throughout the world to interact. As a result, ICTs facilitate any process that depends upon or is affected by these ingredients.

From the perspective of business and economic activity, the changes that have thus far resulted from ICTs are considered a “new industrial revolution” because of their far-reaching impact. Besides altering the business models of traditional high technology firms, ICTs have changed the manner in which virtually every industry operates. For example, many farmers now base their planting decisions on data obtained from the satellite-based Global Information System (GIS), and retail merchants are increasingly using sophisticated computer models to specifically tailor their inventories to their customer buying patterns. Clearly, there no longer appear to be any truly “low technology” industries. As a result, the potential impact of the ICT revolution is in many ways far broader and much more profound than previous industrial or social revolutions. In addition, the rapidity with which these new technologies have been dispersed throughout society, as well as the organisational and structural innovations introduced by the ICT industry itself, have ensured that the ICT revolution has occurred with extreme rapidity in comparison to the timeframes involved with previous revolutions. In various places, these shifts in activities have been characterised as the appearance of a “knowledge economy” where information and the ability to process and manipulate it have displaced capital, labour, and natural resources as the dominant factor of production within societies.

From the perspectives of individuals within society, ICTs have made dramatic changes in the ways that people interact with one another as well as how they conduct their daily lives. For example, interactions over the Internet have resulted in an expansion of the definition of human community to include “cyberculture,” which in a short time has developed norms and traditions which differ from cultural norms governing human interactions that occur outside of cyberspace. The sharing of all manner of things (e.g., official forms, books, reports, personal data, etc.) on the Internet has made all types of information readily available to more and more members of society, leading to shifts in the way retail customers deal with commercial firms, the manner in which citizens participate in their governments, the way some patients communicate with their doctors, and the manner in which students communicate with their instructors. Because the new ICTs increasingly transcend national borders and geographic boundaries, they have made it possible for people to gain knowledge of activities taking place in other nations with an immediacy and a greater variety of viewpoints than previously available from more traditional sources.

While the upsides of the ICTs revolution are readily apparent, the downsides are only now beginning to be appreciated. These include threats to the traditional notions of privacy, both directly as well as from the ease of covertly collecting and readily sharing information about the habits and behaviour of vast segments of society. In addition, because of the increase in the amount of information that is readily available on virtually any topic, individuals are now confronted with serious information overload problems, where decision-making is complicated by a lack of reliable mechanisms for evaluating the quality of and effectively processing the information at hand. As a result, the increasing availability of information and the enhanced ability to communicate with one another resulting from the ICTs revolution

must be viewed in the context of a world in which the ability of individuals to control information about themselves is eroding.

1.4 Key Concepts and Definitions

The central objective of SIBIS is the development and testing of statistical indicators that can be used to monitor and benchmark the information society. As a result, the concepts that are critical to guiding this endeavour are “information society,” “statistical indicators,” and “benchmarking.” How these concepts are defined and used will ultimately determine the direction and the success of every aspect of SIBIS. The discussion that follows is envisioned as one that is robust, but not final, regarding the determination of the meaning of these key concepts.

1.4.1 Information Society

The societal changes caused by the recent waves of technological innovation are widely viewed as having resulted in an “information society.” While this label clearly identifies the importance of ICTs and the centrality of knowledge and data in societal shifts, it behoves us for the success of SIBIS to attempt to develop a more rigorous definition of the term if at all possible. In pursuit of this, we first examine several descriptions of what constitutes the information society and attempt to identify their defining theme.

- **Level of Dependence** – An “information society” is characterised by the critical dependence of its economic and cultural life on information and communications technologies.
- **Level of Integration and Interoperability** – An “information society” is a society in which different information technologies are highly interoperable and very user-friendly, thereby facilitating their widespread integration into many aspects of life.^{5,6}
- **Normative Mores** – An “information society” is a society in which the exchange of information among members of a society is considered a “social good,” which should be supported and facilitated by government.
- **International Perspective** – Because a primary element of the “information society” is its global nature, an international viewpoint on problems and solutions is required.⁷
- **Significance** – An “information society” is one in which the creation, diffusion, use, and manipulation of information is the most significant economic and cultural activity.
- **Pervasiveness** – An “information society” is “characterised by a high level of information intensity in the everyday life of most citizens, in most organisations and workplaces; by the use of common or compatible technology for a wide range of personal, social, educational and business activities, and by the ability to transmit, receive and exchange digital data rapidly between places irrespective of distance.”⁸

⁵ The Infoville Project, <http://www.digitalsites.infoville.net/training/informat.htm>

⁶ “Creating a User Friendly Information Society,” <http://www.cordis.lu/esprit/src/istwork.htm>

⁷ Information Society Forum, “A European Way for the Information Society,” 2000. <http://www.poptel.org.uk/nuj/mike/isf/ew.html>

⁸ IBM Community Development Foundation, “The Net Result Report of the National Working Party for Social Inclusion,” 1997.

- **Overwhelmingness** – An “information society” is characterised by the need of citizens to cope with an ever-increasing flow of information on a daily basis. The success of individuals is based on their ability to locate, analyse, and use relevant information while disregarding the much larger volume of irrelevant data.⁹
- **Threat** – An “information society” is one in which there is a ready ability to collect information on individuals and combine databases of previously unconnected personal information, thereby compromising personal privacy.

Judging from the range of definitions of the term “information society” in common use listed above, there is clearly a lack of consensus regarding the meaning of this concept. Because of the critical importance of this term to the success of SIBIS, however, it is imperative that a universal definition of the term “information society” be formulated. In pursuit of this, the following consensus definition is thereby proposed for use throughout SIBIS.

“Information Society” is (1) a society where an increasing portion of societal activities – work, economic transactions, communications, and other interactions between individuals, private sector organisations, and governments – are conducted via ICT networks or are dependent on ICT technologies, all of which are increasingly interoperable; and (2) a society where information and knowledge are increasingly important economic goods at all levels – that is, as determinants of wage levels for individuals, as factors of production for firms, and as sources of competitiveness among nations and regions or both.

Such a definition encompasses both the focus on technology application that pervades most definitions of the term as well as the significance and pervasive application of information in all levels and aspects of society. Using this definition, any threat or information overload experienced at the individual level, rather than being a characteristic of an information society, is instead, a force which inhibits the formation of a “more complete” information society.

1.4.2 Statistical Indicators

Statistical indicators are aggregate measurements about conditions in the world – the characteristics of human populations, political systems, government activities, national or international economies, activities of organisations, etc. – which seek to accurately characterise or represent the underlying conditions to which they refer. Indicators seek to provide an overall picture of a complex system – human society – by describing the characteristics and interrelations of some of its components and showing how they change over time. Indicators attempt to serve as yardsticks for the entire system by reporting on a few of its particularly significant or relevant features. By allowing repeatable measurements of the same behaviours over time, indicators seek to allow monitoring of social changes, measurement of changes in welfare within societies, and, potentially, insights into the sources of the shifts. Indicators are also designed to monitor situations that individual observers, collared by their own preconceptions or prejudices, would most likely evaluate inaccurately or miss altogether.

The construction of reliable, relevant, and useful indicators from statistical data on the activities and decisions of the members of society is not a simple process. In order to create indicators that truly relate to societal outcomes and are most useful for policy-making, a number of issues need to be considered. Indicators should be:

⁹ http://www.ed.gov/databases/ERIC_Digests/ed327216.html

- **Outcome Focused** – It is critical that an indicator reflect the resulting social outcomes that are of concern. If design decisions are based only on whether numbers are easily measured or already collected and adequate consideration is not given to the connection between those values and the outcomes of interest, the resultant “indicators” will not be useful.
- **Complete** – When seeking to describe a given social result, it is important that indicators take into account all relevant routes to obtaining that outcome. If an indicator captures only one source of a result and ignores others, its usefulness will be compromised.
- **Causatively Informative** – Good indicators should help provide insights into the causes of societal outcomes in addition to their symptoms.
- **Clear** – The connection between the measurements that make up the indicators and the social outcome it seeks to reflect should be unambiguous to all populations who need to understand and use it.
- **Policy Relevant** – Indicators should be designed so they are relevant for policy-makers in the area. Without the connection to policy, the indicator will have little effect on outcomes.
- **Publicly Defensible** – The measurements that serve as the basis of indicators should be reproducible and verifiable. The construction of the indicator and justification for its use must stand up to public scrutiny and challenge.
- **Technology Neutral** – When examining the information society, an area intimately connected with technology and innovative progress, it is critical that indicators not be limited to specific technologies or industries.
- **Stable through Time or Able to be Updated** – Because one of the main functions of indicators is to measure outcomes consistently through time, it should be possible to compare the results of measurements over long periods. If an indicator cannot be measured precisely the same way indefinitely, it is imperative that routes exist to revise and refine it so that the indicator will continue to be a useful measure.
- **Not Geographically Specific** – Because of the importance of benchmarking as an application of these indicators, it is critical that they be constructed in a way which facilitates comparison between disparate regions and nations.
- **Distributionally Sensitive** – If indicators mask differences in the ways social change affects different parts of the population, policies may be designed which do not properly address or may even aggravate the inequality. As a result, indicators should contain information about how the impacts of changes are spread across the population.

While it is clear that not all indicators will meet all of the criteria listed above, such a listing provides a framework to understand and evaluate the strengths and weaknesses of individual indicators during the design process. In the event that changes can be made to an indicator to strengthen it, such a list provides a guide for such strengthening. If analysis demonstrates that single indicators cannot fulfil all the listed requirements, such an examination can justify the use of multiple indicators for a given area. In either case and for all indicators, it is particularly important to rigorously characterise the strengths and weaknesses of each individual measure before it is used to shape policy.

When designing effective and efficient government policies, statistical indicators can be particularly useful. The relationship of indicators to activities within a nation’s society and, consequently, to government policies which seek to regulate those activities is shown. At the most general level, the activities performed and choices made by individuals within a nation

determine the overall outcomes of the social group as a whole. Governments, via policy-making and regulation, seek to affect the overall outcomes for their national societies by guiding the behaviours and activities of their citizens. In designing these policy interventions, governments use various sources of information. The two types of information which are most relevant to this project are statistical data and statistical indicators.

Basic statistical data about the activities of a nation's citizens, which provide some description of individual's behaviour and activities, provide insight into the targets of public policy and how laws and regulations should be designed. Such basic numbers, however, do not get at the true goals of public policy – overall changes in social outcomes that result from the behaviours being measured. In order to address this topic more directly, basic data must be converted into statistical indicators – values which seek not only to be more broadly representative but also to address the fundamental outcomes of interest to policymakers. Because indicators are tied to the outcomes of policy and seek to report on the most relevant societal characteristics in particular areas, they can be used for a number of policy related functions. These include:

- **Policy Outcomes Evaluation** – Indicators can help determine the effects of a given policy decision and characterise the scope of both the intended and unintended outcomes of the change;
- **Policy Effectiveness Evaluation** – Indicators can allow determinations of how cost effective, efficient, or how well implemented policies are by providing a way of comparing the resources they use to obtain a given societal output; and
- **Benchmarking** – Indicators facilitate comparison of societal performance within and among nations and over time.

Because both national governments and the European Union are interested in effective policy-making and appropriate resource utilisation, both are clearly important and relevant rationales for the construction of indicators for SIBIS. Without appropriate measures that truly reflect the desired outcomes of policy, it is impossible to impartially determine the effectiveness of strategies and guide national or continent-wide improvement. Of particular relevance for the Europe-wide scope of this effort is benchmarking, which focuses on the use of indicators as a way to compare, integrate, and understand the effects of policies among different nations and social systems.

1.4.3 Benchmarking

To better understand the activities or performance of an individual human organisation – whether that organisation is a group of individuals, a commercial firm, or a nation – it is common practice to compare the effectiveness of the organisation's activities with some abstract standard or with the performance levels of similar groups. These processes of comparison, known as benchmarking, provide ways of characterising whether certain policies or strategies are relatively effective or ineffective in the absence of an absolute or impartial scale for objective evaluation. For the purpose of this discussion, two types of benchmarking will be considered:

- **Absolute Benchmarking** – The definition of abstract standards of performance against which an organisation or nation evaluates its own activities; and
- **Relative Benchmarking** – Evaluation of performance of a organisation or nation by comparing the effects of its strategies and choices against the performance of others.

Central to the notion of benchmarking is that it provides a standard of comparison, a reference point for determining the current position of the organisation, and more importantly, suggests better positions that the organisation might work toward. Through the process of benchmarking, individual organisations also seek to identify the “best practices” or most

successful strategies of others, better understand how they work, and devise ways in which to adapt and apply them to improve their own performance.

In the context most relevant to this endeavour, the process of relative benchmarking seeks to understand policy decisions taken by individual European nations, identify the sources of their success and reasons for their effectiveness, and apply those lessons to policies across the continent to promote development of a better, more equitable, and broadly beneficial information society for all of Europe. Such efforts allow countries to benefit from both the successes and mistakes of others, thereby reducing the potential costs of trying new policies for all countries. In addition, the process allows faster evolution to effective policies by taking advantage of tested and proven practices. Relative benchmarking is also particularly important in dealing with the practicalities of the political process; legitimate and defensible comparisons among nations can be very effective not only in building support for specific policies that have been demonstrated elsewhere but also simply to provide evidence of the need for action in the light of an arms-length comparison to others.

At the most basic level, the process of benchmarking relies on the development and application of good indicators. In absolute benchmarking, it is the value of a relevant indicator which provides the performance goal that policies are intended to achieve; without relevant and appropriate indicators, the process of benchmarking cannot be effective. Relative benchmarking requires the comparison of relevant indicators from group to group or nation to nation. By examining how policy choices affect the values of the indicators associated with the organisations under comparison, conclusions are drawn about the relative success or failure of the policy strategies. As a result, the process of benchmarking is enabled by the development of indicators that can be legitimately and readily compared among different groups of interest. In this case, the need for indicators suitable to benchmark the development of the information society across Europe underscores the importance of developing indicators amenable to cross country comparisons. Indicators that are sensitive to differences in population or area of nations, for example, would be less suitable for such continent-wide comparisons than indicators which are not. This need for comparability is an important consideration for all the indicators in this project and should be a primary consideration throughout discussions. Furthermore, independent of whether an absolute or relative strategy is adopted, the most useful benchmarks should not simply be individual descriptive statistics. Instead, they should also provide insight into the reasons why differences in performance exist. With this additional insight, such benchmarks provide immediate and unambiguous guidance on how to improve the performance of an under-performing organisation or nation.

1.5 Domains, Issues and Topics

Due to the wide range of areas affected by the transition to an information society and the variety of the topics involved, the development of indicators to benchmark events and measure progress in this area must be segmented. It is our understanding that consensus has already been reached among members of the SIBIS team that the nine areas in which benchmarking indicators are to be developed are:

1. Telecommunication and Access
2. Internet for Research
3. Security and Trust
4. Education
5. Work, Employment and Skills
6. Social Inclusion
7. e-Commerce

8. e-Government

9. e-Health

While it is clear that efforts were made to make these topic areas mutually exclusive, there remains a degree of overlap among them. Hence, in the discussion of the each of the nine areas, the appropriate boundaries between and among related topic areas are suggested. Such separations were specifically designed to facilitate the development of indicators by SIBIS participants and others without having to worry about extensive overlap or duplication. Also note that the scope of several of the topic areas is quite broad to ensure that the indicators developed under the auspices of SIBIS cover as many aspects of the information society as possible.

1.6 Scope of Future Work

Although it is beyond the scope of the current document to comprehensively review the current statistical sources on these areas throughout Europe, it is clear that a significant number of already extant surveys can feed into these efforts. Data collected by Eurostat¹⁰ and the OECD¹¹ are clearly relevant for this work. In addition, data collected by organisations not connected with government can also play a part. For example, the European Information Technology Observatory,¹² a coalition of relevant industry groups, collects data that is particularly pertinent for these topics.

1.7 Quality Criteria and Quality Assurance

At the SIBIS kick-off meeting in January 2001, quality assurance was addressed via internal project reviews, conference participation, the EEAG (External Expert Advisory Group), and the official project review meetings. Remaining is the need to define verifiable quality criteria that are to be met in subsequent work packages.

¹⁰ <http://europa.eu.int/comm/eurostat>

¹¹ <http://www.oecd.org/statistics/>; <http://www.oecd.org/dsti/sti/it/>

¹² <http://www.eito.com>

SECTION II: TOPIC OUTLINES

2 Telecommunications and Access

2.1 Framework for Assessing the Area

The topic of telecommunications and access is both wide ranging and 'horizontal' in nature. It is wide-ranging as it covers both the physical networks over which information is carried, as well as the means to accessing those networks. It is 'horizontal' because it cuts across many of the other priority action lines of the eEurope initiative. In many ways the topic can be considered an 'enabler' – it allows the other eEurope domains to 'happen'.

For this study we have interpreted the term 'telecommunications' very broadly to include all the networks (cable, mobile, Internet, as well as copper wire) over which all types of information (voice, data, sound, image) are carried. So, although we concentrate on telephony networks, we also look at computer networks, the Internet, cable (TV as well as telephony), and wireless forms of transmission. Overall, perhaps a more accurate descriptor in these circumstances would be 'communications'.

'Access' is another loose descriptor. We have defined it formally as 'the ability to retrieve data, graphics, sound, text etc whether on-line or offline'. Translated into the context of eEurope we cover the wide range of means by which users access electronic 'information' – e.g. computers, telephones, multimedia kiosks, televisions etc.

In terms of defining the statistical boundaries within which our study is conducted, fixed telecommunications networks have been in existence for over 100 years, so there has been plenty of time for statisticians, users and the industry to have developed indicators. These typically measure the size and growth of the market and different technologies and are used as an aid to predicting revenues, profits, universality and potentiality. However, newer forms of network – wireless, the Internet (computer use and telephony), cable (TV and telephony), radio – have not been subjected to such long term scrutiny. And, indeed, although basic indicators for public switched telephone networks (PSTNs) are widely available, commonly collected data from different sources can still be conflicting, and more sophisticated and elaborate indicators such as composite indicators are rarely available. Similarly, although basic indicators exist for newer technologies (and these are becoming more common) in many instances they are also often not comparable, nor yet ready to meet the challenge of emerging topics of interest. Examples of the latter include the ability to robustly measure VOIP (Voice over Internet Protocol), broadband penetration levels, broadband technologies or the use of alternative technologies.

The same issues apply to access mechanisms. Although telephone (fixed, mobile) and television ownership rates are well known, there is less information on the extent to which newer forms of access mechanism are available or used. New channels include digital TV, Internet-enabled phones, and interactive TV. Emerging channels will include the new generation of 3G products.

Finally, we do not cover 'content' in this topic. Although tremendously interesting, it is an entire domain in itself, and would increase the necessary research to facilitate indicator development by about 100%. Neither do we include ICT market size or productivity issues.

2.2 Identification of the Stakeholders and their Interactions

The main groups stakeholders involved in indicator generation and indicator use are as follows (in no particular order):

TABLE 2.1 – STAKEHOLDERS FOR TELECOMMUNICATIONS AND ACCESS

Indicator Generation	Indicator Use
Statistical agencies – national and European	Industry – telecommunications operators, equipment manufacturers
Policy bodies	Regulators – there is one in each MS
Analysts and Consultants	Policy bodies
Industry	Analysts and Consultants
Regulators	Users – consumers, ‘watchdogs’
Publishers – IDC, Forrester etc	
Data Generators – such as RIPE, NetWizards etc	

There is a lot of formal interaction between certain groups – especially between regulators and the industry (statutory obligations) and regulators and policymakers (key channel for policy making). Given the economic strength of the telecoms sector, and the perceived European lead in 3G telecoms, there can also be strong relationships between analysts, consultants, data publishers and the industry. In many instances information transfer is quite open and transparent.

2.3 Statistical Measures and Variables of Interest

Most indicators currently available tend to count ‘the number of something’ such as mobile ownership, Internet hosts or ISDN lines per 1000 head of population or by percentage of SMEs, for example. There has been a distinct concentration on the penetration of technologies and on access levels (so-called ‘readiness’ indicators), with less information available on the uses to which this access has been put, or on ‘who is doing what’ (usage indicators). There is even less information available on the impact of the use of new technologies. For example, there is plenty of material on the numbers of SMEs with access to the Internet. There is less data on what the firms are using the Internet for (e.g. is it mainly passive information collection or are active transactions being carried out?) There is even less information available on the difference that the Internet has made to the company (impact indicators) - its turnover, profit, operating efficiency, or marketing strategies, for example.

Turning our attention to the eEurope priorities – bearing in mind several of the telecommunications and access measures are policy-focused and are not particularly relevant to the collection of statistics – we can see variations in indicator availability:

TABLE 2.2 – IDENTIFICATION OF ACTIONS AND OF THE AVAILABILITY OF INDICATORS IN TELECOMMUNICATIONS AND ACCESS

Action	Existing Indicators?
Achieve significant reductions in Internet access tariffs towards the lowest levels in the world by reinforcing competition and clear benchmarking at European and national level.	YES, OECD publishes 6 monthly data
Adopt the five directives ¹³ for the new framework for electronic communications and associated services; Adopt the new Commission Directive on Competition in Communication Services ¹⁴ .	Unknown, but presumably YES – within the EC
Work towards introducing greater competition in local access networks and unbundling of the local loop.	Partial – OECD statistics, World Bank and national regulators
Improve the co-ordination of the European frequency policy framework. (see next as well)	NO. Need adoption of EC Decision on Regulatory Framework for radio spectrum policy.
Co-ordinated allocation of frequencies for multimedia wireless systems	NO. As previous.
Where necessary, public financing instruments will give increased priority to supporting the development of information infrastructure, notably in the less-favoured regions.	Partial/Unknown Some (not all) MS have universal service obligations. Also a DGREGIO study is due to start on the use of Structural Funds to support the development of the IS
Move towards full conversion to IPv6 through pilot implementation in Europe. Key telecom and manufacturer industries will be mobilised together with service providers and users.	NO. Ad-hoc working group set up to accelerate adoption of Ipv6
Reduce prices for leased lines by increasing competition and ensuring implementation of the Commission Recommendation.	YES, partial. OECD, Regulators and consultancies

Examination of the common types of indicator currently available (see table below) shows that there is relatively little cross-over with the priorities of eEurope. If we want to pursue the creation of eEurope-relevant indicators, then we are likely to end up with a different set of

¹³ These Directives concern the overall framework, access and interconnection, authorisation and licences, universal service and data protection.

¹⁴ Full title: *Commission Directive amending and consolidating Directive 90/388 on Competition in the Markets for Electronic Communication Services.*

indicators than if we concentrated on looking at ‘telecommunications and access’ priorities. The table below highlights some of these differences:

TABLE 2.3 – COMMON INDICATORS FOR eEUROPE PRIORITIES AND FOR TELECOMMUNICATIONS AND ACCESS PRIORITIES

Potential Focus Areas for Indicators for eEurope Priorities	Potential Focus Areas for Indicators for Telecommunications and Access Priorities
Progress in unbundling the local loop	Measures of adoption of new technologies
Progress in adoption of various Directives	Measures of adoption of new access mechanisms
Benchmark of use of public funds to support LFR infrastructure development	Pricing of new technologies/products
Progress in adoption and rollout of Ipv6	Progress in adoption and rollout of Ipv6
Comparing telecommunications competition across MS	Impact measures of adoption of technologies/access mechanisms
	Composite measures of telecommunications and access ‘readiness’, use and impact

Under the SIBIS project, most measures of eEurope policy adoption will be collected under workpackage 4, so for the rest of this paper we will concentrate on looking at generic telecommunications and access priorities.

Whilst we are not yet at the stage of defining precisely which indicators should be developed under the SIBIS project, we can begin to codify some initial thoughts. Measures of the **availability** of telecommunications networks and access mechanisms are, generally speaking, already in the public domain. However, their existence is variable (particularly with regard to emerging technologies) and more work could usefully be done in this area. Measures of **accessibility** in terms of cost, frequency or quality (e.g. speed) are less prevalent, and more work could be carried out, whilst measures of **use** (what do organisations/individuals do with connectivity) are scarcer still. **Impact** measures (what difference have telecoms and access made to communication, efficiency, effectiveness, productivity, social democracy, education and training etc) are even rarer. Fortunately, within the context of the SIBIS project, it is possible that some of these more ‘extended’ questions about impact may be addressed under other activity lines.

2.4 Methodology

As there is already quite a lot of statistical data in the public domain, it would seem useful to try to combine some of the existing measures into new indicators as well as collecting new data for those measures where there are currently gaps. An example of the latter are indicators of policy-related importance, where knowledge is fragmented. However, as it is not yet clear upon which indicators or measures it will be the most appropriate to concentrate, (this will be further defined under the next SIBIS workpackage), the following text on approaches to data collection is somewhat generic.

Data collection is likely to involve both primary and secondary research. Much of the latter has already been done under workpackage 1.3, but this will be expanded and updated under workpackage 2.1. For the former we can envisage using a mixture of short questionnaires

(cost effective, giving hard data which can be compared across nations), and telephone or personal interviews. The latter could be of the omnibus variety (particularly for consumer information), or especially tailored for the purpose. Both types of survey would give data on availability/access/use and impact indicators. They have the overriding advantage that they can be customised, and will elicit primary data which is not easily available elsewhere, and which will be directly comparable.

Returning to the topic of composite indicators – combining two or more (probably existing) measures into a composite indicator- it is acknowledged that this approach can be methodologically risky. For example it is quite likely that the base indicators have not been calculated on the same basis, or using the same sample. However, composite indicators can be very rewarding, useful and interesting. Whilst they may not irrefutably demonstrate a cause and effect relationship, they can be indicative of something, or a propensity to do something – and can often provoke further questions; the answers to which can be particularly illuminating.

Taking a simplistic (hypothetical) example, we might want to look at GDP per capita by Member State (available from Eurostat) and consumer ownership of computers (available from EITO). The results can enable us to see if there is a correlation between wealth and computer ownership. Without looking at the figures, we would instinctively expect there to be a positive correlation. But it may be that a Member State with relatively low GDP per capita shows high ownership of computers. The interest for a policymaker would be to ask ‘why’ a ‘counter-intuitive’ situation has occurred. In our fictitious example, the answer could be that the computer purchase for households has been subsidised by the State.

We could then build on this composite indicator by asking a third question. This could either be an existing indicator, or a brand new question which is not covered by existing information – such as asking about the impact of computer ownership has. An example of combining our first two indicators with a publicly available third measure might be to look at revenue from local calls, or the diversity of Internet call packages or the average usage time per connection.

3 Internet for Research and Experimental Development (R&D)

3.1 Framework for assessing the Area

The OECD defines research and development (R&D) as creative work that is undertaken on a systematic basis in order to increase the stock of knowledge and the use of this stock of knowledge to devise new applications (Frascati Manual, OECD 1994, p. 29). This definition of R&D makes use of two elements: The first is on an input level, stating that R&D requires creative and systematic work. The second is on an output level, as R&D has to create new knowledge or, in other words, find solutions for problems that cannot be answered with the available knowledge and techniques.

The second part of the definition which focuses on the goal of R&D is of special importance for understanding its uniqueness. Creative and systematic work can be carried out for similar but nevertheless different goals. For example, an artist usually is very creative and he might be very systematic in his work too, generating a new opus in the field of music, literature or the fine arts. But, an artist's work is (usually) not targeted at answering natural, social or technical questions and solving problems in one or more of these areas. The creative work is justified by itself, whereas the creative work of a scientist always has to pursue some goals. That doesn't mean, that a researcher's work and its results have to be immediately applicable and useful to the society. They can also deal with basic problems that for the time being "only" increase the understanding of nature, the society or a technical field. But they have to be based on a problem and, one of the most important and crucial tasks of each researcher is to properly define his problem(s) and outline the path for dealing with it scientifically.

A scientist also pursues different goals from a business manager who introduces new products into the market to raise his profit, market-share or gain a dominant position in the market. Many innovations have their roots in R&D results, but innovations are not the same as R&D results: the latter can be scientific publications or speeches, inventions which are utilised never, only once or everywhere in the world and, which are available free of charge or only for high licence fees, protected by patents or trademarks. Innovations, on the other hand, are new products, processes or forms of organisation that have been introduced into the market (Oslo Manual, OECD 1997, p. 31). For this market introduction typically additional activities are indispensable, such as market research on available products, competition, possible returns, optimal sales strategies and other activities that are not associated with R&D.

R&D is not the same as education either, though scientists many times work in both functions. While R&D aims at extending the boundaries of knowledge, education primarily has the objective of teaching the important things within these boundaries. Thus, education is the foundation of self-reproduction of science and, doubtless the borders between research and education are anything but clear cut; for example the insights gained in the process of teaching often constitute inputs into research. Nevertheless, in this part of the study it will be supposed that research and education can be separated analytically, and a separate research topic of SIBIS will deal with education issues.

It will not be important for the current analysis whether an organisation that carries out R&D is public or private: Universities, public research institutes, R&D-departments of large enterprises or the researcher-innovator who develops a new product and founds a new company, they all are included. And, the study will not only cover the research on informatics or even more specifically on the Internet, but it will try to investigate the utilisation of the Internet and its effects that in the social sciences and humanities as well as that in the natural sciences and engineering. Of course, it might not be possible to cover the entire world of science within one project and, consequently it might be necessary to use single

domains as examples. But at least to some extent it should be possible to generalise the findings and use them as pilot results for future studies.

3.2 Identification of Stakeholders and their Interactions

Who cares about the potentials of the Internet for R&D and who is affected by the use of it? There are three levels of involvement in research activities that can be differentiated:

- Highest level: researchers and their assistants,
- Medium level: research managers, research-related services, research associations and administrations,
- Lowest level: principals and customers of research activities.

As the Internet was developed by scientists to support their rising need to communicate and exchange information and data, it is not too astounding that it is the R&D personnel in universities and business enterprises who still benefits a lot from the Internet as an input into their research activities.

But it is not only scientists who profit from the Internet, it is also the people who are responsible for optimising the relation between input and output of research activities. Research managers use the Internet to communicate with researchers at different places, to inform them of new developments, ideas, guidelines or objectives, and to monitor the research results. Other institutions, such as libraries, polling institutes and other research-related services, find it easier to offer their services to scientists. However, some of them also have to look for new products and new ways of creating additional value, as their products increasingly become available for free via the World Wide Web. In the field of R&D this especially holds true for science publishers who are confronted with researchers distributing their research results on-line and asking for smaller time lags between the termination of a research project and the publication of its findings. Also, research associations which could also be considered as providing specific services to the individual researcher and research administrations profit from the new electronic means of communication.

And finally, it is not only the researchers and their "satellite organisations" who embrace the novel opportunities of the Internet and try to come to grips with its threats, it is also business enterprises, politicians and society in general. In many cases they are the principals and customers of research activities who profit from more efficient research and more findings by whatever means they are achieved.

The present study will focus on the first and second levels of involvement and develop indicators that reflect the utilisation of the Internet by scientists, research managers and the providers of the most important services for research activities, including research associations and administrations. Within its new strategy of creating a **European research area**, laid down at the Lisbon summit, the European Commission also introduced the goal of increasing pan European networks within the research and development system as well as across its boundaries. Therefore it will create additional value for monitoring European research policy, if indicators can be constructed that measure the Internet-based interaction among researchers, national and European institutions in the field of R&D-policy and other important agents in this field.

3.3 Statistical Measures and Variables of Interest

Looking at the definition of R&D and at the major stakeholders it is possible to separate three different perspectives which are useful, too, to make a distinction between types of indicators:

- a) The first perspective could be labelled *process-oriented*, as it looks at individual steps of the research process where researchers use the Internet to carry out tasks of their research work.
- b) A second perspective would be classified appropriately as *institution-oriented*, as it tries to measure those cases, where researchers and other stakeholders (of the second level of involvement in research activities) use the Internet to interact with each other in the more formalised framework of a working party, research group or research institute.
- c) The third approach is one that considers the Internet itself as a topic and object of scientific research.

3.3.1 The Internet as an Input Into Research Processes

The Internet frequently is described as one huge storage space of information. Now, information constitutes one, if not the major input into research activities: primary information on real world phenomena that can be counted and quantified; secondary information that contains primary information collected by other researchers or specialised institutions such as statistical offices; analyses of both primary and secondary data, including interpretations of their significance for solving research problems; theoretical models which abstract from single cases and point out the causalities between explanatory and endogenous variables – all can be found on the Internet.

Primary data can be assessed via the Internet by means of

- The number of Internet sessions, of websites visited, of terms entered in search engines,
- surveys, experiments and discussions that are carried out on-line or questionnaires that are distributed through e-mail,
- remote-controlled instruments that carry out pre-programmed procedures and sequences,
- distributed computing, where linked computers solve parts of the same problem at the same time and (often) in different places.

Secondary data as well as information on the work of other researchers and ongoing advancements of the state of knowledge can be assessed from:

- Databases containing primary data assembled by others,
- digital libraries, as a specific form of database containing entire electronic publications, or electronic catalogues from conventional libraries at least providing information on the location and main contents of publications.

Besides this one-way information retrieval, the Internet functions as a means of communication and of disseminating information. It is used as a blackboard or market place for making ideas and problems as well as answers and results known to the scientific community and many times to anybody else who is interested. This happens for example via:

- Mailing lists and discussion groups, where e-mail is the main channel of communication on pre-determined topics. Some are filtered by humans or programs of varying degrees of sophistication.
- On-line journals, e-books or other electronic publications that on the one hand work one way, i.e. permit the download of information with or without charge, and on the other hand also can be open in two directions by permitting the reader to attach annotations, suggestions and critique to a publication.
- Previously announced and planned virtual discussions, seminars or conferences, where selected entrants are allowed to interact in the same or a similar way as in real events.

How intensive these techniques of information retrieval and communication are used can be calculated on the basis of surveys. It will be a lot more difficult to assess their effects as it is virtually impossible to construct an R&D landscape that doesn't make use of Internet technologies. So the question "How much and what kind of R&D output would be produced without the Internet?" is virtually impossible to answer. Using time series or comparing research output at different points in time also only yields unsatisfactory results, as many additional factors influence the output of R&D activities.

A pre-condition for using efficacious techniques of information retrieval and communication is the existence of an appropriate infrastructure. While in former times insufficient computing power was one of the main barriers for many computational problems and applications, with the later increase in PC performance this problem has lost importance. Nonetheless it has not become irrelevant, as newer developments of shared computing and Grids prove. The spread of shared computing and Grids, the spread and transmission capacity of national networks reserved for research applications and the connectivity to pan national research networks (such as TEN-155 and its successor Géant in Europe) are possible indicators for the computing and transmission capacities available to the research communities of a country.

3.3.2 The Internet as an Institution-Builder

In some cases the rising opportunities of annulling the limits of geography have lead to a more intensive institutionalisation of long distance co-operations. Then, mostly a determined set of participants (scientists, research institutes, laboratories) have formed virtual working parties, research groups or networks. The OECD coins for such research groups the term "collaboratory". These are typically large and co-operative research groups that are geographically dispersed, yet co-ordinated as if they were at one location and under the guidance of a single director. They provide access to colleagues and to equipment, software and databases that are traditionally part of laboratory organisation, without regard to geography (OECD 1998, p. 19). Such collaboratories can exist at national as well as at international levels and a simple yet informative indicator is the number of researchers and research institutes participating in collaboratories per country. It might be possible to design even more sophisticated indicators, e.g. the number of collaboratories hosted and directed by a country, the percentage of research fields with participants in collaboratories per country, the commitment of the partners to collaboratories etc. But the basic and most important input will be to assess the number of collaboratories and their participants from Western Europe.

As these novel forms of co-operation and networking create new virtual research groups they also open up new and more efficient ways for the diffusion of research results. This might lead to spillover effects within research groups but also across their boundaries, between research groups and among researchers and other economic agents, not only generating additional scientific value but also additional economic value. There have been some efforts

to assess the economic growth effects of research in general, but indicator building is still in its infancy.

3.3.3 The Internet as an Object of Scientific Research

The last perspective for looking at the effects of the Internet on research is one that looks at the spread of Internet-related research. Potential questions to assess how much research on Internet issues is taking place in each country would be:

- How many scientific publications on technical aspects of the Internet appear per country in the leading technical and engineering journals?
- Where do the authors of publications on the socio-economic and cultural aspects of the usage and spread of the Internet come from?
- Where do the leading researchers on methodological issues of Internet-based research come from?
- How many chairs and research departments can be found at universities that investigate different aspects of the Internet?

The answers to each of these questions could be used as an input in forming an indicator that reflects the significance of research on the Internet in a country. But, though this perspective without doubt can deliver important insights into the international disparities of Internet research, it will not be in the centre of this study. Network technologies such as the Internet should be considered as general purpose technologies and the largest productivity benefits for an economy will result from their large-scale diffusion. Nevertheless, it might be worthwhile to assemble one or two indicators on the strengths of Internet research, too, as sometimes the adoption of an innovation is a decreasing function of distance to the innovator.

3.4 Methodology

The basic problem that renders the development of indicators on the Internet and R&D difficult is a fundamental lack of statistical data. As documented in the report on available statistical documents and databases, most indicators on R&D with international coverage are assembled and published by the OECD. **Main Science and Technology Indicators (MSTI)** is the most important database containing among others data on R&D expenditures, R&D personnel and patents. These indicators deliver useful insights into the inputs for R&D activities and their output, but they are not detailed enough to tell anything about the usage and significance of ICT. Yet they might serve as parts of an indicator or an index constructed for monitoring ICT usage, as they are functional to normalise and standardise the data and to eliminate the effects of a country's size. The same applies for publication and citation indexes. If detailed enough, they can also convey information on the output of scientific research, e.g. in the computer sciences and related domains.

For finding out to what extent researchers make use of ICT for information search and communication, the easiest way would be to ask them directly. This might be done e.g. by means of an on-line survey, though this method entails a slight danger of introducing a bias in respect to ICT affinity. Another method for assessing ICT usage might be to analyse data on hits of important scientific websites, such as on-line databases, e-journals, or on-line stores for scientific customers. This method, of course, depends on the willingness of webmasters to make information on the provenience of their customers and users available. The same applies to international research associations which should be aware of important remote-controlled research instruments, large scale distributed computing or collaboratories

in their domain. Some data on these issues is likely to be available on the Web. A survey on this topic should show how these activities began and what other applications of this technology might yield. Much of this information is likely to be anecdotal, rather than systematic, however.

Another important source of qualitative information is international organisations like the OECD and national research administrations and foundations. They should know about the capacities of R&D infrastructure in their countries. The data should either be reachable through web-based investigation or by contacting the relevant organisations.

All in all, it seems that especially qualitative information is relatively accessible and easy to come by, whereas for quantitative facts and figures a questionnaire-based survey of important stakeholders will be indispensable.

4 Security and Trust

4.1 Framework for Assessing the Area

Individual concerns about privacy, security, and the use of information about their preferences and activities are an important barrier to the formation of an effective and broad-based information society. If individuals distrust sending the identifying or financial information over the Internet that is needed to complete transactions, the fraction of commercial and societal activities which can benefit from transition to the electronic medium will be significantly restricted. As a result, insufficient protection (or a perception of insufficient protection) of personal privacy and security in these systems is a potentially serious impediment in the development of the information society and, therefore, is important from the policy perspective.

From the viewpoint of the commercial sector, issues in this area are somewhat different. One of the main benefits seen by firms in the formation of an information society is the opportunity to use information about consumers to target their marketing strategies, understand their customer bases, devise new products, and improve the efficiency of their internal operations. If, for example, access to comprehensive information on individual preferences and purchasing habits allows a firm to precisely target its marketing campaign, it may be possible for the company to generate the same level of sales for a fraction of the cost of a “traditional” broad based marketing effort.

Acknowledging that security and trust are important issues in the development of the e-economy and the information society, eEurope documents state that “the market should, as far as possible, be left to determine the adequate amount of security for user needs.” Without good performance indicators in this area, firms, security suppliers, and consumers will be unable to make informed decisions about the current or desired level of security and privacy.

4.2 Identification of the Stakeholders and their Interactions

Individual consumers stand out as a most important stakeholder in this area. Important data from their perspective include both their beliefs about the level of privacy and security protection that is desirable, and at the same time, their perception of the current level of protection provided by procedural, legal, and technological mechanisms. In addition, a significant number of organisations and coalitions are actively involved in this area that represent various aspects of consumer interests and concerns. Concomitantly, commercial firms in all business sectors – from purely Internet firms to the most traditional “Old Economy” companies – have an important interest in this topic. While the interests of firms and consumers often coincide in the area of security – since both groups gain from prevention of fraud or ICT mediated theft – their interests often diverge in the area of personal privacy and data usage. While firms are concerned about how these issues affect individuals’ purchasing and consumption patterns, they also have legitimate concerns about how restrictions on the use of databases, information collection, and other ICT tools might affect their business and limit the economic benefit of the information society. A subset of firms, focusing on technologies such as encryption, smart cards, biometrics, or other protections, have shaped their business strategies around producing technological answers to these concerns. Regulators and policy-makers seek to balance these sets of competing interests in this area for the overall benefit of society-as-a-whole.

4.3 Statistical Measures and Variables of Internet

Indicators in the trust and security area could potentially be important information for both public and private decision makers. These indicators fall into the following broad categories which seek to cover the impacts of these issues on the development of the information society:

- Consumer perceptions about trust and security;
- Actual levels of security threat and security compromise that are occurring;
- Economic impacts of consumer concern about trust and security;
- Economic impacts of commercial practices which, while raising privacy concerns, promote efficiencies and generate economic profits;
- Economic impacts of ICT security breaches and penetrations for governments, firms, and individuals;
- Presence of the infrastructure and related products associated with increasing overall security and trust;
- Nature of all company practices addressing these issues; and
- Enforcement of government and company policies and practices addressing these issues.

Data about citizen perceptions about security and privacy issues surrounding both the Internet and the use of other information gathering technologies can be gathered through traditional survey instruments. Information on consumer perceptions about security, privacy and trust need to be complemented, as much as possible, with indicators of the "actual" conditions which exist in this area. These indicators could be based on the:

- Number of reported complaints of credit card fraud connected with ICT-mediated transactions,
- Number of reported identity thefts, and
- Number of hacking incidents resulting in theft of personal information.

While some of these data may be difficult to obtain because of legitimate concern of commercial firms about reporting information that questions their security practices, anonymous reporting schemes can be used to induce participation.

While assessing the economic costs and benefits associated with these activities are difficult, it is critical to support effective decision-making in this area. Without indicators to facilitate comparison of the economic benefits of broad commercial databases with the potential reduction in e-commerce generated by consumer unease about them, any conclusions will be speculative. Potential indicators of the value of these broad commercial databases of personal information include the:

- Sales prices of company data collections, and
- Company estimates of how their use has reduced the overall cost of their operations.

Potential indicators of the amount of e-commerce that does not occur due to consumer fears of on-line crime or loss of privacy include:

- Counts of the number of on-line purchases that are aborted at the point where personal or credit card information is requested to complete the transaction.

While some estimates of the economic costs of on-line crime and hacking do exist, better indicators need to be developed. The best possibilities involve working closely with the private sector to obtain specific information on their vulnerabilities or losses without revealing

their specific identities. Other indicators could include the frequency and extent of virus releases or the frequency and impact of denial of service attacks on web sites.

The concerns of citizen regarding the general security of the Internet tend to focus on two types of infrastructure – (1) “barrier” technologies to mitigate privacy and security concerns and (2) legal/policy that restrict the offending behaviour or punish abuses in this area. Both of these activities are important indicators of how governments and social systems are addressing security concerns. In the technological area, potential indicators include the:

- Number of secure Internet servers in use,
- Amount of encryption or public key cryptography in use, and
- Use of identification technologies such as smart cards or biometrics.

In the policy area, potential indicators include the:

- Operative characteristics of company privacy policies,
- Options for preventing companies from changing their privacy policies,
- Options for preventing the use of data in ways counter to their stated policies,
- Legislative restrictions on the use and collection of personal information, and
- Specialised legal frameworks to detect electronic crime and address the special requirements for apprehending and prosecuting offenders in this realm.

In addition to considering the content of legal or policy frameworks, indicators should be developed to judge the effectiveness of implementation or enforcement of these requirements. Such indicators of effectiveness could include the:

- Success rates of prosecuting electronic crimes, and
- Success rates of both civil and criminal cases involving misuse of data.

4.4 Methodology

Surveys are not the most suitable research instruments to track patterns of diffusion and adoption since they only measure *perceptions* about the issue at hand, not the actual empirical magnitude of the phenomenon. The gap between perceptions and reality might be especially great when there is a lack of reliable, standardised public measures – yet it is especially in those cases that one has to resort to surveys.

Security and trust is a sensitive issue given the direct impact intrusions might have on sensitive data, be it personal privacy or strategic company information. The current lack of widely accepted objective measures might foster widespread feelings of distrust. The vagueness surrounding security and trust matters is reinforced by the inherent tendency of the two primal sources of direct empirical data, the ‘victims’ of cyber crime (e.g., banks with substantial operations over public networks) and the cyber crime fighters (suppliers of security & trust products and services), to respectively downplay and exaggerate the magnitude of cyber crime and its (financial) consequences.

Although perceptions are not a reliable proxy for the estimation of the actual occurrence of cyber crime they are important as a variable in itself since the behaviour of firms and consumers is based on their perceptions, not on the actual situation. A negative public image of the trustworthiness of the commercial Internet infrastructure is as much an obstruction to the uptake of e-commerce as the actual occurrence of cyber crime (see Figure 4.1)

FIGURE 4.1 – CONCEPTUAL FRAMEWORK FOR SECURITY & TRUST METHODOLOGY

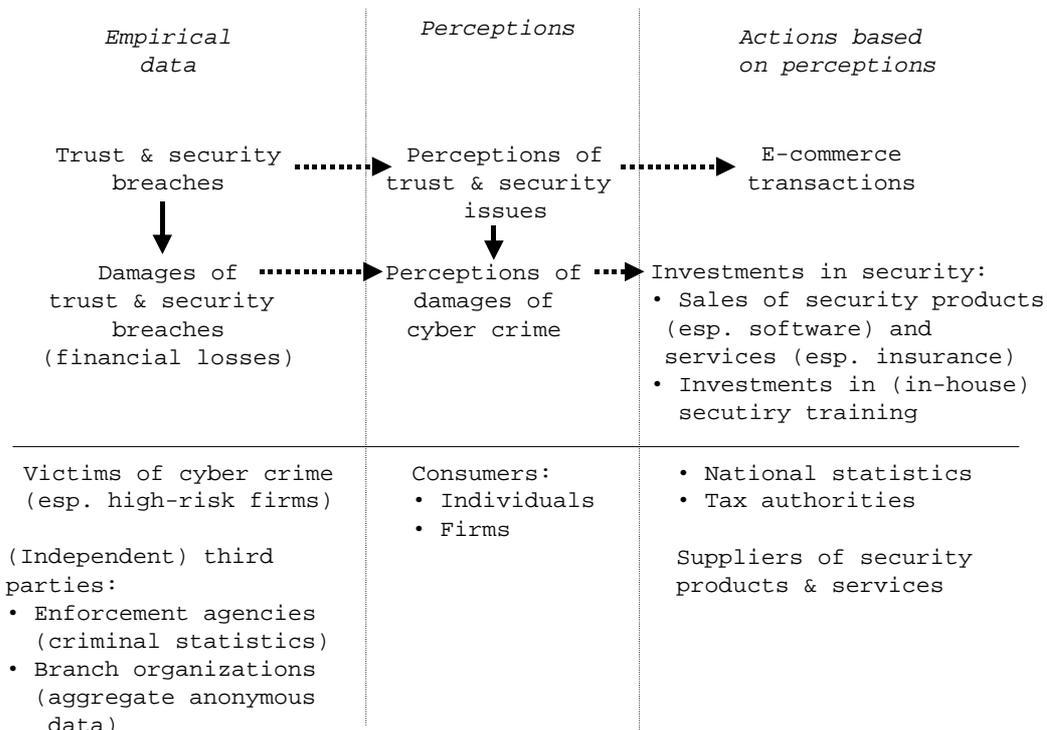


Figure 4.1 depicts each of the three types of variables that were identified in the analysis above. At the bottom of the figure are the main sources of information for that variable.

Victims of cyber crime are the most direct sources of empirical data on trust & security breaches. The actual discovery of cyber theft is severely hampered by the fact that there is no physical removal of the valuable asset. The copying of data is only known through ex post log files or through the subsequent (criminal) acts that are based on the stolen information. Even when firms are aware of the occurrence of intrusions, they are not inclined to share this information, considering the information as a potential commercial threat.

Given the sensitivity of the information, a ‘pull’ approach rather than a ‘push’ approach might be the most appropriate way to gather this type of data. That is, the analysis will be limited to those cases that are reported to third parties. These are either generic law-enforcement(policy) or mission-oriented (semi) governmental agencies or branch organisations.

In Europe, computer crime is generally regarded as traditional crime albeit committed with new, high-tech devices. Statistics on computer crime is naturally found as a subcategory in conventional crime figures. The category is based on a narrow definition of computer-related crime and does not include offences such as content-related offences (e.g., child pornography), copyright infringements etceteras.

In the USA, the view has emerged that computer crime cannot be analogised to traditional crime and that combating it requires discrete legislation and enforcement. Specialized mission oriented agencies (e.g., computer fraud agency) have been established which keep record on a broad range of computer-related offences. These are independent branch-specific clearing houses. They get around the confidentiality problem by recording and reporting intrusions only at an aggregate industry level so that cases cannot be traced back to individual organisations. These statistics are still based on reported, not actual, cases.

Most reliable coverage of actual occurrence of security breaches is done by specialised agencies (computer emergency teams) but their statistics are not based on geographical territories but on types of platform or intrusion. These data do not cover the *damage* that is

caused by the intrusions. Intrusion is a wide-spread phenomenon but the opinions on the magnitude of the financial losses that are born due to computer crime are very much dissented. Payments done by insurance companies might be the most reliable source of information in this matter (see below).

Insofar as surveys are meant to measure the perception of consumers with regard to matters of security and trust conventional attitude surveys will do. When perceptions are used as proxies for the actual occurrence of intrusions, respondents should be asked to give concrete quantitative estimates. Significant deviance in the estimates in a homogenous group of respondents points at a substantial gap between perceptions and reality.

The (potential) value of broad commercial databases of personal information is rather difficult to estimate. Generic data sets such as sold by commercial parties have a very different value to individual firms. Data on consumers is often 'embedded' in the organisation and hence difficult to separate from the overall operations of the firm. Isolating the specific value of the data is a delicate matter as the value of the data itself might be limited. The price on the market that is been paid for generic data-sets says more about the willingness to pay than about the inherent value of the product.

Security and trust is an enabler for about any of the areas that is covered by the eEurope Actions (e.g., electronic commerce, e-government). Trends in these areas (which are already documented by Eurostat in the Action Progress Reports) are an indication for the changes in the underlying drivers, such as security and trust. The main problem here is that security and trust is just one of the drivers and that the determination of the impact of a change in the variables requires a comparison of the actual with the potential magnitude of the behaviour (e.g., actual and potential number (and magnitude) of e-commerce transactions and payments over the Internet).

The demand for trust & security products and services is an obvious measure for the magnitude of computer crime. Referring to Figure 4.1, though, it must be noted that the size of the market for such products is based on the perceptions of consumers on the actual occurrence of trust and security breaches. Security firms thrive on the uncertainty that currently surrounds cyber crime. It is not in their interest to close or at least narrow the gap between perceptions and reality. Nevertheless, according to conventional (micro)economic wisdom in the long run the willingness to pay will be based on the actual opportunity costs that are saved by purchasing the products and services. The main category of security products is dedicated software (e.g., virus scanners, fire-walls). A difficulty here is that security features are often embedded in generic software applications (e.g., servers). There is however a market niche for secure servers. The number of SSL-licences sold is another measure. The OECD has world-wide figures on the number of secure Internet servers. Data on the trust dimension (esp. authentication) might be available from (commercial) providers for so-called trusted third party services (e.g., Verisign). This is however proprietary data and given the strategic nature of the data (and the limited number of players in this market) firms might not be willing to make the information public.

A last category is the investment in people. Accredited courses for computer security experts have been established but are still very much in their infant stage. The number of licensed security experts is a proxy for the supply of (and hence ultimately for the demand for) security products and services. Firms also spend considerable amounts of money on in-house security training. This kind of data can be gathered by means of surveys.

5 Education

5.1 Framework for Assessing the Area

5.1.1 Introduction

In this chapter we provide a brief outline of the major factors setting the policy context for current societal changes of relevance to the development and definition of new and additional indicators in the areas of education for the information society as a knowledge economy.

5.1.2 Background

In order to achieve the goals set out from the European Council's summit in Lisbon that Europe is to become the world's leading economy the central role of education in transforming education was highlighted in the Ministers' communication.

This transformation process is of a dual nature:

- On one hand the educational system will have to adapt to a knowledge economy both in terms of organisational settings, infrastructures and partnerships, pedagogy, curricula and teachers' qualifications.
- On the other hand users of education at all levels and ages will need to develop another mind-set moving from an instruction based understanding of education to a paradigm where the individual most likely will be expected to take a much larger co-responsibility for identifying and continuously developing his/ her skills basis in a variety of ways and settings. Like wise also firms and institutions are in the process of adapting to a business environment where skills and knowledge plays a much more central role in overall economic performance.

Whether we talk about policy developments related to educational systems or the adaptation process of the individual, firms and organisations to living, learning and working in a knowledge economy – ICT is viewed as a critical enabler.

This constitutes the background for the development of new and supplementary indicators in the area of education. Education is in this context understood as a formally institutionalised process of knowledge transfer and knowledge development, as supposed to informal learning arrangements taking place through various community of practice arrangements, on the job training and peer learning. Those processes will be covered in the workpackage.

Much of the policy debate on education for the information society has focussed on an extension of the definition of education in light of changes in from what has been defined from "*an old economy*" to "*a new economy*".

5.1.3 Keys to the Old and New Economies

The table gives a general picture of characteristics in the old and the new economy.

TABLE 5.1 – EVOLUTIONS OF ISSUES IN THE OLD ECONOMY AND THE NEW ECONOMY

ISSUE	OLD ECONOMY	NEW ECONOMY
Markets	Stable	Dynamic
Scope of Competition	National	Global
Organisational Form	Hierarchical	Networked
Organisation of production	Mass production	Flexible production
Key drivers of growth	Capital/labour	Knowledge/innovation
Key technology Driver	Mechanisation	Digitalisation
Source of competitive advantage	Economies of scale	Time to market, innovation
Relations with other firms	Single mover	Alliances and collaboration
WORKFORCE		
Policy Goal	Full employment	Employability
Skills	Job specific	Multidimensional (deep and broad foundation skills)
Requisite Education	A skill- A degree	Life Long Learning

Ref.: Atkinson R., “ *The New economy Index* “ *Progressive Policy Institute*, 1998

A trend in the new economy is that innovation cycles (what Schumpeter calls “creative destruction” are getting shorter¹⁵. This means on one hand that all innovation and innovation related factors like human capital and education, skills and knowledge increases in importance throughout life expressed in the policy focus on *life long learning*, but it also means that the nature of demands for skills and knowledge changes with greater focus on construction of new knowledge as a central educational domain rather than primarily focusing on acquisition of existing knowledge repositories.

The following table points out some key differences regarding education in the industrial society and the knowledge society.

¹⁵ “The new Economy” working paper IPTS, Spain, 2000

TABLE 5.2 – KEY DIFFERENCES REGARDING EDUCATION IN THE INDUSTRIAL SOCIETY AND THE KNOWLEDGE SOCIETY

	Industrial Society	New Economy/ Knowledge Society
Education structure	Learning of practical skills and factual codified knowledge. Separation of professional and practical skills. School/practical training dichotomy	Learning codified knowledge as well as constructing/ discovering new knowledge domains in areas of high innovation. Practice/theory dimensions change through experimentation, testing....
Education goal	Educated/trained for a specific job/trade. Profession concept	Acquire deep and broad competencies with a view to job and competence mobility in an unstable and ever changing job market
Teaching form	Instruction, practical training, classroom, institutional setting	Construction, discovery, simulation, analysis, evaluation in relation to different problems and realities – anywhere, anytime
Organisation of teaching/learning	Subjects class, institutions are the organising elements	Problem areas, multidisciplinary, multiple resources is the given context -
Teacher's role	Professional authority. Conveys knowledge	Supervisor, tutor, "devils advocate" guided learning towards enhanced autonomy
Didactical space	Teacher's responsibility: motivate and activate student	Student shares responsibility for the development of the learning trajectory.
Learning concept	Focus on teaching as communication of externally determined goals and institutionally codified knowledge. Learning as an individual process oriented towards learning skills and knowledge	Learning occurs in a context, in a continual process –discovery, experimentation.
Learning processes	Teacher responsible for reaching determined goals. Goals determined from the outside. Focus on results	Student and teacher co-operate to define and reach goals. Learning to learn is a central process goal.

Ref. Hanne Shapiro, "Pædagogisk Grundlagsnotat," Reform 2000, 1999, Danish Ministry of Education.

5.1.4 Life long learning

Life-long learning is regarded as formal and informal education within and outside the educational system throughout life, though primarily with focus on the period individuals are or potentially are engaged in the labour market. Though primarily argued from an economic point of view education is aimed at developing qualifications among citizens that go beyond technical ICT qualifications with focus on higher order skills to ensure employability and adaptability of the individual to the demands of a knowledge economy.

This characterises the basic philosophy in many national, regional and sectoral information society policies, for which reason education is not a task to be carried out by the educational system alone, but in various partnership arrangements.

Apart from the changes in everyday life and working life that derive from technology in itself, characterised by the Futures Project¹⁶ ICT creates possibilities of developing new forms of educational settings and infrastructures.

5.1.5 E –learning

In the policy debates on the information society and knowledge economy E-learning is seen as an essential component through the entire educational system and in a life long learning perspective. And not only for acquiring ICT skills and with that also emphasis on new partnerships and new stakeholders at the educational scene. E-learning can be used as a concept for electronic, creation, retrieval, recreation and sharing and distribution of knowledge resources and education (real-time asynchronous) in a singular mode or collaboratively an distributed E-Learning creates new pedagogical opportunities, especially with broad band communications an mobile access devices as well as new roles and responsibilities for the educational stakeholders.

Another important area for the ICT educational level is the ability of the companies to internally enhance learning and development of competencies. However, this perspective will not be treated in this chapter, please refer to topic area 5 Work, skills and employment. Education in topic area 4 is delimited to pre-labour market education, that is education ranging from primary to tertiary school.

5.2 Identification of the Stakeholders and their Interactions

With the changes in how education is provided through an increased use of ICT combined with the life long learning perspective on education the educational stakeholders are no longer limited to the public sector and the institutional school system alone. If the need for education and training in the information society can be described through the concept of life-long learning, it seems natural to regard every institutionalised and social context a person gets involved with through all stages of life as an educational stakeholder. This is of course a theoretical implication of the concept that needs delimitation, but still, a broad concept of stakeholders is useful to keep focus on the substance of life-long learning. To illustrate the need for a broader concept of stakeholders in education, there are numerous examples from the European Schoolnet in partnership with IBM¹⁷, to an example from the United States that coming parents wish to create special learning environments for their unborn children. Companies have specialised in stimulating the development of creativity and learning capabilities of the embryo with music and sounds. Some kindergartens offer access to computers; ICT is integrated with toys in order to stimulate creativity and motivation to learn etc.

In the work with this topic area we will however use a bit more narrow perspective on stakeholders. The most important stakeholders are:

¹⁶ Futures Final 2000, IPTS, Spain.

¹⁷ <http://www.eun.org>

TABLE 5.3 – IDENTIFICATION OF STAKEHOLDERS IN EDUCATION

Policy makers	Supranational-, national, regional and municipality policy makers and authorities
The industry	Publishing industry as digital resource base or directly accessed by group Producers of educational software (IBM, Microsoft) Entertainment Industry (LEGO; Disney.....)
R&D	Both public and commercial research and development environments
Educational Institutions	Primary Schools Vocational Education Higher Education
Users	Pupils and students Teachers Family

The interest and motivation to learning about ICT is strengthened with access to a computer or other ICT devices. Not least the game industry, digitised toys as well as mobile phones seem to be a major driver in children's interest in computers and ICT in a broader sense.

Apart from family and kindergarten as stakeholders, ICT education can be regarded as starting from primary school and throughout the entire school system. Some of the most important stakeholders in this respect are primary, secondary and upper secondary schools. In most of the EU countries, ICT is included in the curricula as an integrated part of the training in primary school. ICT is included in the curricula for upper secondary school in all of the EU countries except from Belgium, Holland and Italy in 1997/98¹⁸ (see EURYDICE). It differs whether ICT is included as an independent element of the educational provision or as an integrated part.

Policy makers and administrative authorities put up the framework for learning in society by political visions and budgets. Political priorities decide the focus and form the effort put into ICT in education. As we have seen from the policy document review, ICT has a high priority in national action plans for education. The government decides the political framework for ICT education and ICT integrated with education. Administrative authorities with responsibility for the school system execute the action plans in collaboration with schools and education facilities.

Large commercial IT players such as IBM, Microsoft, Arthur Andersen are today collaborating with educational institutions, from primary school to corporate university, to develop new learning concepts. In the future we can expect that public-private collaborating becomes even more common.

Research facilities play a role in education too. The content of knowledge in education is kept up to date and developed by interaction between education facilities, schools, research facilities and companies. The quality and relevance of education is on the one hand dependent on the immediate usefulness for companies and on the other hand education must at the same time ensure innovation in companies based on new knowledge and competencies.

¹⁸ See: EU Commission, Eurydice (1999/2000): Key data on education in Europe

Teachers as promoters of knowledge are important stakeholders in education and many national action plans therefore have focus on developing the ICT skills of teachers. This applies particularly to teachers in primary, secondary and upper secondary school because of their responsibility to promote the basic attitude to ICT. This responsibility lies not only with the teachers, but also with the schools and administrative authorities.

Finally, the pupils and students are themselves of course important stakeholders in education. Training and learning can only take effect if pupils and students want to learn and have the motivation for it. The family and the teachers take part in developing this basic motivation but just as important is the ability of *learning to learn* throughout life.

5.3 Statistical Measures and Variables of Interest

To be trained is to acquire new knowledge and competencies by learning. With this as a prelude for a definition of training and education, serving as an example, it becomes obvious that concepts like knowledge, competencies and learning are difficult to measure. A careful discussion of possible and relevant measure is needed and on top of that a clarification of the depth and method of the measurements is useful.

The aim is to develop appropriate statistical measures and indicator for policy making at European level. Therefore, the question is how education can be measured and benchmarked. We will now examine which variables could be potentially relevant if viewed from the perspective of an individual, company or society.

From a societal or political perspective the purpose of education is to ensure an ongoing development of society and preservation of the welfare society. From a company perspective the purpose of education is to obtain changes in the achievement of goals. From the perspective of an individual the purpose of education is among others to obtain, develop or preserve employability. Thus, education has different motives dependent on the perspective and can be brought about on different initiatives. Education is supposed to create an effect, which is what we wish to establish a measurement for. However, the effect of education is different on different levels of analysis, which is why the potentially relevant variables are very different, too. Let us now briefly analyse the effect of education with an employed person acquiring new knowledge and competencies as a starting point:

	Education/training
Leads to	reaction from the employee
which leads to	learning
which leads to	changes in job behaviour
which leads to	changes in the company
which leads to	changes in achievement of goals of the company
which leads to	changes in (competition on) the market
which leads to	changes in society

Source: Inspired from Nils Asmussen (1996): Uddannelse, udvikling og evaluering.

For each of these levels one could state several relevant points of measurement for the effect of education and training. Note that the value of information inherent in the points of measurement is very much dependent on the perspective taken as a point of view. Also, the difficulties and expenses joined with establishing the measurements should be considered.

The levels interact with one another and one level cannot be regarded independently from the others, whereas the possibility of making causality probable between training and the effect of training is reduced through up the levels. In other words validity is an important challenge when we want to measure the effect of training and education.

As outlined in report 1.2. we can see from the policy documents reviewed, that some general goals for education can be pointed out. Those measures/indicators are:

- More computers in the schools
- More students and candidates with ICT training and education
- More students and candidates with basic ICT competencies
- More teachers with ICT skills and competencies
- Better access to virtual knowledge sources for students and teachers
- Development of high-quality computer-based training and distance learning
- Developing virtual networks between schools and between teachers

In order to measure the progress towards the knowledge society there is a need for statistical indicators on education and ICT. At this stage, the following main indicators are located in statistical documents from the Scandinavian countries, United Kingdom, the OECD and EU:

- The number of students graduated from ICT studies
- Availability of computers with Internet access, with multi-media facilities and in general, at different school levels (primary, secondary, graduate)
- The students' use of computers in schools, at home, elsewhere
- The schools use of electronic communication services (e.g. video conferencing)
- The purpose of the use (homework, play, etc.)
- The number of pupils/teachers with personal e-mail address
- The ICT budget
- The number of schools with a ICT development plan

In 2000 Andersen Consulting performed an analysis of the ICT readiness in three regions of Denmark¹⁹. This contains potential relevant indicators and can be thought of as a interesting starting point.

In order to measure the ICT readiness in these regions Andersen has developed a model, which focuses on the citizens, the private sector, the public sector, and the educational sector.

The ICT readiness of the regions is measured with a frame model for behaviour, which contains six steps. The six steps are grouped into two, main areas; frame *conditions* and *network behaviour*. *The frame conditions* are regarded as citizens access to computers and their ICT skills. ICT skills are measured by the ability of the use of different Internet related software tools. The *network behaviour* is regarded as the activities performed by individuals or companies. The network behaviour is grouped into the following four types of behaviour:

- **Information**, which measures the level of information exchange via the Internet. E.g. search of information, news, marketing, and competitor surveillance.

¹⁹ *The ICT readiness in three regions of Denmark*, Andersen Consulting, 2000

- **Communication**, which measures the prevalence of Internet based dialogue, e.g. via e-mail, chatting, and advertising.
- **Transaction**, which measures the amount of trade or other transactions, e.g. banking.
- **Integration**, which measures the level of electronic coherence of Internet users, that is when data from one individual is automatically distributed to other individuals.

The model of Andersen Consulting widely applies to the area of education because of its useful distinction between conditions and behaviour. Also, the focus areas for measuring network behaviour in the Andersen model basically reflects the elements needed to be measured regarding the effect of education.

Inspiration from the Andersen model combined with our former discussions gives us at this stage some tentative suggestions to the focus of the development of statistical indicators on education.

As we can see from the already existing measures and variables they are mostly aimed at outlining the technological conditions under which education is performed in respect of the use and penetration of ICT in education. However, the effect of education on skills, performance and behaviour is in fact not covered in this framework. In the next section we will approach a methodology for addressing this dimension.

5.4 Methodology

It would be useful to develop statistical indicators, which aim at outlining and describing the use and effect of education on the relevant levels according to the discussion in the previous section. This development would be a qualitative and useful supplement to the existing statistical material in the area of education.

An important objective for education in information society is to develop the motivation and ability of the citizens to take part in society and contribute to the continuous development of the society. This takes on the one hand an adequate technological infrastructure (e.g. availability of computers and access to the Internet) for performing contemporary education and on the other hand it takes a sufficient level of the necessary skills among citizens. With an adequate technological infrastructure provided and a development of the ICT related skills of the citizens via education, the society eventually observes changes in citizen and company behaviour.

To be able to draw a more complete picture of the present situation and the progress to come, there is a need for both new and more sophisticated (detailed) indicators, such as:

- Teachers with ICT skills/competencies measured on different competence levels
- Programmes to upgrade teachers skills- holistic view (not only functional aspects of ICT)
- Whether ICT is an independent subject or also integrated in others subjects
- Programmes and materials available and skilling complexity (to train a specific skill versus development of higher order skills)
- Whether ICT is an integrated part of the training of teachers
- The number of computer-based training programmes and distance learning programmes addressed to public schools
- Educational portals available (target groups, content, pricing of these)

- Digital educational materials available for different subjects/ themes at different levels.
- Availability and pricing of networks/infrastructures for educational purposes
- Publicly funded and documented multidisciplinary research on ICT and Education in its broadest sense (user behaviour, cognitive advantages, usability, design issues in relation to learning paradigms)
- Publicly available sites that certifies digital educational material, sw, and programmes for educational purposes
- The use of computer-based training programmes and distance learning programmes
- The quality (speed, age) of computers or Internet access

Possible areas can then again be defined at different levels:

- Use of technology as a tool (specific applications)
 - Use of technology in creative processes
 - Use of ICT for analytical purposes (forecasting, statistical analysis....)
 - Use of ICT for collaborative purposes
 - USE of ICT for information purposes (retrieval, analysis....)
 - USE of ICT in communication
 - Use of ICT for integrative purposes

We propose a methodology, which focus on:

- **Technological conditions:** The technological conditions and infrastructure for performing education, measured on variables such as:
 - Integration of ICT in curricula on school levels spanning from the primary to the tertiary level
 - Availability of computers and Internet access in schools, universities etc.

The effect of education under these conditions we propose to address by the following areas:

- **ICT qualifications and ICT readiness:** The readiness of the citizens to take part in information society, e.g. measured on variables such as:
 - Ability to use relevant ICT tools
- **Citizen and company behaviour:**
 - Information
 - Communication
 - Transaction
 - Integration
 - Collaboration
 - Creativity
 - Tool
 - Analysis

Developing and operationalising this tentative framework is now needed.

6 Work, Employment and Skills Definitions

6.1 Framework for Assessing the Area

The domain explores how information society developments affect supply and demand of human skills, how these interact with forms of work organisation and employment patterns, and in which ways information and communication technologies (ICTs) act as enablers and shapers of change. The concept and idea of new ways of working has been described as a new paradigm. It is necessary to conceptualise this paradigm shift in sufficient detail so that the underlying developments can be mapped using existent statistics (as well as fresh data where necessary). Tackling this task has only just begun. SIBIS will build on the work that has been done in this area. It will develop additional or modified indicators and ways of gathering the adequate data, with the aim of contributing to a better statistical representation of the shift in paradigm that is associated with the dawn of the information society.

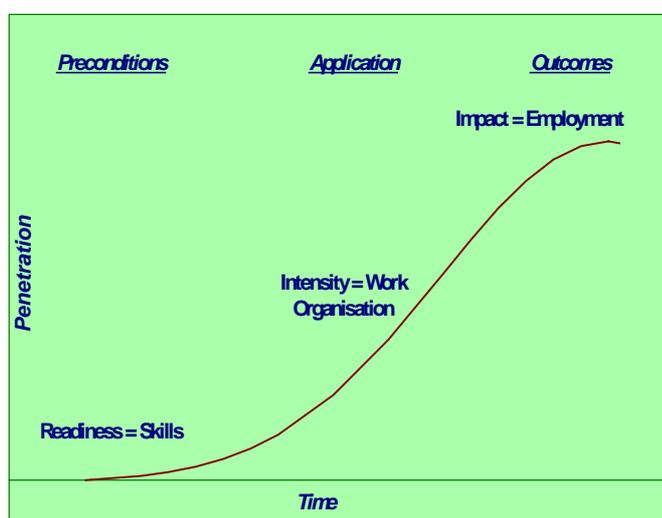


FIGURE 6.1 - SUGGESTED FOCUS OF ANALYSIS ACCORDING TO STAGE OF DIFFUSION OF ICT-BASED NEW WAYS OF WORKING

Figure 6.1 illustrates the penetration of ICT-based new ways of working. Skills are the necessary basis (precondition) for the productive deployment of individuals in the production process (application) which in turn creates the foundation for employment (outcomes). The information society brings with it a new relationship between skills, work and employment, and new requirements which have to be met by

- individuals, to stay competitive on the labour market and to choose a way of working that maximises personal benefits;
- companies, to adapt the deployment of the factors of production, in particular labour, to current market environments; and
- the state, to provide services and regulatory frameworks that support employment structures that serve the public welfare.

6.1.1 Skills

A central characteristic of the information society, as well as all societies, is the need to apply knowledge and skills efficiently and effectively. In the information society, these requirements focus on general skills needed to make use of ICTs, as well as the specialised, technical knowledge needed to compete in increasingly knowledge-intensive industries and activities. We define skill broadly, as “a learned power of doing something competently”²⁰.

New **skill requirements** follow from the concept of the Information Society for a number of reasons:

- The technology that underlays the information society, namely ICTs such as the Internet, itself forms an industry of considerable size; companies that operate in this industry depend on the availability of skills that are in line with the dynamic requirements of the market. As in other industries that rely to a great extent on innovation as their main driving force, specific skills that have been acquired in the past are in danger of becoming obsolete extremely fast; they are constantly being replaced by new skill requirements.
- The nature of ICT-related innovation implies that ICT are a basic technology that affects the foundations of the whole economy in one way or another. It impacts on all economic sectors, as ICTs are applied throughout the economy to increase productivity and enable innovation. Consequently, ICT-related skills are in demand in all companies, either as specialist skills for the operation and maintenance of ICT equipment, or as user skills for applying the technology to support the aims of the organisation.
- People (as citizens or consumers) need skills in using ICTs for them to be in the individual as well as public interest. These skills are not directly related to the competitiveness of companies, but the reality shows that companies benefit from domestic markets in which they can test their products in. The more advanced a population is with respect to the availability of ICT user skills, the better the conditions for companies that sell innovative ICT-related products.
- The application of ICTs has also affected the demand for skills that are not related to ICTs themselves. These indirect effects result, in particular, from the shortening of product life cycles that is being enabled by technology. The intensity of research and development associated with creating new products has steadily increased. Competitive forces are bound to lead to a further acceleration of the process of translating innovation into marketable products and processes. As new products and processes are associated with new skill requirements, skill life cycles, too, have shortened and will decrease further in the future.

Whether ICTs are the focus of the job or facilitate it, whether the job is inside an industry that produces ICTs or in an industry that uses them, new skills will be needed by the workers who perform the work. The increasing speed with which market environments change with regard to technology, the structure of the economy and the regulatory framework, have affected the role of skill requirements in the society at large as well as at the personal level.

The **provision of skills** must be adapted to account for changes in skill requirements. Traditionally, basic skills and qualifications that are necessary to compete in the labour market were acquired in the stages of formal education in school, vocational training, universities, gradual schools, etc. These set the ground for the following stage(s) of gainful work. In the information society, training and working must to some extent take place in parallel, interacting with each other.

²⁰ Source: Merriam-Webster Collegiate Dictionary

The shortening of skill life cycles has resulted in skills not being in sync anymore with the traditional working life cycles of individuals. Workers can to a much smaller extent rely on being able to market the skills they have acquired in the early stages of their life throughout their lifetime but have to constantly adapt them to the demands of the labour market. This belief is behind the concepts of Lifelong Learning and Continuous Training. Distinctions between education and work become increasingly blurred. Education needs to become a life long pursuit for virtually everyone. Ideally, skills would be acquired and refined throughout the decades that one is participating in the labour force, rather than during the two decades or so that precede the active adult work life.

Lifelong Learning has become a top priority in the context of employment, especially since the Lisbon Summit. This becomes evident in the Employment Guidelines 4 and 5 on the issue of “Developing skills for the new labour market in the context of Lifelong Learning.” In line with the EU we define Lifelong Learning as

encompassing all purposeful learning activity, whether formal or informal, undertaken on an ongoing basis with the aim to improve skills, knowledge and competence²¹

Lifelong learning activities often take place outside of the formal education and qualification system. They require that private education and training systems (e.g. company-provided training) are put to best use. Additionally, the role of universities has to be extended into the provision of Lifelong Learning services. Training may occur as workers transition from one position to another. Training must also occur for workers who remain in the same position. There is a need for significant efforts to be put into training of existent staff, because acquiring new skills through new recruitment on the labour market involves high transaction costs and the loss of tacit knowledge embodied in existent staff; it is also made difficult when skill shortages exist in the labour market.

ICTs are not only a major cause for new skill requirements, but they also provide solutions for meeting them. For example, the training may make use of the Internet to substitute or supplement traditional training. Such a case is distance learning or *eLearning*, where training that traditionally would have occurred in a classroom takes place via an ICT link. *eLearning* can help meeting the challenge posed by the Information Society: “A requirement that cuts across all education settings is the need to significantly improve the efficiency of the learning process and thereby control the cost of an exploding demand for education and training²².” SIBIS will also have to map developments in the application of *eLearning* technologies.

To distinguish this topic from Education (Topic 4), the discussion on skills in this Topic Research focuses on the

acquisition of employment-related knowledge and skills after the (mostly uninterrupted) pre-work phase of education (usually consisting of nursery, primary and secondary school, and maybe vocational training, gradual school or university, etc.) has been completed.

According to this understanding, Topic 4 (Education) deals with institutional structures and activities of education which prepares individuals before entering the labour market for the first time, while Topic 5 (Work, skills and employment) deals with activities that take place after entering the labour market, either inside or outside of employment relationships.

²¹ Proposal for a Council Decision on guidelines for Member States’ employment policies for the year 2001, p.3.

²² European Commission, DG XIII: Technologies for Knowledge and Skills Acquisition. Proposal for a Research Agenda. January 1998.

6.1.2 Work and Work Organisation

The concept of work according to the understanding of social scientists as well as the general public has changed. This change has occurred along the following dimensions:

Working time: This includes the variables

- average working time per day, month, year, etc.;
- working time distribution across daytime, week, months, etc.;
- working time variability (which might be attuned to the demands of business, e.g. shift work, or to the preferences of workers, e.g. flexitime).

Working place: All types of telework are examples for changes that concern the spatial/locational organisation of work. Tele-cooperation, where the location of work stays more or less the same but the spatial organisation of teamwork and collaboration is geographically extended over IT networks, is another example.

Type of contract: This refers to the contract that underlays the relationship between worker and the organisation that utilises the work products, e.g. a contract of employment or a contractor/client-relationship that is based on self-employment. Differences in the duration of employment contracts affect average job tenure. Moreover, the contract defines the extent to which compensation is based on the input (working time) or the output (productivity) of work.

Applied skills (work content): The skills workers apply in the production process define the content of their work (and vice versa). Work content has been hugely affected by the increasing 'informatisation' of work and changes to the variability of work tasks and access to work-related decision making. The latter is often discussed among the header job enrichment and job enlargement.

These dimensions are not be understood as being mutually exclusive, as multiple relationships exist between them. Due to the complexity of flexibility developments on hand, it is also not appropriate to try to draw a clear line between 'traditional' and 'new ways of working'. Rather, a more useful approach is to think of jobs as being classified along a number of spectra/dimensions.

There is a widespread consensus among researchers that, although change tends to be gradual by nature, two distinct periods can be differentiated with regard to dominating social concepts of work in recent times. The first is the post-WWII period of relative stability, the second is the period of economic restructuring that began in the first half of the 1970s, with an additional push in intensity in the 1980s and 1990s enabled by ICTs. Both periods were accompanied by what we want to call a work paradigm, i.e. a consensus about how work had to be 'properly' organised and supported by the socio-political framework. We call these the 'post WWII work paradigm' and the '21st century work paradigm'. At the core of the 'post WWII work paradigm' is what is called the 'regular employment relationship', typical elements of which are full-time, permanent jobs with a contract of employment, even and stable distribution of working hours over a fixed number of days per week, and long job tenures.

It is important to note that we talk about paradigms here, i.e. models with a strong normative component which do not necessarily reflect reality in an adequate way. 'Regular employment relationships' have never been as widespread in the decades after WWII as the term implies. Nevertheless, these paradigms are of exceptional importance because labour law and the regulation of social security standards tend to be based on them.

In general, the transition from the previous to the recent paradigm is characterised by developments toward greater flexibility of labour deployment. A changing economic environment together with shifts in social attitudes and the widespread application of ICTs are believed to have resulted in greater spatial, contractual and temporal flexibility, shifts

towards more self-provided social security provision, the need for multi-tasking and significantly more dynamic (social) skill developments. ICTs are enablers of change but they do not predetermine outcomes. They do not e.g. push labour markets towards specific configurations, but open up new possibilities for organising work. The way ICTs are applied to change the organisation of work is to a great extent dependent on the bargaining power of employers vis-à-vis workers, and on regulation by the state.

SIBIS takes a normative view on new ways of working. We are interested in models of work organisation that harness the potential of ICTs to reconcile the interests of workers and employers by allowing greater flexibility for *both* groups of actors.

Against this background, new ways of working in the information society are for this research defined as

those work forms which divert from the post-WWII work paradigm and/or which are made economically as well as socially feasible by the use of ICTs.

The latter part of the definition acts as the major way to differentiate new ways of working against traditional atypical work forms such as shift-work and piece-work in manufacturing and self-employment in retail, small trade and the primary sector.

SIBIS research into mapping new ways of working in the information society will be structured along the dimensions of change towards greater flexibility, as outlined above: working time, working place, type of contract, and applied skills. We believe that all major parameters of the change in the organisation of work can be captured using this framework.

6.1.3 Employment

Employment is the outcome of the labour market procedures that translate skills into work. Whereas skills and – at least in most cases – work are not ends in itself, employment is the socially accepted system through which the capabilities, preferences and needs of individuals are brought to a match. Ultimately, the impact of ICTs on skills and the organisation of work have to be measured according to their contribution to the goal of socially and individually satisfactory forms of employment.

Accordingly, SIBIS should collect and, where necessary, develop indicators for measuring the **outcome** of changes in the ways of working at the **individual** as well as the **aggregate** level. Job satisfaction, for example, is an outcome of work at the individual worker's level that has to be monitored to be able to assess the sustainability of working arrangements. It is matched by productivity which is an indicator of the suitability of working arrangements from companies' viewpoint. Employment rates are an examples for indicators that measure outcomes at the aggregate level.

There have been numerous attempts to conceptualise and measure the contribution of ICTs to trends in the structure and size of employment, with varying degrees of success. Basically, a number of correlations between ICTs and the level and structure of employment exist:

- the production of ICTs creates employment opportunities;
- the application of ICTs:
 - changes production processes inside of companies;
 - affects the processes of transaction between companies;
 - makes possible new means of distribution;
 - enables new ways of managing labour on company level;
 - enables new ways of regulating employment by the state.

All of these have manifold implications for the structure and overall level of employment, and also on macro-economic variables that measure economic activities and output (which in turn influence employment).

A better understanding of the correlation between ICTs production and application and effects on employment is needed to guide policy making on EU and Member State level. SIBIS will discuss ways how to gather the data that is required for such analysis.

Recent research has confirmed that tackling skill mismatches on the labour market implies that it will not be sufficient to train the current labour force, and to qualify tomorrow's new entrants to the labour force by providing adequate education. It will also be necessary to tap *latent* labour supplies. Therefore, measuring the extent of skill supply and demand at present and, in particular, projections and estimates of their future development need to take into account a differentiated view at labour market participation. For these reasons, all indicators to be developed to measure ICT-related developments in employment patterns will have to allow for differentiation, especially with regard to gender.

6.2 Identification of the Stakeholders and their Interactions

The main stakeholders in this topic are:

- *Employers*: Employing organisations form the demand side in the labour market. As such, they translate their labour deployment requirements into demand for types of workers regarding specific skills, location, temporal availability, etc. Bargaining between employers and workers will to a large extent determine the diffusion and actual configuration of new, flexible ways of working. Additional to the open labour market, internal labour markets are of prime importance, especially concerning the creation of skills among the existent workforce. Internal and open labour markets interact in cases when new skills are required. In such a situation, in principal two options are available; first, acquisition of skills by recruiting new workers on the open labour market; second, development of skills by training existent staff.
- *Workers*: The aggregated capabilities and preferences of workers constitute the supply side of the labour market. New skills are constantly added to the open labour market by new entrants who have just finished their education, by inflow of foreign workers, by training measures through which unemployed should gain skills that are in demand, and by self-learning activities of job-seekers. People in work gain skills informally through their everyday working experience, and/or formally through employer-supplied training or training measures provided by third parties.
- *Public regulators in the field of employment policy*: The state takes a central role in the labour market by creating the framework in which labour can be traded between workers and employers. Many observes think that state intervention is to a large extent responsible for the differences in the performance of labour markets between the Member States of the EU, and beyond. This applies, in particular, to the speed and nature of the diffusion of atypical ways of working, including ICT-enabled work forms.
- *Social partners and other non-government regulators*: Traditionally, social partners play a major role in national employment policies in the EU. The results of the collective bargaining process have far-reaching implications for work organisation. In particular, attitudes towards the application of ICTs and new ways of working influence decisions taken on the company level and thereby can significantly affect the diffusion process.
- *Providers of educational services*: Companies and educational institutions run by the state or by private bodies such as unions and professional associations will provide

services for formal education. They will be paid for by the state, employers and/or the recipients.

- *Providers of educational technology:* Using ICTs for education offers huge potentials. The technology is developed and marketed by software firms specialised on eLearning products as well as traditional suppliers of teaching aids who transfer their content to the digital domain.
- *Users of educational services:* Private citizens, workers and unemployed participants of the labour market, as well as companies and other organisations are the primary consumers of training programs. In general, training the unemployed and the youth is the responsibility of the state, while individuals who hold positions in companies are trained by their employer.

Regulators in the field of education: Education is regulated by government on EU, national country, regional and local level; the division of power over policy making in this field differs strongly between EU Member States. Regulation will probably be required to ensure that training paid for by public bodies provides real value, and to ensure that private sector training activities serve the public interest (in particular with regard to the access of disadvantaged labour force segments to training and education).

6.3 Statistical Measures and Variables of Interest

In the new section on “horizontal objectives”, the Employment Guidelines 2001 address (as one of the five objectives described) the need for quantitative indicators:²³

“The Member States and the Commission should strengthen the development of quantitative common indicators in order to evaluate adequately progress under all four pillars and to underpin the setting of benchmarks and the identification of good practice. The Social Partners should develop appropriate indicators and benchmarks and supporting statistical databases to measure progress in the actions for which they are responsible.”

The SIBIS project should try to serve this explicit demand for indicators in the area of work, employment and skills, but keeping in mind a clear focus on developments that touch on the impact of ICTs and the Information Society. In order to do so we suggest to use the “four pillars” of the EU employment guidelines as a help to identify and select indicators for which the supply of data would provide high value for the EU policy making. These four pillars are:

- Improving employability (I)
- Developing entrepreneurship and job creation (II)
- Encouraging adaptability of businesses and their employees (III)
- Strengthening equal opportunities policies for women and men (IV)

6.3.1 Improving Employability

Inside of this pillar, three topics have special relevance for SIBIS: (State-provided) Lifelong Learning, the development of skills related to the Information Society, and policies to improve the efficiency of job matching.

²³ EC (2000): Employment Guidelines 2001. Proposal for Council Decision.

Indicators that measure (state-provided) *Lifelong Learning* activities are not well covered by official statistics. Currently, the major official indicator for Lifelong Learning is the participation rate in training activities. The Labour Force Survey by Eurostat measures “participation in training and education activities during the last four weeks”. This indicator adequately maps participation in formal, full-time training schemes, targeted mostly at unemployed persons. However, it is based on the traditional assumption of a succession of phases which are either dedicated to learning or to working. As the concept of Lifelong Learning stresses the need to do both, learning and working, in parallel, new indicators for measuring learning which is only a secondary activity need to be developed, also including training that is neither provided by the state nor by companies but by individuals themselves or by other institutions. Example for indicators include:

- self-learning activities, differentiated according to types of skills acquired;
- participation in training as a secondary activity, in parallel with employment (see discussion of pillar III below);
- participation in training that is provided by non-state, public institutions such as unions, church organisations, self-help groups etc.

The best (and maybe only reliable) way to gather data for these indicators appear to be surveys targeted at the general population. Surveys that only include individuals not in paid work might also collect much of the data possible, but Lifelong Learning activities inside of employment relationships have also to be covered (see Pillar III).

Very often there is mention of eLearning schemes that make use of ICTs to efficiently deliver training services to recipients. Indicators that measure the availability of such services and the reach, frequency and intensity of use must be developed. A more in-depth analysis should also identify

- the types of skills that lend themselves to Internet training,
- the use of the Internet for synchronous teaching across long distances (see also SIBIS Topic 4),
- the use of the Internet for individualised teaching,
- the use of the Internet to meet the specific training needs of the (long-term and hard-to-place) unemployed.

There are reasons to believe that eLearning technologies can be efficient only for a limited share of training tasks. As long as there is no deeper knowledge of the spread and success of existent eLearning schemes and technologies, their value for the objective of boosting Lifelong Learning will remain uncertain.

Indicators to measure *Information Society skills* need to show how well individuals, as workers or job-seekers, can function in the electronic society. Digital literacy is an essential element for the employability and adaptability of the general workforce. But concepts and data for “digital literacy” are only poorly developed, so far. Which skills do employees need to get a job, how do they acquire these skills and how wide-spread are they currently? Information Society skills with relevance for our Topic consist of

- technical skills,
- communication skills,
- skills in acquiring and using information,
- self-learning and self-assessment skills,
- participation skills (i.e. skills in exerting influence on information society policy).

A basic indicator would be the share of the workforce with basic computing skills. A more detailed indicator would also examine the level of proficiency in specific ICT related skills. Possible indicators include:

- percentage of workers able to complete specified technical tasks, such as using e-mail, using a browser, creating webpages;
- percentage of workers who communicate with friends/colleagues/business contacts/etc. via electronic media;
- percentage of workers who can know how to find specific information on the Internet, and how to assess and use it;
- percentage of users who know about political participation rights and possibilities on the Internet.

A specific issue within this topic is the widely discussed “skills gap”, i.e. the unsatisfied demand for ICT specialists. Market research organisations, especially IDC, have started to calculate the size of the skills gap, i.e. to assess the demand for and supply of ICT specialists needed in each of the EU Member States. Resulting statistics have been published recently in a special section of the EITO Report 2001. There is a need for alternative projection based on different assumptions, as results tend to be heavily influenced by a small number of assumptions about which there is not always much consensus.

The Internet opens up new possibilities to improve the efficiency of *job matching*. Public Employment Services in the EU have begun to make use of the Internet to publish vacancies. They face competition in private labour market intermediaries that charge companies for job advertisements that are placed on websites with sophisticated job and candidate search engines. Hardly anything is known about the degree to which these Internet-based services have made matching more efficient and more effective, and how job-seekers and recruiters use them in combination with traditional channels of communication.

6.3.2 Developing Entrepreneurship and Job Creation

This pillar is only of low direct relevance for our Topic. A question of some importance concerns the extent of employment in industries that supply ICTs and, in particular, the role of start-ups and SMEs in these industries. Data for research into these issues is largely available, but has often not been analysed in sufficient detail.

6.3.3 Encouraging Adaptability of Businesses and their Employees

This pillar concerns the organisation of work in companies and thereby touches upon a large number of organisational innovations that have been made possible by ICTs. It also touches on the issue of Lifelong Learning insofar this takes place inside of employment relationships, i.e. in parallel with working (either as a supplement, or as an integral part of the work itself).

A key word here is “modernisation of work”, which is also one of the three main challenges listed by the eEurope Action Plan. The concept of modernisation, however, does not lend itself easily to measurement as operationalisation requires a clear consensus about what ‘modern’ means. Currently the objective is only described in vague terms and clearly lacks appropriate indicators. Guideline No. 14 indicates the following concepts to approach this objective (for instance):

- “flexible working arrangements”
- “achieving the right balance between flexibility and security”
- “increasing the quality of jobs”

- “Subjects to be covered may, for example, include the introduction of new technologies, new forms of work (e.g. telework) and working time issues such as the expression of working time as an annual figure, the reduction of working time, the reduction of overtime, the development of part-time working, and access to career brakes”.

There is a clear lack of concepts how to monitor and measure the changes in the way work is accomplished in the information society. Occasional studies such as ECaTT focus on certain aspects, quite often those which are well ‘visible’ such as teleworking. The Eurobarometer survey asks for uses of computers at work. More efforts and additional indicators, based on a well developed conceptual understanding of the developments that underlay change in this area, are needed. Changes in the structure and mobility of the workforce need to be examined and measured. These include:

- changes in work content, i.e. time devoted to specific activities,
- working time variability and interrelationship with spatial flexibility (telework),
- proportion of the workforce engaged in ICT-related work settings such as tele-cooperation,
- frequency of and geographic distance involved in telecommuting,
- changes in the length of time people work at a particular company (job tenure), and
- practice of outcome-related compensation models.
- Consideration should also be given to specific issues such as:
 - average level of education needed for “new ways of working” jobs vs. “old economy” jobs,
 - origin of skills that are applied in “new ways of working” jobs,
 - average compensation for “new ways of working” jobs vs. “old economy” jobs, and
 - average prestige of “new ways of working” jobs vs. “old economy” jobs.

Continuous training at the place of employment is a point mentioned in the Guidelines. We need indicators that map (formal as well as informal) training activities that take place in parallel with work and that are provided by employers. Another set of indicators should deal with eLearning schemes in companies, as eLearning might allow them to efficiently provide continuous training to workers at their workplace.

Whereas companies will increasingly be asked to provide continuous learning for their employees, they also have to take care of organisational learning, i.e. knowledge management on the company level. Only if organisations are able to systematically preserve and exploit the know-how of their workforce will they be inclined to invest in training activities. Therefore knowledge management has a close relationship to Lifelong Learning and should be adequately mapped using statistical indicators.

Finally, data that not only maps the spread of flexible work practices, but also worker’s satisfaction with them and effects on the quality of jobs, is still scarce. It is badly needed if policy makers want to make sound decisions about which ways of working should be supported and which should be deterred.

6.3.4 Strengthening Equal Opportunities Policies for Women and Men

The EU Employment Guidelines mention gender mainstreaming as a major objective of employment policies. Mapping Information Society developments must take into account gender differences in access to and use of ICTs. The best way to monitor the relationship between Information Society developments and gender issues in our Topic appears to be to

seek for statistics that allow for gender differentiation throughout our indicator development work.

This pillar also stresses the role of arrangements that reconcile work and family life, as a measure to improve women's position in the labour market. ICTs can help meet this requirement, e.g. by making possible different types of telework. However, care must be taken not to generalise from instances in which ICTs have benefited those who have to reconcile work and family life. There is also evidence of ICT-supported work forms that may turn out to be harmful to gender equality insofar that women are represented above-average in them, such as some call centre employment.

Although this pillar explicitly mentions only gender disparities, opening up the Information Society for all also implies the need to monitor the extent to which groups on the margin such as the disabled, immigrants, 'late life' learners and other learners with special education needs participate in the Information Society. This, again, can best be achieved by providing data that allows for disaggregation and in-depth analysis of smaller subgroups. In particular, the methodology for data gathering must be checked to ensure that margin groups are not systematically misrepresented in the sample drawn (as would be the case e.g. in Internet user surveys).

6.4 Methodology

The following table gives an overview of

- how indicators in the Topic 'work, skills and employment' can be categorised,
- how they relate to the four Pillars of the EU Employment Guidelines,
- what the role of ICTs in this category of indicators is,
- and what methods we suggest to gather data in cases where gaps in data coverage exist which in our opinion have to be filled to allow for proper analysis of developments regarding the four pillars of EU employment policy.²⁴

²⁴ The suggestions for structuring the topic in this overview are preliminary. It will be finalised in WP 2.

TABLE 6.1 – OVERVIEW: STATISTICAL COVERAGE OF TOPIC “WORK, EMPLOYMENT AND SKILLS”

Thematic area			Suggested sub-domain	Relevance for EU Employment Guidelines Pillars	Role of ICTs	Suggested methods of data gathering
SKILLS	WORK	EMPLOYMENT				
			Skill provision			
			Acquiring Information Society-related skills	Pillar I	ICT as tool for teaching skills (eLearning)	inventory of training schemes; representative population survey; survey of organisations in education sector
			Lifelong learning inside of employment relationships	Pillar III	ICT as enabler of Lifelong Learning; eLearning	representative population survey; representative business survey
			Lifelong learning outside of employment relationships	Pillar I	ICT as enabler of Lifelong Learning; eLearning	representative population survey
			Skill requirements			
			Skills gap for professionals in ICT	Pillar I	skills needed are directly related to ICT	scenario development; surveys of companies
			Skills needed for Digital Literacy	Pillar I	skills related to ICT	expert survey; stocktaking of past research
			Applied skills/ Work content			
			Informatisation of work	Pillar III	ICT as major components of work content	representative population survey; in-depth analysis of existent data
			Access to decision making (job enrichment, job enlargement)	Pillar III	Flexibility enabled by ICTs	representative population survey; survey of HR managers; business survey
			Variability of work content	Pillar III	Flexibility enabled by ICTs	representative population survey; survey of HR managers; business survey
			Time of work			
			Average working time	Pillar III	no direct	representative population survey; business survey

		Working time distribution	Pillar III	Flexibility enabled by ICTs	representative population survey; business survey
		Working time variability	Pillar III	Flexibility enabled by ICTs	representative population survey; business survey
		Place of work			
		Flexible work locations (e.g. home-based telework)	Pillars III, IV	Flexibility enabled by ICTs	representative population survey; business survey
		Tele-cooperation	Pillar III	Application of ICTs for collaboration	representative population survey
		Contract of work			
		type of contract (employment status, duration, etc.)	Pillar III	ICT is an enabler of atypical ways of working	existent data to be supplemented by additional data e.g. on voluntariness; representative population survey
		outcome-related compensation	Pillar III	no direct	representative population survey; business survey
		job tenure	Pillar III	no direct	in-depth analysis of existent data; representative population survey
		Outcomes on individual level			
		Job satisfaction	Pillar III	effect of ICT-related new ways of working on job satisfaction	in-depth analysis of existent data; representative population survey
		Outcomes on aggregate level			
		employment / unemployment rates	all Pillars	analyse effect of ICT on overall employment	existent data sufficient
		employment by sector	all Pillars	analyse effect of ICT on employment in sectors	existent data sufficient
		employment in ICT-related start-ups	Pillar II	ICT directly contributes to new employment	survey of start-ups and new enterprises; in-depth analysis of existent data on start-ups
		Productivity	all Pillars	effect of IT investments on productivity	existent data sufficient

7 Social Inclusion

7.1 Framework for Assessing the Area

7.1.1 Summary

The sections to follow deal with the setting boundaries for the domain of social inclusion and the Information Society. It follows on from the initial framework establishment undertaken earlier, and builds on identifying the main issues pertinent to this topic. Thus the main stakeholders in this area are identified, as well as their interactions. Next, statistical measures and variables of interest are reviewed, together with most relevant studies. Finally, relevant methodological issues are outlined.

7.1.2 Setting the Framework

The boundaries of the theme of social inclusion have traditionally been very hard to define with some authoritative precision. The main reason behind this is the fact that this theme is inextricably linked to the issues of (accessing) employment, education, and healthcare, not least because they provide the most tangible indicators for measuring social inclusion in the first place. The same holds true for the topic of social inclusion and the Information Society, with an added dimension being access to, and usage of, information technology. It is worth mentioning that both access and usage are inextricably linked with individuals' and groups' possession of skills and competencies, the issue which was briefly mentioned in other segments of the workpackage (e.g. definitions) and with no doubt, the one to which we shall return again.

With regard to the above, it was undertaken to set up a framework for assessing the area of social inclusion and information society. This framework will seek to set the stage for measuring social inclusiveness of the Information Society primarily, albeit (inevitably) somewhat influenced by the traditional debate regarding social inclusion in general. The theme of social inclusion in general therefore always provides the setting for "digital inclusion", that is to say, these two terms can be visualised as the two intersecting (overlapping) plains. Embedded in these "plains", there are four main building blocks / dimensions of this framework. (as illustrated in the figure overleaf) with a multidimensionality being the key theme, that is to say each one of these individual dimensions is detectable in the others.

The first one deals with the issue of *continuity versus change*, that is to say, it deals with the influence of the current and past debates, concepts and indicators in relation to social inclusion in general on the topic of Social inclusion and the Information Society and their relevance. This can be illustrated by predispositions to view divisions in relation to the Information Society as been just an extension of divisions from "pre-Information Society". Alternatively, these divisions are seen as rather new phenomena characterising the Information Society in particular.

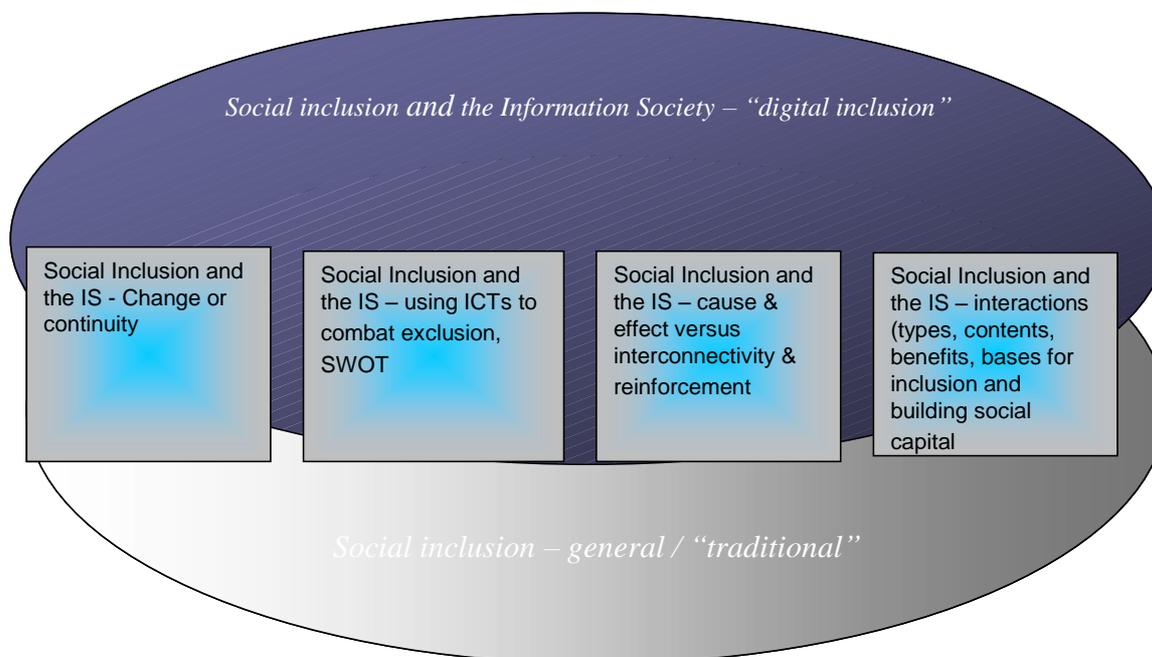


FIGURE 7.: SETTING UP THE FRAMEWORK FOR ASSESSING SOCIAL INCLUSION AND INFORMATION SOCIETY – RELEVANT DIMENSIONS

The second issue that needs to be considered in relation to social inclusion concerns *opportunities and threats* (potential pitfalls) that the Information Society can present. It has been argued that tendencies to perceive the advent of the IS as the panacea for solving the existing problems in relation to social inclusion are already pervasive. This approach effectively represents an attempt to use technology to solve some of the underlying problems of social exclusion. Albeit dangerously liasing with crude technological determinism, this approach has a significant appeal across the board, that is to say, it surpasses “technology circles”. Ironically, seeing the IS as an opportunity in this light has justified seeing it as a threat in the other. The threat is that technology might become used in isolation and / or as a substitute for other policies aimed at ensuring inclusion.

The third dimension deals with views of social inclusion and exclusion in terms of *linear causal pathways and / or multi-linear interconnectivity*. This dimension provides the bedrock for a debate whether general social divisions have *caused*, or are in some other ways responsible for, a new digital divide. A significant part of the debate focuses on the issues of interconnectivity of social and digital divide. Thus general social divisions might indeed precede the digital ones, it might make them more discernible, or it might reinforce them. In addition to the above, it is important to consider interconnectivity within digital divide (the same holds true for a general social divide), with conflation of causes and effects, where the “effects” can themselves become the “causes” of further exclusion.

The fourth dimension is concerned with *interaction* as basis for assessing social inclusion. This theme offers potentially strongest base for indicator building in relation to analysis of digital social inclusion, and will be considered in more detail (while the influence of other dimensions will be still discernible). It deals with a broad theme of *interaction* characterising the Information Society, whether these interactions have simply been continued, adapted, revolutionised or only become possible with its advent. It has been argued the information and communication technologies (ICTs) have already made a significant impact in this area. Thus, the argument goes, these technologies have provided new routes for social interaction, completely new basis for social inclusion via enhanced social participation, equivalent improvements in social capital and social cohesion.

Although the above proposition could be labelled as “maximalistic” in terms of the influence of ICTs on social participation, it offers a useful starting point for our analysis. It is also suitable for indicator generation and development. It will, nevertheless need to be *tempered* somewhat in relation to developing and operationalising some concepts.

7.2 Identification of the Stakeholders and their Interactions

Following on from the previous section and focusing further on the theme of interaction in relation to social inclusion and the Information Society, it is at this point necessary to consider relevant groups of stakeholders. These would include - in broad terms, and mirroring the stakeholders relevant for other topics researched by the SIBIS project - government representatives, private firms, and individuals. However, in relation to the topic of social inclusion, we need to consider these groups more closely and, furthermore, to examine which additional stakeholders merit their inclusion here.

In relation to the government representatives, potentially relevant stakeholders would be: social welfare department and equivalent, department of education (including also both private and public schools and universities), department of enterprise / labour, health department, public libraries, government agencies providing public internet access points (PIAPS), government agencies supporting people with disabilities, government agencies providing training and education to the marginalized and disadvantaged groups, government agencies / branches working in the area of tackling urban / rural / ethnic deprivation, and various advisory bodies to the government dealing with the topic of exclusion / inclusion, and public electronic media.

In relation to the private sector, potential stakeholders include private agencies involved in advising government(s), those in partnership with public sector on once-off projects dealing with social inclusion, employment agencies, Assistive Technology industry, and private electronic media and publishing.

In relation to the individuals, particular attention needs to be given to the groups that are relatively more vulnerable and have relatively higher propensity to be excluded (this holds true for both traditional and “digital” exclusion). These include the elderly, the disabled, and the socio-economically disadvantaged. Another relevant category, which can both coincide and cut across these groups, is the group of so-called “late adopters” of new technologies.

Regarding the earlier mentioned need to consider additional stakeholders to the above three groups, there is one particular group of stakeholders that merits inclusion. This group consists of non-governmental organisations and community organisations. Another group worth considering consists of virtual communities, electronic bulleting boards, and chat rooms participants.

Given the variety characterising these (four groups) of stakeholders, the range of interactions is equally wide. These interactions can initially be seen to belong to the following areas:

- Government to person / person to government interactions and public service provision. Here, these services can be examined in terms of user friendliness and adoptions of design for all concepts, their quality, and their uptake
- Government to community interactions
- Specific private sector and individual interactions
- Individual to individual interactions, and
- Individual to community interactions

As elaborated earlier in the previous section, it is also necessary to consider the other three dimensions / building blocks of social inclusion domain and consider these interaction with a view of detecting new, the information society-exclusive interactions and analysing the ways in which ICTs have influenced the existing interactions and connections. In a similar vein, these interactions can be examined in terms of their contribution to the info-inclusion and in terms of positive (or negative) externalities that they have on some of the outcomes of social exclusion.

7.3 Statistical Measures and Variables of Interest

This section seeks to identify the most appropriate (existing) measures and variables needed to construct indicators for the topic, based on the framework and stakeholder discussion from the previous sections. However, there is an additional dimension to this section stemming from the need to consider the goals and actions of eEurope in relation to the theme of social inclusion and the Information Society.

The first set of indicators can be derived from general indicators measuring the overall (development of) Information Society, that is to say, measuring the spread, benefits and the uptake of ICTs. In order to construct the corresponding indicators of social inclusion, it is necessary to add variables that facilitate measuring distribution of these technologies among various groups / individuals at a national / regional / administrative level. Some of these indicators that are arrived / can be arrived at in this way, are listed below:

- Percent of households with internet access by location (urban, rural, city), income level, education level, and race / ethnic group,
- Percent of households with a computer by location, income, education, race,
- Percent of households with a high speed internet access, and percentage of these by same by location
- Reasons for households with a computer / web TV never accessing the Internet, that is to say, reasons for not accessing the Internet despite the apparent availability of tools
- Reasons for not having internet access and reasons for leaving / discontinuing the Internet services
- Internet use by gender, age, and labour force status,
- Internet access, PC use experience and regular use of PC by disability status
- Income, age employment status (distribution) for persons with disabilities (in order to use these as secondary, function variables)
- Internet use by age and disability status
- E-mail use by age
- National residential basket (the average cost of national calls for residential sector) as a proportion of household / individual income
- Residential mobile basket (the average costs of residential mobile tariffs) as a proportion of household / individual income

In addition to the above indicators, some additional ones are needed in relation to the eEurope actions, that is to say, we need the indicators measuring the achievement of these actions. For example, we need indicators measuring the uptake and application of "Design for All " standards, awareness of the Web Accessibility Initiative and its adoption (eEurope actions focused on public websites), indicators that are going to capture the conformity of

national legislation and positive standards with the principle of accessibility, and indicators measuring digital literacy of general population.

Indicators of social inclusion should be broad enough to capture all relevant interactions. It might be necessary to focus relatively more on some interactions, which will in turn necessitate a more detailed approach to studying that particular set of interactions. For example, the focus might be on the government agencies and their service provision in the area of social inclusion. Accordingly, the interactions between individuals and community on the one hand, and service providers on the other would then become the interaction in focus. Consequently, it would be undertaken to develop indicators measuring the level and quantity of the services provided, (users') perception of quality of service provision, the uptake, the nature of their use and the result of the use of the services provided, and the gap that might exist between the available services and individuals' and communities' expectations.

7.4 Methodology

This section briefly outlines issues such as choosing research methods, conducting relevant observations, reviewing existing research methods, and some methodological issues that relate to conceptual framework.

The starting premise for this section is that the choice regarding the main research method has already been made, that is to say, the survey research using the CATI technique will be the main research method. It is worth pointing out that many commentators in the field of social inclusion in general have a number of reservations in relation to this particular research method and technique. They mainly focus on two issues - its appropriateness regarding achieving the adequate representation of some vulnerable groups, such as people with disabilities in particular, and its ability to adequately capture and translate their views and experiences. The latter is even more relevant given the fact that many interviews will be conducted with a "proxy", that is to say, with the "reference person" who will answer the telephone and provide information for the entire household.

While it is certainly necessary to keep the above potential difficulties in mind, it has to be said that quantitative research techniques have been indispensable for researching various aspects of social inclusion (and the lack of it, that is to say, social exclusion). It is also intended to counter any potential problems outlined above by relying on additional observations of the issues relevant for social inclusion. These observations will be an integral part of research process and data collection exercise. In addition, some qualitative interviewing might be a part of, or alternatively, reinforce these observations. Finally, the fact that some aspects of info-exclusion might not have been readily detectable by the CATI technique will need to be considered in the data analysis and interpretation phase.

Given the aim of this section, it is useful to briefly review one of the most relevant studies of the theme of social inclusion and the Information Society, namely the *Falling Through the Net : Towards Digital Inclusion* report. The relevance of this report is twofold. Firstly, it illustrates how to combine the existing and new variables into indicators relevant for measuring digital inclusion (most of which have been listed in the previous section). Secondly, it adequately deals with the aforementioned issues in relation to achieving representation of people with disabilities by effectively combining two samples. However, the methodology section (at least in the publicly available form) remained short on specifics regarding the nature of data collection from people with disabilities and measures undertaken to eliminate potential bias.

In relation to methodological issues regarding the development of conceptual framework, there are two main issues that need to be considered. Firstly, the framework of research enquiry is based on measuring *the gap* between the various groups and / or individuals in

relation to their proximity to the Information Society. The second issue relates to conceptualising *proximity*. This is done by (in part) using concept of access, which can be visualised as having four dimensions. The first one deals with the way in which access has been conceptualised to represent the ability to use Information Society tools, mainly the Internet and related tools. The second one deals with rather obvious physical access either in terms of having access to the public buildings where the above technology is available to the general public (e.g. government sponsored accessibility initiatives such as availability of *public internet access points – PIAPs*). The third dimension deals with the financial side of access, that is to say, having sufficient finances to obtain relevant ICT tools and to afford / acquire meaningful access to them and to the Internet. It is here that some similarities with general telecommunication access topic will be visible. It might also be necessary to conduct some delineation in relation to it. Fourth dimension deals with access as accessibility and user friendliness of ICT tools and it mainly relates to the “Design for All” principle and WAI initiatives.

8 e-Commerce

8.1 Framework for Assessing the Area

The advent of ICT networks has significantly changed the structure of traditional business and all enterprises—including small and medium ones— now have the ability, in principle, to reach international customers, thus becoming part of a world-wide market. This phenomenon is commonly identified as e-commerce.

Because of the broad range of transactions that it covers, current definitions of e-commerce do not always coincide. As a result, we make a fundamental distinction between the components of e-commerce:

- **BtC** (Business to Consumer), where ICT networks and—in particular—the Internet are used to sell goods and services to end users;
- **BtB** (Business to Business), where transactions are performed among companies to sell goods or services, or to manage the various functions of an enterprise. Therefore, BtB comprises one or more operational tasks involved in running a business: from marketing design to inventory control, from sales forecasting to ordering, etc.

BtB can be further split into *end-use-e-commerce*—intended as on-line transactions involving businesses as end-users—and *process-e-commerce*—related to *inter alia* steps in the value chain other than transaction steps;
- **BtG** (Business to Government), referring to the electronic procurement of goods and services by public bodies and government organisations for their internal functioning.

To avoid an overlap of this topic with the other ones in SIBIS, this topic will not consider health-related e-commerce or any analysis specifically related to trust and security of on-line transactions.

8.2 Identification of the Stakeholders and their Interactions

The e-commerce process can be divided into 5 different steps: gathering of information, placing an order/purchasing, delivery, payment, customer support. Stakeholders involved vary according to the phase we take into consideration and according to the definition of e-commerce we apply.

- **BtB** is related to businesses;
- **BtC** involves – in addition to companies – consumers as end users of products sold on-line, while;
- **BtG** includes among its actors public administrations.

If consumers of goods purchased on-line are quite easy to define, the group of businesses involved in e-commerce services, as providers as well as users, is much more heterogeneous. Beside the suppliers of goods and services sold on-line, a growing number of providers have an active role in e-commerce business processes, either as providers of goods and services supporting e-commerce activity (such as Internet Services Providers, producers of platforms and technical solutions, and managers of e-marketplaces) or providing solutions for payments and for the safety of transactions concluded on-line (i.e. banks, Trusted Third Parties and other intermediaries).

Lastly, a determinant role is still played by the national and European regulators, whose intervention on e-commerce related issues, in particular on trust and safety aspects and intellectual property rights, may strongly influence the speed and direction of the diffusion of e-commerce. Technology plays a fundamental role, but the most important impacts of e-commerce concern the adjustments that are necessary within (and among) enterprises to make possible the development of on-line services. Therefore, the growth of e-commerce goes hand-in-hand with the modification and reorganisation of business processes and functions, giving rise—where necessary—to new business models.

8.3 Statistical Measures and Variables of Interest

E-commerce plays a vital role in the development of the Information Society. By monitoring e-commerce it is possible to provide information on the state of digitisation of large sections of the economy.

Indicators suitable to analyse e-commerce may be clustered as follows:

- **Readiness indicators** – Indicators relating to the basic conditions for using e-commerce. This includes accessibility to the Internet, ICT infrastructure equipment and user profiles;
- **Intensity indicators** - Indicators that provide a picture of the intensity of e-commerce application and usage. Examples include standard usage figures, types of usage, type and number of processes that can be/are performed electronically, adoption patterns broken down into products/countries/sectors, current and expected market growth for e-commerce, etc;
- **Impact indicators** - Indicators that measure the effects/implications of using e-commerce such as changes to internal management of business processes, as well as the broader socio-economic, legal and societal implications.

The usability/adaptability of these indicators may vary significantly between countries, according to the level of diffusion of e-commerce. For example, in those regions where the adoption of e-commerce is at an early stage, analyses tend to focus on the conditions enabling the implementation of e-commerce (typically represented by readiness indicators). Once e-commerce has reached a sufficient level of diffusion, there is a stronger need for indicators that measure the intensity of use of e-commerce (intensity indicators). Only when e-commerce has diffused widely will there be a strong need for impact indicators. These are able to provide a picture of the changes in the economy and in society that have resulted from the introduction of e-commerce.

8.4 Methodology

Statistical sources available so far tend to focus on readiness indicators and, in particular, on the development of BtC e-commerce: socio-economic user-profiles (age, sex, income of residential internet users...); ICT equipment in private households (availability of a PC, Internet connections in households...); types of use of the Internet (e-mail, web, newsgroups...); and, in some cases, barriers preventing the diffusion of the Internet and e-commerce.

Readiness indicators on BtB are well covered in the literature. Existing analyses give a quite detailed picture of the number of enterprises offering BtB solutions, the business branches in which they are active and, in most cases, the use of advanced ICTs within enterprises

(e-mail, video conferencing, EDI, Website presence, etc.). In some cases, it is possible to find data concerning business functions usually supported electronically as well as information regarding barriers preventing businesses from using BtB applications.

The area of intensity indicators is covered only partly: there is still scarce information on the purchasing behaviour of consumers. Information regarding enterprises purchasing goods on-line is still sketchy: some studies provide data concerning the supply of goods over the Internet (methods of delivery, methods of payment, after sales services offered, etc.) or the number of transactions concluded on-line. On the other hand, statistics on investments in types of ICT equipment by enterprises, on expenditure in advertising and on the geographic dimension of BtB are still scarce. The same applies to BtB Intensity indicators on the demand side: there is a shortage in the availability of data on the volume of on-line transactions concluded by businesses and on the ways these transactions were carried out.

Definitely, the research area that is least covered by existing statistical sources is that of impact indicators. Data on customer satisfaction, in terms of saving of time and money, willingness to purchase again on-line, or use of the Internet for other activities are very scarce.

The same applies to the analysis of impacts of BtB on businesses' internal organisation (e.g. substitution of business processes and value added regarding management). New business models and patterns of competition have emerged which have far-reaching effects on prices and market structures. Thus, some sectors benefit from the influence of e-commerce, while others lag.

Beside the shortage of data, statistics still indicate some relevant boundaries that prevent having a satisfactory picture of e-commerce. Indicators used in studies measuring the diffusion or impact of ICT and e-commerce are very often based on assessment criteria that have been developed for industry structures that are no longer in existence. For this reason, they may not properly represent the changes that take place under the influence of the digital economy.

Definitions of e-commerce are not used consistently, and it is not always clear what exactly should be counted as e-commerce transactions and how to deal with combinations with traditional means of communication (fax, telephone etc.) in e-commerce statistics. Differences in definitions in conjunction with differences in survey methodologies (often made worse by a lack of information on methodological procedures such as questionnaire used) have the effect that data stemming from different surveys or statistical studies are difficult to compare.

A Dutch policy document, "Measuring the e-commerce – Recommendation for a Dutch e-commerce monitor", (Dialogic Innovatie & Interactie, Utrecht, July 1999), provides useful guidelines for a methodology for an e-commerce monitoring exercise. According to this document, once a basic set of readiness, intensity and impact indicators will be available, the next step should be to focus on more complex data. These complex indicators may focus on various aspects, such as: changes in the position of a company in the value chain, cost structures, savings made in businesses and consequences for businesses organisation, effects on taxation, etc.

The statistical representation of BtB e-commerce needs to be reorganised according to the distinction between "end-use-e-commerce" and "process-e-commerce". A methodology should be used that is able to provide data that distinguish between the *active* provision of e-commerce facilities (in the case of companies selling their products on-line) with particular attention to the co-ordination of back and front office processes and their *passive* role as user of BtB services.

So far, a strong effort has been invested in the production of market forecasting statistics. Among these is the value of products traded on-line. However, this measure will soon be considered insufficient as an indicator of value added created by e-commerce. Therefore, the Dutch policy document recommends that future analysis should be focused on providing

insights into the rate of adoption of e-commerce, the implementation of on-line business processes, and the changes to the organisation of production which result from BtB and BtC e-commerce.

Last but not least, the indicators to be developed should give a good representation of all relevant market sectors to allow an analysis of sectoral differences in adoption rates, and monitoring early and late adopters business branches.

9 e-Government

9.1 Framework for Assessing the Area

Government operates on several different levels. As a result, it is necessary to split e-government into three categories:

- Government to citizen (GtC),
- Government to business (GtB), and
- Government to government (GtG).

In all cases, the relationship is between the two parties so that GtC designates just as well interactions that originate with government as with the citizen. Likewise, GtB designates interactions between businesses and government. GtG is self-explanatory.

By necessity, e-government comprises a number of functions currently filled by traditional modes of communications, while also offering the possibility for a new way of linking parties in government transactions. In some instances, transactions that today require face to face contact, letter writing, or telephone communication may be replaced by electronic interaction. This has the potential to facilitate and speed many processes. Citizens, operators of businesses and even government employees transacting government business will avoid standing in long lines and will perhaps be able to communicate with the government at any time of day or night. At the same time, governments and citizens will need to weigh the benefits of e-government against perceived or real dangers, such as loss of privacy and potential for fraud. In the same vein, the implementation of e-government should do more than merely map existing processes onto new technologies and instead force a re-evaluation of how GtC, GtB and GtG interactions occur today and how they may be improved in the future.

Prisma proposes five steps to evaluate the progression of e-government.

1. Government entities post information about themselves,
2. Citizens and businesses are able to provide information about themselves,
3. Two way exchanges of information and value can occur between government and citizens or businesses,
4. A portal that integrates the complete range of government roles and paths to them based on need and situations rather than department or agency,
5. Digital democracy—transparent, open and accountable government.

Reactions to e-government may vary. Some welcome the application of improved ICTs to government, while others may view these developments with a certain degree of suspicion, fearing a loss of privacy.

9.2 Identification of the Stakeholders and their Interactions

To see how government can adopt information and communication technologies to implement e-government, it is necessary to understand who is affected by the development of e-government. Depending on whether one considers GtC, GtB or GtG, the stakeholders are governments and either citizens or businesses. Even in the case of GtG, the stakeholders include citizens and businesses, since information about them may transit from one government agency to another. Likewise, citizens may be stakeholders in GtB, and

businesses in GtC, when information about them is provided to businesses and citizens, respectively, by government.

On the simplest level, government provides citizens, businesses and other government agencies with information and services. This is usually obtained by visiting government offices, by requesting information in writing, or by telephone. With the advent of the Internet, government web-sites have replaced or duplicated some of these sources of information and services. Citizens and businesses also provide information to their government. Again, this may require office visits, mail, or telephone interaction. Government web-sites now offer new options to interact with the government electronically. As a result, government efficiency is increasing, because the labour of data entry by government employees is eliminated. It also provides improved accountability by making information more readily available among government agencies.

The range of services that may be provided by e-government spans from simple information sites to fully interactive experiences where users and government engage in a dialog mediated by information technology. Examples of areas where government and citizens or businesses communicate include, among others:

- Access to laws, rules, and regulations
- Information on parks and recreation
- Personal and corporate income taxes
- Unemployment or disability compensation
- Social security
- Personal documents
- Car registration
- Application for building permits
- Declarations to the police
- Public libraries
- Change of address announcements
- Census bureau surveys
- Corporate taxes
- New company registrations
- Submission of data to statistical offices...

This list is by no means exhaustive and serves to illustrate areas where e-government has or will make its presence felt.

The success of e-government depends on all the parties involved in e-government transactions. When seeking information from government, citizens, businesses and other government agencies must be able to easily find what they need and be confident that whatever information is available on-line is current and accurate. When providing information to government, all will want to feel secure in the knowledge that the information provided is recorded accurately and that their privacy is maintained. To that end, it is important to systematically analyse government links and to provide all with information regarding the level of security achieved.

Each of the three areas of e-government has different needs and we consider the three areas separately.

9.2.1 Government to Citizen

A citizen is defined as a member of a state.²⁵ A citizen is a natural person, as opposed to an artificial person, such as a corporation. The citizen has a number of relations to the state. These include, among others, those of: client, customer, voter, subject (to laws and regulations), claimants, beneficiaries, etc. GtC interactions vary in their level of complexity and in the symmetry of the transaction. In the simplest interaction, citizens may wish to obtain general information from government, such as regarding laws or regulations, where secure communication and knowledge of the citizens' identity is not necessary. On a more complex level, citizens may provide information to government by identifying themselves, in which case they may require protection of their privacy. Finally, instances may occur where information flows between parties in both directions and secured communication is also desirable.

9.2.2 Government to Business

Entities that are not natural persons interact with the state in ways that mirror the actions of citizens. Their creation is registered with the government and their progress is tracked in numerous ways during the course of their existence. They pay taxes and must abide by regulations. They may be subject to periodic inspections. Clearly information flows between government and businesses exist. Business here includes for-profit and not-for-profit commercial operations, non-government organisation, professional associations.

While businesses do not vote, by analogy with citizens, businesses have a number of relations to government. These include, among others, those of: client, customer, subject (to laws and regulations), claimants, beneficiaries, etc. In addition, businesses may act as providers to government in instances where government contracts services to businesses or operates in conjunction with them. As with GtC, GtB interactions vary in their level of complexity and in the symmetry of the transaction. Again, businesses may wish to obtain general information from government, where secure communication and knowledge of the business's identity is not necessary. On a more complex level, businesses may provide information to government by identifying themselves, in which case they may require protection of their privacy. Finally, instances may occur where information flows between parties in both directions and secured communication is also desirable.

9.2.3 Government to Government

The operation of government may proceed more smoothly following the adoption of ICTs, since these may allow government to operate more effectively and efficiently. E-government initiatives may result in improved communications and processes because record keeping and service uniformity will be ensured. GtG services may facilitate GtC and GtB operations by creating a single point of contact for services that currently require the interaction with a number of agencies.

Just as in the case of GtC and GtB, the implementation of GtG will call for a re-examination of how government agencies are organised today. Looking at Prisma's step 4 suggests that ICTs may mask difficulties inherent in the way that some government entities are organised today. This is because the portal would serve the role of front office that interacts with the client. The exchange of information between agencies that a powerful portal might require may point to new arrangements of these agencies or different roles for each one. Fundamentally, the successful implementation of e-government depends on how readily

²⁵ Webster's Ninth Collegiate Dictionary. Merriam-Webster Inc.: Springfield, MA. 1991.

accessible government becomes via the Internet. It also depends on how willing citizens are to transact with government in new ways.

These relationships between different government institutions may occur at different levels or may even cross from one level to another. For example, they may include supranational, national, regional and municipal levels. As with the exchanges that occur between citizens and government, e-government exchanges between government agencies may be a two-way process, where a user provides information to trigger the flow of information back. In other instances, however, government agencies may provide information to each other in a format similar to an information kiosk, where an individual at one government agency can browse the site of another agency while providing minimal inputs to guide the search. Finally, information exchanges between government agencies may include the transfer of large databases from one agency to another to complete existing data.

The ability and willingness of government agencies to provide information to one another reflects the level of trust that exists between them. It also depends on how compatible their information systems are. Historically, some government agencies have jealously guarded their information as a way to maintain control over it. It has become apparent, however, that sharing information among agencies can improve not only the position of the two parties, but also improve how they are perceived by third parties.

In the United States, RaDiUS, a complex database that provides information about federally funded research and development (R&D), illustrates one implementation of e-government across agencies. RaDiUS was developed and is administered by RAND, a private corporation. By maintaining a distance between itself and the government agencies that provide information about R&D funding, RAND gains the trust of the agencies that provide it information. Because it can obtain more complete information as an "outsider" than any "insider" could, RAND can then provide government agencies information about funding activities that would not be available from any single source. One particularly illustrative application of RaDiUS has been the request by some cities and regions to learn what federally funded research activities occur in their jurisdictions. Prior to the existence of RaDiUS, this would have required extensive research across government agencies to learn what activities each one sponsored.

The success of RaDiUS depends heavily on the fact that its data inputs are collected unobtrusively. A number of government activities create the records that provide the basis of the data for RaDiUS. Thus, indicators of activity exist and can be relatively easily accessed and analysed, but their collection does not require surveys.

9.3 Statistical Measures and Variables of Interest

Indicators of the success of e-government should not only look at the services that are provided by government but also at how citizens, businesses and governments make use of these services and what their expectations are. Indicators should point to areas where barriers exist to the adoption of e-government. They should also help understand the nature and extent of the barriers. Finally, indicators should suggest ways that e-government can improve.

Looking at the goals of eEurope 2002 and considering how e-government interactions have evolved, it is possible to identify the type of indicators that would be useful to assess its success. Measures of effectiveness can be obtained by looking at the types of transactions that occur on-line and comparing them to the traditional modes of interaction. In this way, one can determine which transactions lend themselves best to an on-line version. Specifically, looking at the goals in eEurope 2002, one can look at which public services occur on-line. They include:

- Number of successful on-line GtC, GtB and GtG transactions,
- Number of traditional GtC, GtB and GtG transactions, and
- Number of attempts at carrying out on-line GtC, GtB and GtG transactions.

In addition, Prisma's five steps to e-government suggest indicators to gauge the progress of government. Thus one may consider the extent to which:

- government agencies post information about themselves on-line,
- citizens and businesses can provide information about themselves on-line,
- citizens, businesses and governments can participate in two way exchanges of value,
- portals integrate government roles and provide paths to them based on need and situation rather than department or agency.

The fifth step is more abstract, since the measure of transparency, openness and accountability may be somewhat subjective.

Other relevant measures focus on the perceived importance the Internet as a source of information on government. Potential indicators of this include:

- Percent of government documents, reports, etc., available on-line,
- Number of times government on-line documents are accessed, and
- Currency of information available on government sites.

The indicators listed above provide some insight into the acceptance and use of e-government. They also point to the success of trying to adapt to new modes of interaction with government. Looking more closely at ways to access government on-line, it might also be possible to determine how well users of e-government are able to navigate government services on-line by studying unsuccessful attempts. Potential indicators of this include:

- Types of activities resulting in an unsuccessful transaction (user gets lost, incorrect routing on site, etc.), and
- Customer satisfaction with on-line government interaction.

After studying how well on-line interactions proceed, one may inquire about barriers to the implementation of e-government. These may range from costs barrier to insufficient training in the use of the Internet, to distrust of e-government. Cost barriers may be remedied by creating and maintaining public access terminals at libraries and schools. Training issues are making education readily available. Access and education are treated as separate topics separately and so are not considered in this section. Distrust may be remedied through education, but it may also represent a general unease with the amount and type of information that government makes available. Clearly, providing sufficient safeguards to protect the privacy of everyone is of great importance.

Specific e-government benchmarking indicators are provided in the eEurope Action Plan.²⁶

Public Services for Citizens

1. Income taxes: declaration, notification of assessment

²⁶ Common list of basic public services. Available in pdf format at http://europa.eu.int/information_society/eeurope/action_plan/pdf/basicpublicservices.pdf, accessed on 5 July, 2001.

2. Job search services by labour offices
3. Social security contributions (3 out of the following 4):
 - Unemployment benefits
 - Child allowances
 - Medical costs (reimbursement or direct settlement)
 - Student grants
4. Personal documents (passport and driver's licence)
5. Car registration (new, used and imported cars)
6. Application for building permission
7. Declaration to the police (e.g. in case of theft)
8. Public libraries (availability of catalogues, search tools)
9. Certificates (birth, marriage): request and delivery
10. Enrolment in higher education / university
11. Announcement of moving (change of address)
12. Health related services (e.g. interactive advice on the availability of services in different hospitals; appointments for hospitals.)

Public Services for Businesses

1. Social contribution for employees
2. Corporation tax: declaration, notification
3. VAT: declaration, notification
4. Registration of a new company
5. Submission of data to statistical offices
6. Customs declarations
7. Environment-related permits (incl. reporting)
8. Public procurement

Information about on-line and traditional transactions should be available from government offices that maintain on-line access. Additional information about failed attempts at on-line transactions should also be available from government offices that maintain a presence on-line. Surveys may be needed among on-line and traditional users of government services to determine why they use one option or the other. Such a survey would also provide the opportunity to understand what happens to make on-line transactions unsuccessful and how this might be changed. In addition, information about customer satisfaction with on-line government transactions could be obtained at that time.

9.4 Methodology

Conferences have been organised to assess the development of e-government in Europe. Of particular interest is *From User To Citizen: The Citizen And The Global Information Society* (EU ISPO, April 1998). At the time, it appeared that many citizens, both as consumers and users of computer-based products, remained unconvinced by the rhetoric of

policy-makers and industry leaders. The success of e-government depends on conveying to citizens that the information society has the potential to be a force for liberation, improving the quality of life. Specifically with respect to e-government, new technologies have the potential to reinforce and strengthen the rights of all by providing instant access to a wide range of public information and government services. Improved access may increase the capacity of citizens to participate in the process of decision-making and to oversee the affairs of government, both locally and nationally.

Information obtained in *From User to Citizen: The Citizen And The Global Information Society* provides a context to consider e-government, but it lacks the statistical indicators needed to measure the success of e-government in society. It provides context to explain why the successful implementation of e-government is not guaranteed. Thus, social exclusion must be avoided, information security and confidential and safe transactions must be guaranteed. A challenging way forward is to prepare a clear statement of citizens' rights, which can be used as a benchmark by which public policy and information society structures can be judged. Such a statement, in line with the recent Commission Call for an International Charter and coupled with practical confidence-building measures, can nourish the process of change and give meaning to a vision of humanity within the Information Society.

Some reports exist, which provide useful indicators of the success of e-government. In addition, some outline strategies to meet the goals of e-government. The Dutch government has proposed a plan in *Towards Optimum Availability Of Public Sector Information* (Dutch Ministry of the Interior and Kingdom Relations, April 2000). The objective of this memorandum is to develop a framework for the commercial use of public sector databases and a more precise definition of the term 'basic information of the democratic constitutional state'. The stated goals are to ensure that the public sector information is as widely accessible and available to citizens as possible, to clarify the legal framework, to remove the obstacles to using Web information, and to make "other information" (besides 'Basic information of the democratic constitutional state' and Web information) more accessible and usable to a wider audience.

The success of e-government can be measured in a number of ways. Frequency of use, ease of use, and satisfaction with the service are straightforward measures. The measures relate to the goals stated in eEurope 2002 of establishing government on-line by providing electronic access to public services. Specifically, they are:

- Efforts by public administrations, at all levels, to exploit new technologies to make information as accessible as possible, and
- Member States should provide generalized electronic access to main basic public services by 2003.

Along with the goals stated in eEurope 2002 were a few indicators. These provide only guidance in finding or developing indicators of the success of e-government. They include:

- Percentage of public service interactions carried out on-line, and
- Percentage of public procurement carried out on-line.

A recent document, *25% Electronic Public Service Delivery In The Netherlands* (Dutch Ministry of the Interior and Kingdom Relations, January 2001), sets baseline measures to evaluate the improvement of e-government over time. The Netherlands Economics Institute (NEI) has carried out a zero measurement. This zero measurement relates to the efforts of the present government to make available at least a quarter of all public services electronically by 2002. The zero measurement involves calculation of the percentage of electronic services provided by the government sector. The measurement assesses the present availability of public services on the Internet, the effective and efficient accessibility of government information to citizens. Based on this study, whereas at least 25% of all

public services should be available electronically by 2002, the degree of electronic service make available is currently less than a quarter.

Other documents such as *eGovernment: Ready or Not?* (The Henley Centre, 1 July 2000) provide some statistical indicators of e-government. Here we consider highlights of the document. Among the indicators provided within the document, it lists various services that citizens are interested in accessing electronically, along with the percentage of respondents who expressed interest. It provides reasons why citizens are interested in accessing government electronically. The answers are broken down by age group. The report also shows why citizens might not be interested in the implementation of e-government. In addition, it lists the types of devices that citizens might use to access government. Data such as these can be integrated directly into an analysis of e-government.

10 e-Health

10.1 Framework for Assessing the Area

10.1.1 Summary

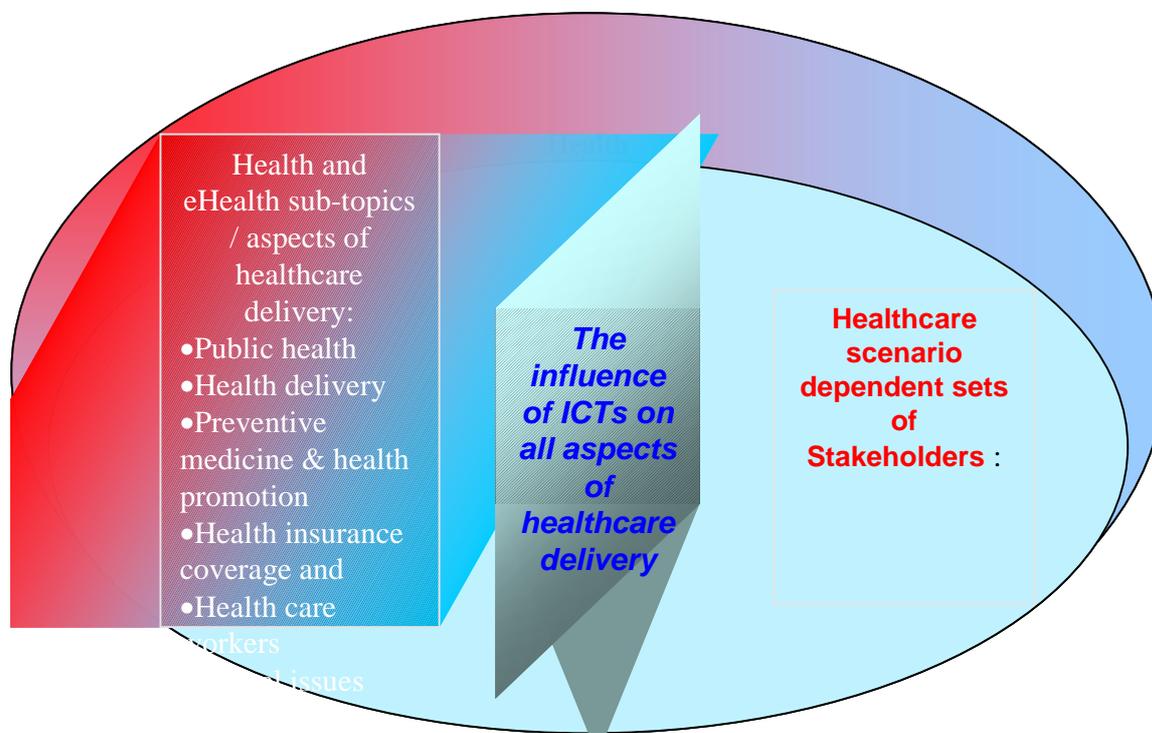
The framework for assessing the area of e-health is essentially about setting the boundaries for this domain. It builds on the initial framework establishment undertaken earlier, in the work task 1, mainly by identifying the main issues pertinent to this topic. It restates the main stakeholders in this domain and identifies additional ones, which are context-dependent. Some relevant issues relating to statistical measures and variables of interest are also outlined. Finally, some relevant methodological issues are considered.

10.1.2 Setting the Framework

It has already been acknowledged that the theme of health in general is a very broad one, including the areas of health delivery, preventive medicine, public health, health insurance, and issues relating to health care workers themselves. Following on from this, it is apparent that the domain of e-health will be equally broad, since each of the above areas provides the field in which the influence of ICTs can be observed. The delimitation of the topic of e-health is made more difficult by the fact that the issues like security (e.g. of electronic patient records, of transactions between the health care service providers and patients/general public, etc.), e-access and health related aspects of info-inclusion, are intertwined with and within this domain. Nevertheless, the following delineation is proposed (illustrated in the figure overleaf).

Briefly, e-health is essentially the influence of ICTs upon the healthcare delivery, and the interplay that ensues between these two. Taking a step back, the main aspects of e-health are at the same time characterising the area of health in general. These aspects are public health, healthcare delivery, preventive medicine and health promotion, health insurance coverage, healthcare sector workers, and ethical issues in health care. The impact of ICTs is discernible in each of these aspects, although it is proposed here that some feedback loops also exist, that is to say, the influence of healthcare stakeholders and related developments in the field are also important for the ways in which ICTs are put to use, and, going a step further, have implications for the subsequent development of the ICTs that are relevant for this sector.

FIGURE 10.1 - SETTING UP THE FRAMEWORK FOR ASSESSING E-HEALTH



10.2 Identification of the Stakeholders and their Interactions

The main stakeholders in general are providers, consumers and regulators. While in other domains of the Information Society these roles remain fairly fixed and are assigned in a fairly straightforward way, the designation of stakeholders in e-health is much more complex and it is dependent on multiple healthcare aspects determined scenarios.

From the perspective of patients and relating to the delivery aspect of healthcare, the relevant stakeholders are medical personnel in the role of providers, patients in the role of consumers, and public / government agencies supported by peer review / regulating bodies in the role of regulators.

If the scenario is a public health care, patients are again in the role of consumers, while government departments, health professionals and pharmaceutical companies can all be in the role of providers. The government bodies and medical boards are again regulators.

Considering the aspect of preventive medicine and health promotion, the relevant stakeholders are general public in the role of consumers, government agencies (such as health departments, occupational health and safety agencies) and non-government organisations in the role of providers, while the government also finds itself in the role of a regulator. Although this situation, where the government effectively plays two stakeholder roles is not necessarily ideal, it has to be pointed out that we are talking about different, often even competing agencies of the government.

The government finds itself in a dual role again when the aspect of health coverage is considered, since it is both a regulator and, together with private concerns, a provider. Both health professionals and patients are the consumers in this case (e.g. the former are also in a dual role since they are often receiving their fees through / from private health insurance providers, while they are themselves in the role of providers of these services when private health insurance providers are buying their services).

When considering the aspect of healthcare personnel, they are in the role of consumers of information that is provided by their colleagues and peers, by pharmaceutical companies, by

academic institutions, and by government agencies. This process is regulated by medical boards and government agencies.

The advent of health on-line has also given a rise to another category of stakeholders – telemedicine ICT applications and medical software industry who can be considered together with the providers of health portals and databases.

Finally, it has been acknowledged that e-health has, on the one hand, raised some new ethical issues, not least for introducing confidential (patients') data into the cyberspace where it is arguably more susceptible to various types misuse and abuse. On the other hand, it has a potential to contribute towards improving the position of patients in relation to enhancing the accountability of healthcare providers, with an inherent potential to make the whole arena more transparent. The stakeholders in this case are the patients as consumers while relevant information can be provided by government agencies, professional associations, peer review boards, pharmaceutical companies, health portals, etc.. The role of regulators can be set on a case by case basis, with supranational health organisations, medical boards and government agencies playing the most prominent part here. In relation to confidentiality, which is an integral part of ethics, the security of electronic data is the main issue, coupled with considerations regarding a potential for a "secondary" (mis)use of these records. The main regulator is again the government and its agencies.

10.3 Statistical Measures and Variables of Interest

This section seeks to identify the most appropriate measures for the topic, based on the initial framework and stakeholder discussion from the previous sections. Generally speaking, and also consistent with evaluation of eEurope actions, the indicators could be classified into three groups measuring readiness, usage and the impact respectively.

The above typology can be applied in relation to the domain of e-health. Thus readiness indicators would be the ones measuring penetration of ICT tools, such as the Internet, into the health sector. These indicators focus on the connectivity rates of healthcare providers and the two main ones are the percentage of general practitioners with the Internet connection and the percentage of clinics / hospital with the Internet connection. The indicators in use are:

- Primary health care establishments access to the Internet (three categories – basic access, professional access, www self presentation)
- Connection of hospitals to the ISDN and leased line networks.
- Availability of (telecommunication) discount schemes for health sector (policy and external environment indicator)

In addition to the Internet-related indicators, another set of readiness indicators relates to penetration of some telemedicine applications. Although not nearly as ubiquitous as the Internet *per se*,²⁷ some of these applications have become standardised enough to lend themselves to a relatively straightforward quantitative measurement. An example of this would be primary health care establishments' diffusion of PSs video communications and PACS (Picture Archiving and Communications Systems). Furthermore, various specific indicators measuring the extent of electronic, computer based patients records could also come under this subheading.

²⁷ The majority of these applications rely on the Internet as their "vehicle", that is to say, access to, and ability to use, the Internet is a pre-requisite for their functioning.

Some progress has already been made in relation to the usage indicators too. Thus we are already witnessing some attempts to combine these readiness indicators with the usage indicators in the survey of EU GPs conducted in May 2000 by the Eurostat, although there were no composite indicators *per se*. In summary these indicators measure the following:

- Awareness, and frequency of usage of medical information available in an electronic form by general practices (the main primary health care agents in most EU countries)
- Awareness, and frequency of usage of ICT tools associated with general practice (including smart cards)
- Awareness, and usage of on-line tools associated with general practice

It is worthwhile considering these indicators in more detail (listed below):

- GPs use of ICTs (e.g. Internet and PC, smart cards, special medical software)
- GPs' consulting professional databases (e.g. Medline)
- GPs' consulting sites created by professional associations
- GPs' consulting official state / health department sites
- GPs' consulting "holistic" medicine sites
- Consulting the web regarding new drugs
- GPs' use of experts' discussion panels
- GPs' electronic interactions with patients (using e-mail)
- Receiving the results from medical laboratories (share received electronically)
- Transferring medical records electronically to other health providers
- GPs' interacting with proximity organisations (e.g. health insurance companies);

However, it is the so-called impact indicators that are notably underdeveloped. However, this is precisely the area that has been identified as probably the most relevant in terms of measuring the influence of health on-line. While accepting the premise that it might be too early to specify what difference the usage of ICTs have made in this sector, a noted movement in this direction is necessary if the benefits of the information Society are to be duly recognised and fully appreciated. In this vein, some attempts have been made to assess whether there has been an improvement in relation to the position of health care consumers / patients. It was attempted to capture this indirectly via reviewing the initiatives intended to support healthcare consumer empowerment.

10.4 Methodology

Given the breadth of the topic and the number of stakeholders involved, coupled with changing and multiple roles assigned to stakeholders depending on the particular scenario and aspect of e-health, it was to be expected that this would be reflected in methodological approaches. The whole issue is made more complex if evaluation of eEurope actions is considered (even in the background) at the same time.

Apart from being sensitive to the scenarios regarding the fluctuating roles of stakeholders, there are also important ethical considerations and, from the perspective of researchers as data collectors, certain constraints, to keep in mind in relation to this domain. This can be illustrated in the following (still hypothetical example at this stage). It might be decided to undertake an investigation of national health web portals or websites owned by health insurance providers. As apart of this exercise, it could be decided to evaluate these by

analysing data relating to the interaction between the health insurance providers and the consumers. This would for example include numbers on hits of these sites, the length of time spent, the number of registered users on web portals coupled with the terms and conditions for registration, etc. However, it might be impossible to obtain such data due to the restrictions imposed by the organisations concerned (and these restrictions would be justifiable on the grounds of confidentiality mentioned above). Ironically, in this case it would be the researchers who generally aspire to ensure confidentiality in general sense that would be somewhat hamstrung in the quest for data by the very issue they support.

Consistent with the initial methodological approaches envisaged for the Sibus project, surveying the general population is deemed suitable for the domain of e-health and this is the best way to cover one important set of stakeholders. Furthermore, the consumers have been identified as the most constant stakeholders (in terms of the roles assigned in e-health scenarios outlined in the previous section), being predominantly the *clients*. This, in turn, justifies the selection of this uniform research technique for eliciting their proximity to, and predispositions and attitudes towards the domain of e-health.

It is also useful to briefly consider other stakeholders. It appears necessary to consider combining surveys of decision makers (in health sector and related industries and services) with some qualitative techniques (e.g. interviews with experts in the area) and some desk research.

SECTION III: THE SIBIS GLOSSARY

11 Definitions

This section contains basic information on definitions, data sources and methodologies. An understanding of the definitions used and the methodologies used are important to a proper analysis of the statistical indicators presented. The section is divided into subsections corresponding to:

1. The New Economy, eEurope and the Information Society in general
2. Telecommunications and access
3. Internet for research
4. Security and trust
5. Education
6. Work, employment and skills
7. Social inclusion
8. eCommerce
9. eGovernment
10. Health
11. Transport
12. Statistics, indicator development, and other methodological issues
13. A Glossary of general ICT terms assembled from a variety of sources.

For simplicity, the information is organised into prototype tables, with columns corresponding to the term, a short verbal definition and, for terms corresponding to measurable quantities or indicators, an indication of likely data sources. In addition to contributing to 'your' sections, I'd like members to make suggestions for eliminating section 13.

I think the following ultimate definition structure (to which this list is input) makes sense:

- A. General definitions: a 2-column (name, definition) table of terms of art covering the general IS, the SIBIS topics, and the relevant disciplines (economics, statistics, ?)
- B. Specific definitions: a 3-column (name, definition, source(s)) table of specific indicators.

11.1 Definitions relating to the New Economy

The most generally used definitions of the major items and the sources of information about them are shown below. These definitions may not be implementable in common form in all countries, so it is necessary to note differences where unavoidable. The terms can be further divided among broad general concepts, political terms, economic terms of art, etc.

Term	Definition	Data Source(s) (if relevant)
General Concepts		
Dematerialisation	Reducing the material 'footprint' of production, esp. through ICT	
Dependability of information infrastructures	Being aware up to what level you can depend on the information infrastructure	
Digital Economy		
Global network	A 'network of networks' including telecommunications, transport, energy and other networks.	
Immaterialisation	Reducing the material 'footprint' of consumption, esp. through ICT	
Information Security	Measures taken to protect information systems against unauthorised use and attacks.	
Information Society		
Intangible Economy	That portion of the economy engaged in development, production and distribution of intangibles (sometimes 'information goods and services')	
Internet	The world's largest computer communication system, with an estimated 100-million users. Originated in the United States, though now operating world-wide, the Internet is a loose confederation of principally academic and research computer networks. It is not a network but rather the interconnection of thousands of separate networks using a common language. Developed by the Pentagon, the Internet first linked government agencies and colleges. Now the Net also connects thousands of companies and millions of individuals world-wide who subscribe to on-line services.	
Knowledge (-based) economy	That portion of the intangible economy engaged in the production, distribution and use of knowledge.	
Network	<p>Communication Networks correspond to a complete system of communications between user's terminals. Networks may be "point to point" (the transmission goes from a fixed origin to a fixed destination), "switched" (the transmission is switched so as to reach a single destination out of many) or "broadcast" (the transmission goes simultaneously to multiple destinations). Networks may be "public" (owned by an operator and open to any member of the public that subscribes) or "private" (owned or leased by an individual or company or group of companies exclusively for its own use).</p> <p>Other types of networks are involved in transport (of tangibles), energy, etc. In every case, 'pathways' or links connect the sending/receiving nodes.</p> <p>This can be differentiated from a (simplicial) <i>complex</i> in which the links themselves can act as nodes. The word node is replaced by the word 'vertex' – vertices are joined by edges, and edges by faces.</p>	

Term	Definition	Data Source(s) (if relevant)
Network economy		
New Economy	Can refer to specific sectors, or to the economy as a whole, transformed by new technology.	
New Economy sectors	<p>US: The US used to use the 1987 SIC (Standard Industrial Classification) system. se of the SIC system is being discontinued because SIC groupings have become outdated by changes in the economy. Most of the detailed data from the 1997 Economic Census are reported in the new North American Industry Classification System (NAICS) categories.</p> <p>OECD: Manufacturing classes 3000, 3130, 3210, 3220, 3230, 3312, 3313 Service classes: 5150, 7123, 6420, 72</p>	
Secure network	Network security has three basic components: confidentiality, integrity and availability. Confidentiality refers to the protection of sensitive information from unauthorised disclosure. Integrity means safeguarding the accuracy and completeness of information and computer software. Availability relates to ensuring that information and vital services are available to users when required.	
Social inclusion/exclusion		
Social network		
Telecommunication network	Communication network	
Telecommuting	Working in one place on tasks in another. This can take place in real time (using continuous connections to simulate a virtual presence) or asynchronously (using sporadic transmission to exchange pieces of information).	
Telelearning	Distance education using electronic communication. This can take place in real time (using continuous connections to simulate a virtual presence) or asynchronously (using sporadic transmission to exchange pieces of information).	
Teleworking	Telecommuting.	
Weightless economy		
Business and Policy Terms		
B2B eCommerce	Business-to-business eCommerce (electronic transactions)	
B2c eCommerce	Business-to-consumer eCommerce (electronic transactions)	
eCommerce	Electronic transactions in goods and services. Covers shopping, negotiation, contracting, purchase, payment, fulfilment, etc.	
eEurope	On 8 December 1999 the European Commission has launched an initiative entitled "eEurope: An Information Society for All", which proposes ambitious targets to bring the benefits of the Information Society within reach of all Europeans. The initiative focuses on ten priority areas, from education to transport and from healthcare to the disabled.	

Term	Definition	Data Source(s) (if relevant)
eGovernment	The use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions.	
eHealth	(Also, telemedicine) Maximising the services provided by the health system through the use of ICT.	
elearning	Telelearning	
iMode		
mCommerce	Mobile commerce – eCommerce that takes place using mobile connection devices.	
Economic terms		
Capital Expenditure	Value of purchases of fixed assets (assets that are used repeatedly in production processes for more than one year). The value is at full cost price. Sales of fixed assets are not deducted.	Sources include national statistical offices and OECD data collected in the Industrial Structures Information System (ISIS) collection exercise.
Employment	Total employment of the statistical units included in the ICT sector. It includes: employees and self-employed; full- and part-time personnel. It is measured in terms of the number of persons employed and not in full-time equivalent (FTE).	Source is usually national statistical offices, and OECD ISIS data. In some cases, data are only available on numbers of employees.

Term	Definition	Data Source(s) (if relevant)
International Trade	<p>Two main data items here are <i>imports</i> and <i>exports</i>.</p> <p><u>Imports of goods</u> = value of goods that enter the domestic territory of a country irrespective of final destination, valued on a free-on-board basis.</p> <p><u>Exports of goods</u> = value of goods that leave the domestic territory of a country, irrespective of processing in the domestic territory, valued on a cost-including-freight basis.</p> <p><u>Imports/exports of services</u> = value of services provided to residents of other countries (or received by residents of the domestic territory).</p>	Data sources include the OECD's Foreign Trade Statistics database (FTS) and IMF Balance of Payments Statistics database. [Iceland and Mexico have no statistics for trade in services.]
Number of ICT Enterprises	The number of enterprises or legal entities operating within the ICT sector. In some countries, the definition of an enterprise may vary slightly from the legal entity basis described above.	Source is generally national statistical offices, and OECD ISIS data. Some data are available on numbers of <i>establishments</i> .
Production	Market value of all production undertaken during the period. It is thus very similar to the data item turnover and differs only in that it does not incorporate any allowance for a change in the stock of work in progress or finished goods. Production is valued at producers' prices and includes indirect taxes but excludes VAT and subsidies.	Source is generally national statistical offices, and OECD ISIS data. Some data on turnover are available.
Research and development	Research and development expenditure is the money spent on creative work undertaken on a systematic basis to increase the stock of knowledge and the use of this knowledge to devise new applications.	These data are sourced from the OECD's Business Enterprise R&D (BERD) or Analytic Business Enterprise R&D (ANBERD) databases. These databases contain data originally provided by Member countries, generally national statistical offices.

Term	Definition	Data Source(s) (if relevant)		
SME	A Small or Medium-sized entity. There are various definitions in terms of turnover, employee counts (or FTEs), etc. A further subdivision is 'micro business' – typically 10 employees or fewer. To be classed as an SME or a micro-enterprise, an enterprise has to satisfy the criteria for the number of employees and one of the two financial criteria, i.e. either the turnover total or the balance sheet total. In addition, it must be independent, which means less than 25% owned by one enterprise (or jointly by several enterprises) falling outside the definition of an SME or a micro-enterprise, whichever may apply. The thresholds for the turnover and the balance sheet total will be adjusted regularly, to take account of changing economic circumstances in Europe (normally every four years).			
		Medium-sized	Small	Micro-enterprise
	Employees	<250	<50	<10
	Turnover (MECU)	<40	<7	N/A
	Balance-sheet total (MECU)	<27	<5	N/A
Value Added	This data item is gross output minus intermediate inputs. It is valued at producers' prices and includes all indirect taxes but excludes VAT and subsidies.	The source for this data item is generally national statistical offices sometimes based on the ISIS data collection exercise. It is often compiled on an establishment basis, otherwise known as "census value added"; on some occasions, however ICT data have been compiled on an enterprise basis and on these occasions the data item supplied will be industry gross product, which differs marginally in the intermediate inputs which are deducted from production.		
Wages and salaries	This measures gross earnings before taxation and other deductions. It therefore includes wages and salaries paid to employees, payments in kind, bonuses, commissions leave payments and the like. It also includes salaries and fees of directors and executives.	The source for this data item is generally national statistical offices, sometimes based on the ISIS data collection exercise. The data item is sometimes not available separately as national statistical offices do not collect data for that item. Sometimes the data may be collected as part of a "compensation of labour" data item.		
Business sector indicator definitions				
Business sector employment	Total dependant employment of the business sector plus the self-employed.	Original sources for the variable components are the national accounts of the countries. Aggregated data found in OECD Analytical Database.		

Term	Definition	Data Source(s) (if relevant)
Business sector value-added	<p>Value-added for the business sector is GDP of the business sector expressed at factor cost. The GDP for the business sector (GDPB) is expressed as: $GDPB = GDP - CGW - TIND + TSUB - CFKG$, where:</p> <p>GDP= gross domestic product, value, market prices</p> <p>CGW= government final wage consumption expenditure, value</p> <p>TIND= indirect taxes, value</p> <p>TSUB= subsidies, value</p> <p>CFKG= government consumption of fixed capital, value</p>	Value-added data for the business sector can be found in the OECD Analytical Business Enterprise R&D database.

11.2 Telecommunications and Access Definitions

Term	Definition
1G	First generation wireless: analogue mobile phones.
2.5G, 2G+	Interim stage between 2G and 3G, providing faster data services.
2G	Second generation wireless: digital mobile phones.
3G	Third generation wireless: digital plus high-speed data and global roaming. Known as IMT-2000 by the ITU and implemented in Europe as UMTS and cdma2000 in North America. Goals are high-quality multimedia and advanced global roaming (inhouse, cellular, satellite, etc.).
Access	The ability to retrieve data, graphics, sound, text etc whether on-line or offline.
Advanced Intelligent Network (AIN)	The integration of ISDN and Cellular Radio into a Personal Communications System (PCS). By adding wireless interfaces to ISDN a personal cellular telephone could be attached to the global ISDN from any worldwide location.
Analogue Mobile Phone System (AMPS)	The analogue cellular mobile phone system in North and South America and more than 35 other countries. It uses FDMA transmission in the 800Mhz band.
Analogue	A continuous representation of a signal such as voice, sound, video, or any other information without discontinuities. It is the direct representation of a waveform, as opposed to digital which is a coded representation.
Asymmetric Digital Subscriber Line (ADSL)	A protocol allowing high-speed communication over existing copper wires. Able to reach speeds 500 times higher than plain modems, ADSL provides high-speed data transmission over standard phone lines whilst maintaining voice traffic on these same lines. The distance to the exchange is limited.
Asynchronous transfer mode (ATM)	A high-speed cell switching technology for LANs and WANs that handles multimedia data in cell format. It combines high efficiency with optimum bandwidth allocation. ATM uses fixed length cells in order to support multiple types of traffic. It is asynchronous in the sense that cells carrying a user's data do not need to be separated by specified time periods. It is the internationally agreed basis for broadband ISDN.
Backbone	The main line that ties networks, phone systems or computers together. There are many small connections (called nodes or terminals), branching off from the backbone.
Bandwidth	The physical characteristic of a telecommunications system that indicates the speed at which information can be transferred. In analogue systems, it is measured in cycles per second (Hertz) and in digital systems in binary bits per second. (Bit/s).
Base Rate Interface (BRI)	ISDN offering that allows two 64kbps "B" ("bearer" or voice) and one 16kbps "D" (signalling) channels to be carried over 1 typical single pair of copper wires. This is the type of service that would be used to connect a small branch or home office to a remote network. Through the use of BONDING (Bandwidth on Demand) the two 64kbps channels can be combined to create more bandwidth as it becomes necessary.
Basic Access	In ISDN, basic access consists of two 64kb/s B (bearer) channels and one 16kb/s "D" channel (2B+D). This is the minimum ISDN service available.
Bit	Short for "binary digit". A bit is the smallest possible unit of storage of

Term	Definition
	computer information. It is the representation of a signal, wave, or state, and can be one of two values: 0 and 1, low and high, or on and off.
Bit rate	The number of bits (binary digits) transmitted in a specified length of time, usually expressed in bits per second (bps). This is considered the most accurate way of measuring the speed of a modem.
Bluetooth technology	Is an open specification for wireless communication of data and voice that describes how mobile phones, computers, and personal digital assistants can easily interconnect with each other and with home and business phones and computers using a short range wireless connection. It will enable users to connect a wide range of computing and telecommunications devices easily and simply, without the need to buy, carry, or connect, cables.
Bridge	A telecommunications "bridge" is used to connect several telephone circuits (for conference calls) or to link up computer networks.
Broadband	Broadband is generally defined as the capacity to transfer data at rates of 2Mbit/s (bits per second) or greater.
Bundling	Bundling' generally means the tying of one service or product to the supply of others.
Byte	An 8-bit quantity of information, also generally referred to in data communications as an octet or character.
Cable	In the world of telephone companies, a cable is one or more insulated wires inside a common protective wrapper.
Cable modem	A modem used on coaxial cables. Speeds are up to 30 Mbps. It is inherently a one-way broadcast service that must be turned into a two-way cable to be viable for Internet access.
Carrier Pre-Selection	The facility offered to customers which allows them to opt for certain defined classes of call to be carried by an operator selected in advance (and having a contract with the customer), without having to dial a routing prefix or follow any other different procedure to invoke such routing.
CdmaONE	The name used by the CDMA (Code Division Multiple Access) Development Group (CDG) for CDMA networks (IS-95) using 2nd-generation digital technology.
Cdma2000	3G CDMA (Code Division Multiple Access) evolution from cdmaONE supported by cdmaONE operators. Phase 1 provides 144 Kbps data rate and Phase 2 up to 2 Mbps.
Cellular Network	A network of cells used to switch and route cellular phone traffic using different techniques for voice encoding and frequency bandwidth utilisation. It is connected to PTT exchanges and allows automatic handing-off of calls in progress from one cell to the next one, optimising the process by cell selection and best path allocation.
Cellular Radio	Technology employing low-power radio transmission as an alternative to local loops for accessing the switched telephone network; users may be stationary or mobile. When mobile they are passed under control of a central site from one cell's transmitter to an adjoining one with minimal switch-over delay.
Channel	In communications, a physical or logical path allowing the transmission of information; the path connecting a data source and a data sink, or receiver.
Channel capacity	Channel capacity is generally measured in bits per second (like bandwidth)

Term	Definition
	but may be stated in many other ways. For example, a channel might be described as being able to carry so many voice conversations or television signals.
Circuit	A physical transmission path between two or more points. (See channel.)
Code Division Multiple Access (CDMA)	The term CDMA refers to any of several protocols used in so-called second-generation (2G) and third-generation (3G) wireless communications. As the term implies, CDMA is a form of multiplexing, which allows numerous signals to occupy a single transmission channel, optimising the use of available bandwidth. The technology is used in ultra-high-frequency (UHF) cellular telephone systems in the 800-MHz and 1.9-GHz bands. CDMA employs analogue-to-digital conversion (ADC) in combination with spread spectrum technology. Audio input is first digitised into binary elements. The frequency of the transmitted signal is then made to vary according to a defined pattern (code), so it can be intercepted only by a receiver whose frequency response is programmed with the same code, so it follows exactly along with the transmitter frequency. There are trillions of possible frequency-sequencing codes; this enhances privacy and makes cloning difficult.
Data Compression	Application of several techniques that reduce the number of bits required to represent information in data transmission or storage, therefore conserving bandwidth and/or memory.
DECT	European cordless telephone standard.
Dedicated line	A direct, permanent connection between a phone or computer and something else externally. For example, a branch office might have a dedicated access line to the company's head office, for phone calls, data, or both.
Demodulation, demodulator	Demodulation converts data back and forth between digital and analogue. A demodulator is the technology that does this. (See modulation, modem.)
Dial-up	Describing the process of establishing a temporary connection via the switched telephone network.
Digital	The representation of data in a form of bits that have two states, "0" and "1".
Digital Cellular	Referring to cellular telephony using compressed digital speech and digital modulation, as opposed to analogue voice channels. Digital techniques will improve the use of available spectrum by factors of between 3 and 7 while reducing noise and allowing the efficient transmission of digital information. There is a gradual migration to digital cellular technology.
Digital compression	Techniques used to compress digital information so it can be sent using less bandwidth.
Digital data speed	This is the highest transmission speed of digital data service available to a subscriber. In some cases, the access line must be set up in a special way and/or dedicated for the subscriber. However some data lines are available on a "dial-up-as-needed" basis.
Digital Subscriber Loop (DSL)	A family of technologies generically referred to as DSL, or xDSL, capable of transforming ordinary phone lines (also known as "twisted copper pairs") into high-speed digital lines, capable of supporting advanced services such as fast Internet access and video-on-demand. ADSL (Asymmetric Digital Subscriber Line), HDSL (High data rate Digital Subscriber Line) and VDSL (Very high data rate Digital Subscriber Line) are all variants of xDSL

Term	Definition
Digital switched network (DSN)	A high-speed digital switched public network which allows access to a wide range of services such as telecommuting, videoconferencing, telemedicine, distance education and criminal identification at prevailing long distance rates and discounts.
Digitise	The way to convert analogue signals to digital form.
Dual-mode handset	Mobile phone that switches from analogue to digital or from land based to satellite or from cordless to cellular.
Enhanced Data rates for Global Evolution (EDGE)	An enhancement to the GSM and TDMA wireless communications systems that increases data throughput to 384 Kbps.
Extranet	A network using Internet protocols, that allows external organisations (eg customers or suppliers) access to selected internal data. Essentially it is an Intranet (see Intranet), which gives external users restricted access (often password protected) to information through the firewall (see firewall)
Fibre optics transmission system (FOTS)	A system which uses glass fibres the size of human hairs through which modulated lightwave signals, generated by a laser or LED are transmitted. By changing the patterns of light sent through the lines, information is transmitted. These signals are then demodulated back into electrical signals by a light-sensitive receiver. Fibre optics generally allow for a much greater speed and bandwidth than transmitting over regular wires, microwave or satellite transmission methods.
File Transfer Protocol (ftp)	The process for transferring binary files across a network
Firewall	A secure gateway limiting access in and out of an internal computer network, such as an Intranet. A combination of settings on computer hardware, and software on computer servers, denies access to unauthorised users.
Fixed radio access	Fixed link telecoms service that connects the network to the consumer's premises by radio instead of copper line or fibre
Flat rate service	A service provided at a fixed monthly charge regardless of usage.
Frame relay	Packet switched data service (see packet service) providing for the interconnection of Local Area Networks (LANs) and access to host computers at higher speeds (up to 2 Mbit/s) than those provided by an X.25 service
Frequency	The number of repetitions per second of a complete waveform normally expressed in Hertz (Hz).
Gateway	A facility which adapts signals and messages of one network to the protocols and conventions of other networks or services.
General Packet Radio Service (GPRS)	Is the next step towards third-generation personal multimedia services, providing the platform for mobile data networking services. It will support mobile connections to IP networks forming a seamless gateway for Internet integration.
General Tariff	The official published rates and rules provided by a telecommunications common carrier.
Geostationary satellite	A satellite in a geosynchronous earth orbit (GEO) 22,300 miles above the earth, at a precisely timed speed and path to position it over a fixed location within a narrow band of the earth. From the earth, the satellite appears to

Term	Definition
	be stationary. Communications satellites are geostationary satellites.
Global System for Mobile Communications (GSM) 1	A digital cellular phone technology based on TDMA (Time Division Multiple Access) that is the predominant system in Europe, but is also used around the world. Operating in the 900MHz and 1.8GHz bands in Europe and the 1.9GHz PCS band in the U.S., GSM defines the entire cellular system, not just the air interface (TDMA, CDMA (etc). GSM phones use a Subscriber Identity Module (SIM) smart card that contains user account information. GSM provides a short messaging service (SMS) that enables text messages up to 160 characters in length to be sent to and from a GSM phone. It also supports data transfer at 9.6 Kbps to packet networks, ISDN and POTS users.
Groupware	Software which allows several users to collaborate sharing information. Lotus Notes is one of the most common packages.
Handshaking	In communications, a predefined exchange of signals or control characters between two devices or nodes that sets up the conditions for data transfer or transmission.
High Rate Digital Subscriber Loop (HDSL)	Provides a symmetric bi-directional high-speed communication service over copper wires, up to T-1 (A 1.544 Mbps point-to-point dedicated, digital circuit provided by the telephone companies. The monthly cost is typically based on distance) speeds in each direction over a maximum distance of seven kilometres.
High speed	Refers to data communications systems operating at speeds above 9,600 bits per second.
HyperText Transfer Protocol (http)	The protocol used to transfer information across the WWW. It indicates that information is encoded in HyperText Mark Up Language (html).
i-Mode	A packet-based information service for mobile phones from NTT DoCoMo (Japan). i-Mode provides Web browsing, e-mail, calendar, chat, games and customised news. It was the first smart phone system for Web browsing and grew very quickly after its introduction in 1999. i-Mode is a proprietary system that uses a subset of HTML, known as cHTML, in contrast to the global WAP standard which uses a variation of HTML, known as WML. The i-Mode transfer rate is 9600 bps, but is expected to increase to 384 Kbps in 2001, using W-CDMA.
Independent Service Provider (ISP)	Entities which provide telecommunications services over fixed or mobile networks, or services with a telecommunication service component, to the public at large but do not own or operate telecommunications networks.
Indirect Access	a situation where a customer contracts to buy a telecommunication service from an operator to which the customer is not directly connected, and where the second operator pays the first operator for the use of that connection.
Integrated Services Digital Network (ISDN)	An international telecommunications standard for transmission of voice and data over dial-up lines running at 64 Kbps. It allows sharing of multiple devices on a single line (eg phone, computer, fax). Two B channels are for voice and data and one D channel is used for control as out of band signalling allowing special features. Basic Rate Interface (BRI or ISDN 2) provides two B channels at 64 Kbps each, and one D channel at 16 Kbps. Primary Rate Interface (PRI) provides two 32 Kbps B channels, plus a D channel at 16 Kbps.
Intelligent Agent	A piece of software using artificial intelligence techniques that operates autonomously using a particular set of rules. Commonly used to roam the

Term	Definition
	Internet and search out information, or to filter incoming messages for items of interest.
Interactive Services	This term covers two forms of interactivity. The first is where viewers use the remote control to click to applications, which are included in the broadcast stream. The second form of interactivity is where the modem is used to communicate with a remote server.
Interconnection	The physical and logical connection of two operators' networks thereby allowing customers of one system to connect with customers of the other, or to access services provided from the other system.
Interconnection Directive	An EU Directive which came into effect from January 1995, setting rules for, amongst other things, who has rights and obligations to interconnect and the terms on which it should take place.
Internet	The global 'network of networks', utilising the TCP/IP protocol for communications. Routing of traffic through the WWW is based on routers and routing protocols. The service is provided by Internet Service Providers (ISP), which establish points-of-presence (POP) for dialling into the network.
Internet Protocol (IP)	The IP part of the TCP/IP protocol, which routes a message across networks. Every entity on the Internet has a unique IP address for purposes of routing.
Internet Protocol version 6 (IPv6)	IPv6 is sometimes also called the Next Generation Internet Protocol or IPng. Internet Protocol Version 6 is abbreviated to IPv6 (where the "6" refers to it being assigned version number 6). The previous version of the Internet Protocol is version 4 (referred to as IPv4).
Internet Service Provider (ISP)	Companies that provide a service for accessing the Internet by establishing a POP, and allowing dialling into the network, or through fixed, leased-line connections. An ISP establishes agreements with other ISPs to allow the free flow of data between networks globally. Common services provided include email, FTP, NEWS, DNS, Authentication, Authorisation and billing, as well as HTTP
Interoperability	The technical features of a group of interconnected systems (includes equipment owned and operated by the customer which is attached to the public telecommunication network) which ensure end-to-end provision of a given service in a consistent and predictable way.
Intranet	An internal Internet – ie an internal network running using TCP/IP. Most intranets are connected to the Internet, and use firewalls to prevent unauthorised access.
Leased line	A private communication channel leased from the common carrier. It is usually a dedicated fixed-route link (e.g. point-to-point frame relay).
Line	A communications channel. Also called a circuit, trunk or facility. It often refers to access to the public switched telephone network (e.g., residence line, individual business line).
Local Area Network (LAN)	The most common way of connecting computers in a small area (typically inside a building or organisation) for sharing databases and communication facilities. The two most common versions are Ethernet and Token Ring. Implementation is based on coaxial cables or plain wires. Speed achieved ranges from 10 Mbps to 100 Mbps.

Term	Definition
Local loop	A communication line between the customer and the local central office. The line is usually a two wire copper line for POTS. The expansion of services to the customer requires higher bandwidth and the utilisation of the local loop for the transmission of multimedia has been a source for substantial development work such as HDSL, ISDN and other standards.
Local Loop Unbundling	Non-incumbent operators will be able to 'own' access to the network connection between the customers' premises and the local exchange (generally, the digital local exchange), which is usually a loop comprising of two copper wires. The customer would then be able to choose which supplier to provide services, and may cease to use the incumbent.
Local measured service (LMS)	A pricing structure for local calls which requires customers to pay according to usage, rather than simply paying a flat monthly fee.
Local multipoint communication systems (LMCS)	A wireless service capable of carrying basic and advanced communication services such as "wireless" cable TV, high speed Internet access, video conferencing and various other multimedia programming.
Loop start	In telephony, a local loop that signals an off-hook condition by allowing data communications current flow between the tip and ring conductors. Loop start is common for single line telephones.
Low speed	Data communications systems operating at speeds of less than 2,400 bits per second (bps). (See high speed, medium speed.)
Managed (private) network	The provision of all the necessary services to ensure that the owner or user of a private network is freed from all aspects associated with its operation and use, other than as a user of the services provided by the network.
Messaging Service	A service enabling customers to exchange messages with each other through 'mailboxes' embedded in network equipment. Both voice and text messaging services are available.
Metropolitan Area Network (MAN)	A network in a metropolitan area, usually encircling it or connecting a large proportion of the population
Microwave transmission system	A high-capacity transmission system that sends information using high-frequency radio signals called microwaves. Originally, microwave systems offered only analogue transmission. Today, microwave systems can be upgraded to digital.
Mobile communications	A wireless form of communication in which voice and data information is sent and received via microwaves. Mobile communications allow individuals to talk to each other and/or send and receive data while moving from place to place.
Mobile Network Operator (MNO)	Organisation with a license to operate a mobile network
Mobile satellite services (MSS)	Mobile satellite services (MSS) refers to networks of communications satellites intended for use with mobile and portable wireless telephones. There are three major types: AMSS (aeronautical MSS), LMSS (land MSS), and MMSS (maritime MSS). A telephone connection using MSS is similar to a cellular telephone link, except the repeaters are in orbit around the earth, rather than on the surface. MSS repeaters can be placed on geostationary, medium earth orbit (MEO), or low earth orbit (LEO) satellites. Provided there are enough satellites in the system, and provided they are properly spaced around the globe, an MSS can link any two wireless

Term	Definition
	telephone sets at any time, no matter where in the world they are located. MSS systems are interconnected with land-based cellular networks.
Modem	A device that converts digital computer output to signals suitable for transmission over switched communications channels. It is one of the most important devices in data communications and is widely used in home computers to access the Internet and other dial-up services. It stands for MODulator/DEModulator.
Multiplexing	A way of combining several communication channels into one.
Multipurpose Internet Mail Extension (MIME)	A standard format for encoding files sent over the Internet. It can handle special character codes and symbols, and is routinely used for sending email attachments.
Narrowband	A service or connection allowing only a limited amount of information to be conveyed, such as for telephony. It compares with broadband which allows a considerable amount of information to be conveyed
National Regulatory Authority	The body or bodies, legally distinct and functionally independent of the telecommunications organisations, charged by a Member State with the elaboration of, and supervision of compliance with, telecoms authorisations
Near video-on-demand (NVOD)	The transmission of a film or TV programme over several channels at the same time but with a short delay (eg of 15 minutes) between the screening on each successive channel to give the customer a choice of viewing times. It aims to approach the functionality of pure video-on-demand which allows the customer complete control over the time the film is watched.
Network	A group of nodes (voice or data terminals) interconnected by a series of communications channels; via an assortment of modems, multiplexers, and transmission equipment.
Network Architecture	The design of a communication system reflecting the underlying structure for access methods, as well as fundamental network issues such as redundancy, fall back mode, alternate routing, survivability, and recovery from different failure modes.
Network Computer	A desktop computer that provides connectivity to intranets and/or the Internet. It is designed as a "thin client" that downloads all applications from the network server and obtains all of its data from and stores all changes back to the server. The network computer (NC) is similar to a diskless workstation and does not have floppy or hard disk storage.
Network Embedded Services	Services provided by a network operator from within its network with service level advantages over customer premises equipment. Due to the network efficiencies that arise, service providers who are not network operators or owned by network operators would not ordinarily be able to compete in the provision of such services.
Network Operator	The licensed operator of a telecommunication network which provides, amongst other things, network services.
Node	A point where one or more functional units interconnect transmission lines (ISO). A physical device that allows for the transmission of data within a network; an end point of a link or a function common to two or more links in a network, typically includes host processors, communications controllers, cluster controllers, and terminals.

Term	Definition
Open Access	Where a network operator grants access to the network to any service provider who may reasonably request it.
Open Network Provision (ONP) Committee	A standing committee of member state national regulatory authorities and others (EC, PTOs and user representatives), which supervises the European Commission's development of the ONP programme. This covers measures aimed at ensuring that services which are not yet required to be liberalised in all member states are regulated in such a way as to guarantee their supply in accordance with certain standards of objectivity, transparency and non-discrimination.
Packet (Switched) Service	A service involving the transmission of data in the form of discrete blocks (packets) of information and, if necessary, the assembly and disassembly of data in this form.
Personal Communications Network (PCN)	High capacity digital cellular networks.
Personal Digital Communications (PDC)	A digital cellular phone system widely used in Japan. Based on TDMA, it transmits in the 810-826MHz and 1477-1501MHz bands. PDC is a 2G wireless system.
Plain Old Telephone Service (POTS)	The traditional telephone system and its services.
Point of Presence (PoP)	Used to indicate an access point to an ISP. Most providers provide PoPs on a national or international basis, giving clients access to the Internet for the price of a local telephone call.
Portability	Refers to telephone number portability between operators, which enables a customer to transfer from one operator to a second operator and retain the same number provided the customer remains at the same address.
Private Automatic Branch Exchange (PABX)	The telephone system at the customer's premises, used for internal and external calls. Modern PABXs are all digital and provide in-house services such as call forwarding.
Private Circuits	Point-to-point circuits for customers exclusive use covering speech, data or image communications. Also known as leased circuits.
Private Networks	A telecommunications network on the customer's side of a network termination point, which forms the boundary between a public telecommunication system run under a PTO licence and the user's network. At its simplest, a private network may consist of just one handset and a length of wiring.
Protocol	Formal set of rules governing the format, timing, sequencing, and error control of data exchange across a data network. May be public or proprietary.
Public switched telephony network (PSTN)	A network established and operated by a telecommunications company for the specific purpose of providing services over the telephone network to the public.
Public Telecommunications Operator (PTO)	Network operators providing services to the public with powers granted by the relevant statutory body to enable them to install their systems on public and private land, property etc.
Radio Fixed Access	Technology that enables operators to provide customers with direct

Term	Definition
(RFA)	connection to the public telecommunications' network via a fixed radio link from the home or premises to the local exchange, instead of providing a 'wired' connection using copper cables or optical fibre.
Radio Spectrum	The range of frequencies used for broadcasting fixed and mobile telephony for radio, terrestrial television and satellite television
Remote Access	1) The ability of transmission points to gain access to a computer at a different location. 2) A private branch exchange (PBX) feature that allows a user at a remote location to access PBX features by wide-area telecommunications services (WATS) lines. Individual authorisation codes are often required for remote access.
Satellite	A device sent up into space used to relay telecommunications signals between two or more points. The main advantage of satellites is the relatively low cost of the earth station equipment needed to link up with satellites compared to stringing wire or fibre optic cable over very long distances.
Satellite communications	The use of geo-stationary orbiting satellites to relay transmissions from one sending earth station to another, or multiple other, earth stations.
Search Engine	A facility that allows Internet information to be searched using an index.
Service Provider (telecoms)	Provider of telecommunication services, or services with a telecommunication service component, to third parties whether over its own network or otherwise
Shared Access	An arrangement where two operators provide services over the same loop. One of the operators will be employing the lower frequency portion of the loop to provide voice telephony and the other will be using the higher frequencies to provide high-speed data services.
Short Message Service (SMS)	Is a wireless bearer service initially used in paging systems and now available on GSM. It is based on Time Division Multiple Access (TDMA) techniques and allows the exchange of short messages over digital control channels.
Significant Market Power (SMP)	The Significant Market Power test is set out in various European Directives, including the Interconnection Directive, the Amending Leased Lines Directive and the Revised Voice Telephony Directive. It is used by the NRA's to identify those operators who must meet additional obligations under the relevant directive. It is not an economic test, rather it requires a consideration of the factors set out in the test within a specified market.
Smart phone	A digital cellular phone that has text messaging, Web access and other data services along with voice.
Spamming	The sending of bulk/junk emails to individuals and newsgroups
Splitter	Device which separates a local loop into two independent channels, so that different services can be run on it without interference
Station	One of the input or output points of a communications system.
Subscriber Identity Module (SIM)	A smart card inserted into GSM phones that contains the telephone account information. SIM cards can also be programmed to display custom menus on the phone's readout.

Term	Definition
Switched	Relates to a telecommunications network comprising at least one exchange and capable of routing signals and messages from one line to all other lines comprised in the network.
Synchronous Digital Hierarchy (SDH)	A method of telephony transmission using digital techniques where the data is packed in containers which are synchronised in time enabling relatively simple modulation and demodulation at the transmitting and receiving ends. The technique is used to carry high capacity voice circuits over long distances.
Tariff	A document filed by a regulated telephone company with the state public utilities commission in order to establish rates charged for services offered. The tariff defines the service and the rate.
Telecommunications	Conveyance of speech, music and other sounds, visual images or signals by electric, magnetic, electro-magnetic, electro-chemical or electro-mechanical means
Telecommunication network	Transmission systems and, where applicable, switching equipment and other resources which permit the conveyance of signals between defined termination points by wire, by radio, by optical or by other electromagnetic means.
Teletext	A one-way information retrieval service normally provided by a cable TV channel with a special decoder that allows page selection from a computer.
Textphone	A device used by hearing and speech impaired people to communicate over networks in typed text rather than speech (ie the device is needed at both ends of the call).
Time Division Multiple Access (TDMA)	A multiple access technique where multiple users of a radio channel share the channel by time usage. Messages are always digital and transmitted in frames. Transmission time slots are controlled by a master station either from a reference frame or from an echo of transmitted frames re-clocked by the master station. Used as a multiple access technique in satellite and cellular telephone systems.
Time of day routing	The routing of calls to different destinations depending on the time of day or the day of the week, according to instructions held in the network that relate to a particular customer. For example, an organisation may wish to advertise a single telephone number but have incoming calls directed to different locations at different times. Such routing usually requires use of a number translation service.
Total Access Communication System (TACS)	An analogue cellular phone system deployed mostly in Europe. It was modelled after the AMPS system in the U.S. In the U.K., ETACS (Extended TACS) transmits in the 871-904/916-949MHz band. International TACS (ITACS) and International ETACS (IETACS) are versions that operate outside the U.K. Narrowband TACS (NTACS) operates in the 860-870/915-925MHz band, and by using a narrower channel spacing, delivers more channels in the same amount of spectrum.
Transport or Transmission Control Protocol/Internet Protocol (TCP/IP)	The basic protocol of the Internet. TCP controls data transfer and the IP controls the routing. TCP/IP is a connectionless protocol system designed to work with a very wide assortment of computer equipment. While it is not formally standardised, it is widely used and highly developed, and therefore, very popular.

Term	Definition
Tromboning	Sending traffic which comes from a fixed and is destined for a mobile network in the same country via a second country to take advantage of beneficial accounting rates for termination of international traffic on mobile networks
Universal Mobile Telecommunication System (UMTS)	The next generation of mobile communications system which will provide an enhanced range of multimedia services (such as high speed Internet access). Known as 'third generation' or '3G', these networks are expected to enter service in 2002/3 using radio spectrum in the 2GHz bands.
Universal Service	The basic level of telecommunications services which should be available to all customers.
Very High Speed ADSL (VHSADSL)	An ADSL service at speeds of 52 Mbps. Distances are limited to a few hundred meters.
Very Small Aperture Terminal (VSAT)	Digital satellite data network with small antenna diameter
Videoconferencing	Camera, microphone and monitors allow the transmission of visual images over a high speed link.
Virtual Private Network (VPN)	A private network that is configured within a public network. For years, common carriers have built Virtual Private Networks that appear as private national or international networks to the customer, but physically share backbone trunks with other customers. Virtual Private Networks enjoy the security of a private network via access control and encryption, while taking advantage of the economies of scale and built-in management facilities of large public networks. Today, there is tremendous interest in Virtual Private Networks over the Internet, especially due to the constant threat of hacker attacks. The Virtual Private Network adds that extra layer of security.
Webcasting	Broadcasting live video and audio over the Internet. Often used for conferences, where the images and sound are received over the phone line to the remote viewers computer.
Wide Area Network (WAN)	A network allowing the interconnection and intercommunication of a group of computers over a long distance
Wideband-CDMA (WCDMA)	A 3G technology that increases data transmission rates in GSM systems by using the CDMA air interface instead of TDMA. In the ITU's IMT-2000 3G specification, W-CDMA has become known as the Direct Sequence (DS) mode.
Wireless Application Protocol (WAP)	WAP is a new protocol for delivering data over mobile telephone systems: it allows cellular phone sets and other mobile hand-set systems to access WWW pages and other wireless services.
Wireless communication	Sending signals without a physical connection using technologies such as cellular telephony or microwaves.
Wireless Generations	The first generation (1G) of mobile cellular communications systems were analogue such as AMPS, TACS and NMT. Primarily used for voice, they were introduced in the late 1970s and early 1980s. Starting in the 1990s, second generation (2G) systems used digital encoding and include GSM, TDMA and CDMA. Except for GSM's SMS text message service, 2G systems have been used mostly for voice. Between now and the third generation (3G), which is expected in the 2003-2005 timeframe, a variety of 2G+, or 2.5G, techniques are being employed to improve the speed of data

Term	Definition
	<p>for enhanced e-mail and Internet access. These technologies include packet enhancements for GSM (GPRS), improved data rates for GSM and TDMA (EDGE) and improved data rates for CDMA (IS-95B and HDR).</p> <p>The third generation (3G) is defined by the ITU under the IMT-2000 global framework and is implemented regionally in Europe (UMTS), North America (cdma2000) and Japan (NTT DoCoMo). 3G is designed for high-speed multimedia data and voice. Its goals include high-quality audio and video and advanced global roaming, which means being able to go anywhere and automatically be handed off to whatever wireless system is available (in house phone system, cellular, satellite, etc.).</p>
Wireless LAN (WLAN)	An implementation of a LAN with no physical wires, using wireless transmitters and receivers. Used for interim periods of relocation and where wiring is very expensive.
World Wide Web (WWW)	The collection of pages in html which reside on web servers. Although www and the internet are different, the terms are increasingly becoming used interchangeably.
X.25	A widely available, low speed, packet switched data service operating at speeds below those offered by Frame Relay.

11.3 Internet for R&D

Term	Definition	Source
Acceptable use policy (AUP) (=Conditions of Use (COU))	AUP refers to the definition of what type of traffic or use is allowed on a network infrastructure.	Aiken 2000, p. 93
Applied research	Applied research is original investigation undertaken in order to acquire new knowledge. It is directed primarily towards a specific practical aim or objective.	OECD 1994, p. 69 (Frascati Manual)
Bandwidth	<p>"The difference between the highest and lowest frequencies of a transmission channel (the width of its allocated band of frequencies).</p> <p>The term is often used erroneously to mean a data rate or capacity - the amount of data that is, or can be, sent through a given communications circuit per second."</p>	http://foldoc.doc.ic.ac.uk/foldoc
Basic research	"Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view."	OECD 1994, p. 68 (Frascati Manual)
Bibliometrics	Statistics on scientific publications	
Broadband	"A transmission medium capable of supporting a wide range of frequencies, typically from audio up to video frequencies. It can carry multiple signals by dividing the total capacity of the medium into multiple, independent bandwidth channels, where each channel operates only on a specific range of frequencies."	http://foldoc.doc.ic.ac.uk/foldoc

Term	Definition	Source
Business enterprise sector (within OECD R&D statistics)	<p>“The business enterprise sector includes:</p> <ul style="list-style-type: none"> - all firms, organisations and institutions whose primary activity is the market production of goods or services (other than higher education) for sale to the general public at an economically significant price; - the private non-profit institutions mainly serving them.” 	OECD 1994, p. 49 (Frascati Manual)
Citation	“A citation is a footnote or reference published with a scholarly journal article.”	Institute for Scientific Information (ISI) http://www.isinet.com/is/search/glossary/index.html
Citation index	“A citation index is a bibliographic tool in print or electronic format that lists all referenced or cited source items published in a given time span. The tool is a useful method for tracking the historical development - backwards and forwards in time - of an idea or given topic within the literature published in a wide selection of journal titles. What distinguishes it from other indexes is that it includes all the cited references (footnotes or bibliographies) published with each article it covers.”	Institute for Scientific Information (ISI) http://www.isinet.com/is/search/glossary/index.html
Collaboratory	<p>The OECD provides two different meanings:</p> <p>1) Computing and communications system: “The “collaboratory” is an integrated, tool-oriented computing and communications system which supports scientific collaboration. It allows researchers to concentrate on the purpose and results, rather than the mechanics, of communication. It has been defined as “a centre without walls in which ... researchers can perform their research without regard to geographic location, interacting with colleagues, accessing instrumentation, sharing data and computational resources, and accessing information in digital libraries” (National Research Council, 1993). It is an environment in which networked facilities permit all of a scientists’ instruments and information to be virtually local, whatever their physical location.”</p> <p>2) Research group: “This is typically a large, unified, cohesive, co-operative research group that is geographically dispersed, yet co-ordinated as if it were at one location and under the guidance of a single director. It provides access to colleagues and to equipment, software and databases that are traditionally part of laboratory organisation, without regard to geography.”</p>	OECD 1998, p. 44 OECD 1998, p. 19
Data rate (=Transmission capacity)	<p>Number of bits that can be transmitted by a communications channel or a computing or storing device; units:</p> <p>Kilobits/s 1.000 Bit/s Megabits/s 1.000.000 Bit/s Gigabits/s 1.000.000.000 Bit/s Terabits/s 1.000.000.000.000 Bit/s</p>	

Term	Definition	Source
Data warehouse	"A data warehouse is a "historical archive" of all the data relating to an organisation's activities and business. It must be chronological, non-volatile, easily accessible and decisional support-oriented. It normally collects, correlates and integrates the information concerning the different processes coming from different applications and their databases."	EITO 2001, p. 211
Digital library	"The term "digital library" does not refer to a library in the conventional sense of a central repository of information. Rather, the term encompasses a broad range of methods of storing materials in electronic format and manipulating large collections of those materials effectively."	National Science Board 2000, p. 9-30
Electronic publishing (e-publishing)	Publishing of research results on electronic media as Compact Disk - Read Only Memory (CD-ROM) or Digital Video Disk (DVD) or the Internet. Resulting publication forms are e-books (electronic books) or e-journals (electronic journals).	
Experimental development	"Experimental development is systematic work, drawing on existing knowledge gained from research and practical experience, that is directed to producing new materials, products and devices; to installing new processes, systems and services; or to improving substantially those already produced or installed."	OECD 1994, p. 70 (Frascati Manual)
Géant	Project co-ordinated by DANTE of Cambridge, U.K., and funded by the European Commission out of its IST programme that will interconnect the national research networks with a transmission capacity of 2.5 Gigabit/s.	
Gross domestic expenditure on R&D (GERD)	GERD is total expenditure on R&D within a statistical unit performed on the national territory during a given period.	OECD 1994, p. 101 (Frascati Manual)
Gross national expenditure on R&D (GNERD)	GNERD is total expenditure on R&D financed by institutions of a country during a given period. It includes R&D performed abroad but financed by national institutions or residents; it excludes R&D performed within a country but funded from abroad.	OECD 1994, p. 101 (Frascati Manual)
Government sector (within OECD R&D statistics)	"The government sector is composed of: <ul style="list-style-type: none"> - all departments, offices and other bodies which furnish but normally do not sell to the community those common services, other than higher education, which cannot otherwise be conveniently and economically provided and administer the state and the economic and social policy of the community. (Public enterprises are included in the business enterprise sector.) - NPIs [non-profit institutions] controlled and mainly financed by government." 	OECD 1994, p. 55 (Frascati Manual)

Term	Definition	Source
Grid	Distributed computing infrastructure for advanced science and engineering. A Grid needs Grid technologies, i.e. the protocols, services and software development kits needed to enable flexible, controlled resource (data, computers, sensors and other resources) sharing on a large scale.	Foster 2000 http://www.nature.com/nature/webmatters/grid/grid.html
Higher education sector (within OECD R&D statistics)	<p>“This sector is composed of:</p> <ul style="list-style-type: none"> - All universities, colleges of technology, and other institutions of post-secondary education, whatever their source of finance or legal status. It also includes all research institutes, experimental stations and clinics operating under the direct control of or administered by or associated with higher education establishments.” 	OECD 1994, p. 59 (Frascati Manual)
Hypertext	“... text with links to further information, on the model of references in a scientific paper or cross-references in a dictionary. With electronic documents, these cross-references can be followed by a mouse-click, and with the World-Wide Web, they can be anywhere in the world.”	CERN http://public.web.cern.ch/Public/ACHIEVEMENTS/WEB/whatis.html
Innovation	à technological product innovation, technological process innovation	
Institutional Research Network (IRN)	à research network	
Intellectual Property	<p>“Intellectual property, very broadly, means the legal rights which result from intellectual activity in the industrial, scientific, literary and artistic fields. Countries have laws to protect intellectual property for two main reasons. One is to give statutory expression to the moral and economic rights of creators in their creations and such rights of the public in access to those creations. The second is to promote, as a deliberate act of Government policy, creativity and the dissemination and application of its results and to encourage fair trading which would contribute to economic and social development.”</p> <p>“Intellectual property is divided into two categories: Industrial property, which includes inventions (patents), trademarks, industrial designs, and geographic indications of source; and Copyright, which includes literary and artistic works such as novels, poems and plays, films, musical works, artistic works such as drawings, paintings, photographs and sculptures, and architectural designs. Rights related to copyright include those of performing artists in their performances, producers of phonograms in their recordings, and those of broadcasters in their radio and television programs.”</p>	WIPO, p. 3 WIPO http://www.wipo.org/about-ip/en

Term	Definition	Source
Intellectual Property Rights (IPR)	“Generally speaking, intellectual property law aims at safeguarding creators and other producers of intellectual goods and services by granting them certain time-limited rights to control the use made of those productions. Those rights do not apply to the physical object in which the creation may be embodied but instead to the intellectual creation as such, ...”	WIPO, p. 3
Invention	'Invention' means a solution to a specific problem in the field of technology. An invention may relate to a product or a process. (à patent)	WIPO, p. 13
Journal	“A serial or periodical usually devoted to a specific field or subset of scholarly knowledge. A few scholarly journals (such as Science or Nature) are multidisciplinary in their approach to a broad range of inter-related fields of investigation. An article appearing in a scholarly journal is composed of different elements including an author abstract and a bibliography of works cited or referenced in the article.”	Institute for Scientific Information (ISI) http://www.isinet.com/is/search/glossary/index.html
National Research (and Education) Network (NRN, resp. NREN)	à research network	
Network research	Long-term basic research on network protocols and technologies. There are many types of network research that can be roughly categorised into 3 classes: <ul style="list-style-type: none"> • research on network transport infrastructure (i.e., the physical, data link, network, and transport layers) • research on “middleware” (components as email gateways or directory services), • research on the real applications (e.g., e-commerce, education, health care, et c.), network interfaces, network applications (e.g., e-mail, web, file transfer, et c.), and the use of networks and middleware in a distributed heterogeneous environment 	Aiken 2000, pp. 91-92
Open-source software (free software)	“ ... software released under a licensing scheme authorising users to freely access the source code, modify it, compile it, use the resulting executable and redistribute the possibly modified code.”	Aigrain 2000, p. 113
Organisational innovation	“Organisational innovation in the firm includes: <ul style="list-style-type: none"> • the introduction of significantly changed organisational structures; • the implementation of advanced management techniques • the implementation of new or significantly changed corporate strategic orientations.” 	OECD 1997, pp. 36-37 (Oslo Manual)

Term	Definition	Source
Other supporting staff in R&D projects	Besides à researchers and à technicians other supporting staff can be included among à R&D personnel if they provide support to à R&D activities. The OECD lists especially: skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects or directly associated with such projects.	OECD 1994, p. 87 (Frascati Manual)
Pan National Research Network (PNRN)	à research network	
Patent	“A patent is a document, issued, upon application, by a government office (or a regional office acting for several countries), which describes an invention and creates a legal situation in which the patented invention can normally only be exploited (manufactured, used, sold, imported) with the authorization of the owner of the patent. 'Invention' means a solution to a specific problem in the field of technology. An invention may relate to a product or a process. The protection conferred by the patent is limited in time (generally 15 to 20 years).”	WIPO, p. 13
Peer review process	Process applied to secure the quality of scientific à journals. Submitted articles are read and evaluated by outside referees which usually are experts on the topic(s) of research.	
Preprint and reprint archive	Specific form of electronic publication where scientific à papers are printed before (preprint) or after (reprint) publication in a scientific à journal. The original and most widely copied model is the Los Alamos physics preprint server (http://xxx.lanl.gov).	
Research and (experimental) development (R&D)	“Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.” R&D covers three activities: à basic research, à applied research and à experimental development Not included in R&D are activities in the areas of education and training, other related scientific and technological activities, other industrial activities, and administration and other supporting activities.	OECD 1994, p. 29 (Frascati Manual)

Term	Definition	Source
Researcher (= scientist)	<p>“Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods, and systems, and in the management of the projects concerned.”</p> <p>The OECD lists the following occupations of the ILO International Standard Classification of Occupations (ISCO-88) as researchers:</p> <ul style="list-style-type: none"> • physical, mathematical and engineering science professionals, • life science and health professionals, • college, university and higher education teaching professionals, • business professionals, legal professionals, archivists, librarians and related information professionals, • social science and related professionals, • research and development department managers. • According to this classification ã technicians and equivalent staff as well as ã other supporting staff are not classified as researchers but as research personnel. 	OECD 1994, pp. 86, 162 (Frascati Manual)
R&D expenditure	<p>Expenditure spent on R&D within a statistical unit (intramural) or outside it (extramural), whatever the source of the funds.</p> <p>The expenditures can be current expenditures such as labour costs for R&D personnel and costs for purchases of materials, supplies and equipment to support R&D. They can also be capital expenditures on land, buildings, instruments and equipment used for R&D activities.</p> <p>On a national level ã gross domestic expenditure on R&D and ã gross national expenditure on R&D can be distinguished as well.</p>	OECD 1994, pp. 91-100 (Frascati Manual)
R&D personnel	<p>All persons employed directly on R&D, as well as those providing direct services such as R&D managers, administrators, and clerical staff (ã researchers, ã technicians and equivalent staff, ã other supporting staff). Excluded should be services and indirect support activities as specific services to R&D (such as central computer departments, libraries), the services of central finance and personnel departments, security, cleaning, maintenance, canteens, etc.</p> <p>The measurement of number as well as of R&D activities in full-time equivalents (person-years) is recommended.</p>	OECD 1994, pp. 79-90 (Frascati Manual)

Term	Definition	Source
Research network (RN)	<p>“... production network, and which supports various types of domain specific application research. This application research is most often used to support the sciences and education but can also be used in support of other areas of academic and economic endeavour.”</p> <p>Different types of RN:</p> <ul style="list-style-type: none"> • An Institutional Research Network (IRN) is a network that supports universities, institutes, libraries, data warehouses, and other ‘campus’ like networks. • National Research Networks (NRNs), such as the Netherland’s Gigaport or Germany’s DFN networks, support IRNs or affinity based networks. • Pan National Research Networks (PNRNs) interconnect and support NRNs (e.g. Dante’s Ten-155 and the NORDUNET). 	Aiken 2000, p. 92
Scientific papers	Papers are defined as regular scientific articles, review articles, proceedings papers, and research notes. Letters to the editor, correction notices, and abstracts are not counted in commercially available citation indexes.	Institute for Scientific Information (ISI) http://www.isinet.com/demos/esi/fs-open.htm
Scientometrics	Statistics on the output of scientific research, sometimes also used for labelling the research on quantitative aspects of science; it is in the latter case the quantitative arm of the Science of Science, of Scientific Communication Studies and of Science Policy Studies	
Technicians and equivalent staff	“Technicians and equivalent staff are persons whose main tasks require technical knowledge and experience in one or more fields of engineering, physical and life sciences, or social sciences and humanities. They participate in R&D by performing scientific and technical tasks involving the application of concepts and operational methods, normally under the supervision of researchers. Equivalent staff perform the corresponding R&D tasks under the supervision of researchers in the social sciences and humanities.”	OECD 1997, p. 86 (Oslo Manual)
Technological process innovation	Technologically new (to the firm) or significantly improved process that has been used within a production process.	OECD 1997, p. 31 (Oslo Manual)
Technological product innovation	Technologically new (to the firm) or significantly improved product (good or service) that has been introduced on the market.	OECD 1997, p. 31 (Oslo Manual)
Transmission Control Protocol / Internet Protocol (TCP/IP)	Set of rules for the computer communication over the Internet	CERN http://public.web.cern.ch/Public/ACHIEVEMENTS/WEB/behaviour.html

Term	Definition	Source
Virtual Private Network (VPN)	Virtual Private Network (VPN) is used in the classical sense for a network tunnelled within another network (e.g. IP within IP, ATM VCs, etc.), and it is not necessarily a security based network.	Aiken 2000, p. 93

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11.4 Security and Trust Definitions

Term	Definition
Security and Privacy	The more accessible the site, the less citizens or visitors are obliged to provide personal information in order to easily download or upload material and responses
Communication infrastructure	The collection of hardware equipment and procedures (software, management) for transporting data needed by an application to deliver specified services to the users. Synonymous with information infrastructure.
Complex system	Collection of a large number of functional entities (equipment, procedures and humans) with a large number of interconnections among them.
Closed system	A system consisting of a known number of components or nodes, their characteristics both physical and as data sources or sinks, their location and their interconnections.
Open system	A system consisting of an unknown or partially known number of nodes or their characteristics both physical and as data sources or sinks. Connectivity is generally unknown or partially known.
Dependability	Property of a system that indicates its ability to deliver specified services to the user
Quality of service	The term (QoS) is used to measure the performance of data networks with respect to the transport of data.
Vulnerability	vulnerability of a system to a threat can be understood as a weakness or flaw in the system that eliminates or reduces its ability to deliver the specified services, or (in the context of critical infrastructures) is related to interdependencies between systems due to massive interconnections in systems-of-systems.

11.5 Education Definitions

Term	Definition
Trans-European network for electronic scientific communication (high-speed....)	A digital network for scientific communication among European researchers
Collaborate learning	Learning processes facilitated by collaboration between individuals or organisations.
Collaborate researching	Research facilitated by collaboration between individuals or organisations.
World Wide Grid	Concept to facilitate collaboration between geographically dispersed teams in scientific disciplines
Virtual centre of excellence	Virtual network connecting researchers a.o. with specialized knowledge.
Campus networks	A digital network in e.g. a university campus
Innovative forms of learning	Effective, new learning forms e.g. e-learning.

Term	Definition
Availability of teachers with IT-skills	Shortage of teachers with relevant IT skills makes it difficult to match demand and supply of IT skilled employees which might reinforce labour market bottlenecks.
Research networks	Collaboration between researchers, research teams or research institutions/departments.
E-learning	Software programs for learning specific topics, for creating digital learning sessions or digitally supported learning processes.
Digitally literate	A person who is IT skilled to a level that makes it possible for him/her to participate in work that involves the use of computers.
Literacy in the Information age	The ability to understand and use information. Literacy can be seen in relation to prose literacy, document literacy and quantitative literacy.
Life-long learning	Learning all life in working life and spare time - not only at school, universities etc.
Virtual schools, universities, education	Suppliers of education that only/primarily is based on e-learning.
IT skills	Skills that are relevant for using IT systems.
Distance learning	Learning where the pupil is geographically dispersed from the classes. Often web based learning.
Web based learning	Learning sessions distributed through the internet.

11.6 Work, Employment and Skills Definitions

Term	Definition
Labour force, active population	The sum of persons in work and unemployed persons.
Employment rate	The proportion of the population aged between 15 and 64 in work (EU convention, cf. EC: Employment in Europe 2000; US convention applied by US Bureau of Labor Statistics: total employment as % of population aged 16+). The employment rate can also be expressed in (̂) full time equivalents.
Full time equivalents (FTE)	Another measure for the employment rate: dividing the total hours worked by the average annual number of hours worked in full-time jobs (and calculated as a proportion of total population aged between 15 and 64).
Unemployment	Persons aged 15+ who are i) without work, ii) available to start work within the next two weeks and, iii) have actively sought employment at some time during the previous four weeks or have found a job to start later (definition according to the ILO – International Labour Organisation).
Unemployment rate	The proportion of unemployed persons aged between 15 and 64 of the active population of the same age.

Term	Definition
Youth unemployment rate	The proportion of unemployed persons aged between 15 and 24 of the active population of the same age.
Long-term unemployment	Being unemployed for at least 12 months. The long-term unemployment rate are the long-term unemployed as a share of total active population.
Underemployment	Involuntary part-time working
Tax wedge	A micro-economic concept that refers to the difference between the total labour costs to firms and the net wages actually received by workers, thus measuring the burden of taxation on individual workers.
Implicit tax rate (ITR)	A macro-economic concept defined as the total amount of taxes on employed labour divided by compensation of employees. It measures the total burden of taxation and other charges in the economy or in individual sectors.
Disposable income	Net income plus received social and private transfers
Equivalentised income	In order to take account of differences in household size and composition in the comparison of income levels, the household's total income is divided by its "equivalent size", computed using the modified OECD equivalence scale: This scale gives a weight of 1.0 to the first adult, 0.5 to the second and each subsequent person aged 14 and over, and 0.3 to each child aged under 14 in the household. To calculate the share ratio, persons are first ranked according to their equivalentised income and then divided into 5 groups of equal size known as quintiles. S80/S20 represents the share of the top 20% to that of the bottom 20%.
Low income	The low income rate is measured in terms of the proportion of the population with equivalentised income below 60% of the median equivalent in each country.
Employability	The possession of basic skills required to get a job.
Entrepreneurship	The required skills and mindset to start and/or run a business.
Labour productivity	Calculated either as GDP per person employed or as Gross Value Added per person employed. Usually GDP expressed in Purchasing Power Standard (EU15 = 100) is used. Person employed covers employees and self-employed. Labour productivity can also be expressed "per hour worked" (= GDP per hour worked).
Adaptability	The ability to cope with change, as individual workers and as enterprises.

Term	Definition
Telecommuting	<p>Working in one place on tasks in another. This can take place in real time (using continuous connections to simulate a virtual presence) or asynchronously (using sporadic transmission to exchange pieces of information. More specifically, the following organisational forms of telework can be distinguished:</p> <ol style="list-style-type: none"> 1) Permanent home-based telework: employees who spend more than 90% of their working time at home 2) Alternating home-based telework: employees who spend at least one full working day but less than 90% of their working time at home 3) Mobile telework: Frequent business travellers who work at least 10 hours per week away from home and the main place of work and use online communication links to their business when doing so 4) Telework of self-employed: freelancers or self-employed whose main place of work is at home or who claim not to have a main place of work and who use ICT as a major means of exchange with their client(s) 5) Supplementary telework: Type of home-based telework where employees do not spend regular working hours at home, but carry out additional tasks or only occasionally work from home
Teleworking	Telecommuting
Flexible work	Working schemes giving the employee different options regarding the time and/or place of work rather than having strict working hours and places.
Telework-centre	An establishment that offers workplaces to employees of one or more organisations, or tele-mediated services to remote clients.
Freelancer	People who work mainly based on temporary contracts either for one or for several contractors
E-lancer	Freelancer who usually gets in touch with clients via the Internet, works as a teleworker and transfers work results via ICT networks
Virtualisation of labour markets	A labour market in which labour is – by analogy with eCommerce – just another commodity, traded freely ‘on the net’ like electronic products.
Virtual organisation	Temporary networks of individuals, small companies or parts of larger corporations that are set up for a specific purpose, mostly laid down in clearly defined goals. The network co-operates using ICTs, especially groupware and workflow systems. Although its individual components are largely autonomous, the virtual organisation operates a single ‘shop window’ to customers. Products and services are marketed in integrated form and under one brand.
e-work	The organisation and execution of work by actors in (partly or fully) virtual business communities. Alternatively, the term can also refer to specific new professions related to the internet and/or involving a high degree of ICT usage.
High-tech sectors	Chemicals (NACE 24), mechanical and electrical engineering (NACE 29 and 31), office machinery (NACE 30), radio and TV (NACE 32), precision instruments (NACE 33), motor vehicles (NACE 34), other transport equipment (NACE 35), post and telecommunications (NACE 64), computing (NACE 72) and research and development (NACE 73). Eurostat definition (cf. EC: Employment Outlook 2000)

Term	Definition
High-education sectors	Sectors with the highest share of workers with tertiary education, i.e. the following 8 NACE 2-digit sectors (in 1999): R&D, education, computers, manufacture of office machinery and computers, general business services, health and social services, activities of membership organisations and extra-territorial organisations (EC definition, Employment Outlook 2000)
Knowledge triangle	The combination of innovation, education and technology, describing the close relationship between skills and educational levels on the one hand and employment on the other.
ICT literacy	The possession of basic skills in operating digital information and communication technologies, e.g. the knowledge how to operate standard word processing programmes using a personal computer, how to use e-mail and how to retrieve information on the world wide web.
LFS (European Union Labour Force Survey)	Quarterly continuous survey by Eurostat, conducted in most European countries (the most notable exceptions being Germany and France). LFS delivers widely used and acknowledged standardised statistical data on employment and unemployment in Europe.

11.7 Social inclusion definitions

Term	Definition
Accessibility (of the Information Society, non-technically defined)	Relates to the concept of taking into account the different needs of the "end-users" with the overriding principle that all citizens should be participants in the Information Society. The concept is particularly relevant to the participation of people with disabilities and is related to the 'Design for All' concept.
"Bobby" approved site / "Bobby Test"	<p>A website that is interactive in a sense that designers interact with users who help them to identify the changes needed to enhance user friendliness, especially relevant for users with disabilities. The "Bobby" is a term used for this Web page authors' tool. For example, a blind user will be aided by adding a sound track to a movie, and a hard-of-hearing user will be aided by a written transcript of a sound file on a Web page. "Bobby" will recommend that these be added if they do not already exist.</p> <p>The "Bobby Test" is an accessibility test provided on the Web by CAST (Centre for Applied Science and Technology), a non profit organisation which aims to expand the opportunities for people with disabilities through innovative development and application of technology.</p>
Braille Display	Also known as "Dynamic Braille Display". It uses, the Braille system, which is a universally used tactile method of writing for the blind, employing groups of dots to represent printed letters and numbers. The system's basic "Braille cell" consists of six raised dots grouped in different patterns to represent letters of the alphabet, numbers, punctuation signs, and certain speech sounds called contractions to be read by people who are blind, using their fingertips. The Braille display raises and lowers dot patterns on command from electronic device, usually a computer, resulting in a line of dynamic Braille (currently Braille displays range from one cell to an eighty cell line)

Term	Definition
Community	A multidimensional term, denoting a group of people brought and maintained together by a collective, shared purpose, and shared interests and activities. Participating in communities is non-segmented, democratic, based on mutuality and free of coercion, while internal relations are not formally regulated and are based on the notion of fairness and justice. The members have a right to access appropriate information, services and facilities that such a group possesses. The advent of the Information Society presents some new opportunities as well as potential threats to communities.
Digital divide	This term is multidimensional in a sense that denotes the gap between individuals (citizens), groups of individuals, households, business establishments, geographic areas and countries with regard to access to and usage of information and communication technologies (ICTs), or the "Information Society". At micro level, the main focus is on the differential among citizens and / or particular groups of citizens and / or communities in relation to their closeness to, and subsequently, their potential to benefit from the Information Society. The most relevant digitally "have nots" have already been identified: people with disabilities, people from generally disadvantaged background (e.g. unemployed), and people from ethnic minorities, with some overlapping between these categories. The majority of main underlying reasons behind digital divide at this level can be grouped under two broad headings – access and skills. The former relates to the level of country's socio-economic and infrastructure development and its access-enhancing policies, coupled with the individual's potential and motivation to access and participate in the Information Society. The latter relates to whether and to what degree are individuals equipped with relevant skills (i.e. skills in using various ICTs).
Design-for-All	Also referred to as "Universal design" is a concept / principle which seeks to take account of the needs of the maximum number of potential users of a product or service at the design stage. The aim is to achieve highest possible direct usage of and access to the ICTs for people with extremely varied abilities and circumstances, thus minimising the need for assistive devices and procedures, but nevertheless assuring that the design is at the same time compatible with assistive technologies. Although it has a particular relevance for people with disabilities, it has been recognised that products and services designed according to this principle are easier to use for everybody. Therefore, it is as much relevant for supporting diversity as it is for supporting any particular group of people.
Disadvantaged / Disadvantaged Groups in relation to the IS	This term can be used to describe any group which has to overcome some sort of barrier in order to obtain equality of access to ICT and/or to benefit from ICT. Disadvantage can be linguistic, gender, physical, cultural, economic, skills based, age, or a combination of some or all of these.
Employability	This term unifies both health perspective and labour market perspective. The former refers to the promoting individual's well-being through sound health and safety practices and reintegrating and rehabilitating the groups of workers most at risk of exclusion such as older workers and physically impaired workers. The latter refers to individuals' possession of the skills and the existence of retraining opportunities in the socio-economic context needed to allow people to change / get jobs. The concept of employability is relevant to determine whether or not someone is employable in today's competitive marketplace and knowledge economy, and if rehabilitative training is necessary (e.g. after the spell of illness or occupational injury, to help people with disabilities prepare for, obtain and maintain employment).

Term	Definition
Employment rate	<p>The proportion of the population aged between 15 and 64 in work (EU convention, cf. EC: Employment in Europe 2000; US convention applied by US Bureau of Labor Statistics: total employment as % of population aged 16+).</p> <p>The employment rate can also be expressed in “full time equivalents” (FTE) . FTE means dividing the total hours worked by the average annual number of hours worked in full-time jobs (and calculated as a proportion of total population aged between 15 and 64).</p>
Equivalent content	<p>Digital contents are equivalent when both fulfil essentially the same function from the user perspective. The distinction on primary and equivalent content is also relevant in this area. In relation to people with disabilities, the equivalent content has to fulfil essentially the same function for the person with disability as the primary content does for the person without any disability. Thus the main emphasis is on providing equivalent information and making (digital) documents accessible to people with disabilities.</p> <p>Since text content can be displayed as synthesised speech, braille and visually displayed text we can distinguish between text equivalents (for graphic and audio information) and non-text equivalents (e.g. an auditory description of graphics, sign language translations).</p>
Instrumental Activities of Daily Living (IADL)	<p>Instrumental activities of daily living (IADL) are activities related to independent living (e.g. preparing meals, managing money, shopping or personal items, performing light or heavy housework, and using telephone). If a person has any difficulty performing an activity by himself or herself and without special equipment, or did not perform the activity at all because of health problems, and this condition is chronic, then the person can be categorised as having a limitation in that activity.</p>
Limitation of activity	<p>Refers to a long-term reduction in a person’s capacity to perform the usual kind or amount of activities associated with his or her age group that has arisen due to a chronic condition.</p> <p>It can be operationalised by gauging limitations in ability to perform activities due to physical, mental, or emotional problems, limitations in daily activities and instrumental activities of daily living, leisure, education, work, and difficulty in walking or remembering.</p>

Term	Definition
<p>Less Favoured Regions (LFRs) / Objective 1 and 2</p>	<p>This term refers to regions in the European Union which are lagging behind in terms of development or which are (in need of) undergoing (economic) restructuring. These are known as Objective 1 and Objective 2 status regions respectively.</p> <p>Objective 1 regions are those regions whose per capita GDP is less than 75% of the Community average, but also include Finnish and Swedish regions covered by the former Objective 6 (development of regions with an extremely low population density, the most remote regions (French overseas departments, the Canary islands, the Azores and Madeira</p> <p>Objective 2. There are four types of areas concerned: industrial, rural, urban, and areas dependent on fisheries. A total of 18% of the European population is covered by Objective 2. Each type of area must meet a certain number of criteria:</p> <ul style="list-style-type: none"> • Industrial areas <p>Eligible NUTS III level areas must meet the following three conditions:</p> <ul style="list-style-type: none"> • an unemployment rate above the Community average; • a higher percentage of jobs in the industrial sector than the Community average; • a decline in industrial employment. • Rural areas <p>Eligible NUTS III level regions must meet two of the following four criteria:</p> <ul style="list-style-type: none"> • A population density less than 100 inhabitants per km² or a rate of agricultural employment equal to or higher than double the Community average; • An unemployment rate higher than the Community average or a decline in the population. • Urban areas <p>Eligible areas must meet one of the following five criteria:</p> <ul style="list-style-type: none"> • a long-term unemployment rate above the Community average • a high level of poverty • acute environmental problems • a high crime rate • a low level of education • Areas dependent on fisheries <p>Eligible areas must have a substantial percentage of the population employed in the fishing industry and, at the same time, a significant reduction in employment in this sector.</p>
<p>Long-term unemployment</p>	<p>A spell of unemployment that is at least 12 months long</p>

Term	Definition
Mainstreaming (in relation to social inclusion of disabled into the IS)	The principle supporting a notion that social inclusion should be mainstreamed in all policies relating to the Information Society, while making specific references to people with disabilities as a group that is at risk from social exclusion, consistent with the view that social inclusion is best achieved by mainstreaming needs when creating all policies, rather than having just one policy specifically for this group, in isolation.
National poverty rate	The percentage of the population living below the poverty line determined by the country' authorities. It is usually an estimate based on household surveys.
Peripherality	This term is used to refer to regions which are geographically located on the perimeters of the European Union.
People with disabilities	An umbrella term denoting people's health characteristics within the context of their individual life situation and environmental impacts. The term is based on the fact that disabilities are produced, reproduced and acquired as a result of the interaction of the individuals' health characteristics and contextual factors (broadly known as a social definition of disability). Medical definition for disability is also relevant for the purpose of survey questions and for the operationalisation of the concept defining a disability as a general term that refers to any long- or short-term reduction of a person's activity / capacity as a result of an acute or chronic condition.
Physician	Graduate of any faculty or school of medicine working in the country in any medical field (practice, teaching, research).
Public expenditure on social security	Indicates the level of governments' intervention in relation to provide compensation for loss of income to the vulnerable groups (unemployed, disabled, elderly, the children). It is measured as a percentage of total government expenditure ²⁸
Rural exclusion or Rural disadvantage	In addition to the general disadvantage or digital divide factors outlined above, rural exclusion or disadvantage is often compounded by geographical location and/or demographics. This often takes the form of limited access to physical communications infrastructure because it is not economic for PTOs to provide it, and exacerbated problems of access to ICT and/or training – often owing to lack of transport, skilled trainers, etc..
Social capital	Refers to the institutions, relationships, and social norms impinging upon the quality and quantity of social interactions within a society. In a broad sense it includes the social and political framework that shapes both these norms but also the relevant social structures.

²⁸ (a note of caution is in order here since higher expenditure can also be a result of a high unemployment rate)

Term	Definition
Social disadvantage	An adverse outcome of social and economics processes (e.g. social exclusion, the adverse effects of the free market) with individuals and / or groups of people experiencing some observable difficulties
Social exclusion	<p>The term relates to those individuals and groups of people whose quality of life and ability to fully participate in society is severely curtailed. For the purpose of simplicity and consistence it is²⁹ defined as an opposite of social inclusion – it is visible in terms of distance / gap, it negates a sense of belonging / creates the sense of alienation, and it is a process that adversely affects particular groups / individuals in a society. In the real life, it is manifested when individuals and / or group(s) of people are experiencing (usually a combination of linked) problems such as unemployment, poor skills, low incomes, poor housing, high crime environments, bad health, at a higher than average rate. The normal cause and effect path does not apply to the concept of social exclusion: its causes are interconnected, and its effects themselves become causes of further exclusion; for example, poverty is both a key cause of social exclusion and its key effect.</p> <p>It is also defined as a process whereby any person becomes marginalised in society on the basis of ethnicity, gender, disability employment status or any other attribute.</p>
Social inclusion	<p>A complex, context-dependent social phenomenon that is discernible and defined at three levels:</p> <p>Proximity (defined as a “distance” or “gap”, either social or economic)</p> <p>A sense of belonging / acceptance / positive reciprocity/ having positive interactions with the rest of society</p> <p>The process conducive to the enhancement of capacities, capabilities, and competencies of groups and individuals.</p>
Social Insurance	Public sector provided insurance funds and services to combat ill health, disability and unemployment. Also known sometimes as Social Welfare.
Unemployed persons / people	Persons aged 15+ who are i) without work, ii) available to start work within the next two weeks and, iii) have actively sought employment at some time during the previous four weeks or have found a job to start later (definition according to the ILO – International Labour Organisation).
Universal Access	Access to both infrastructure and services (usually used in reference to telecommunications, such as talking specifically about access to broadband, for example, but increasingly used in a wider context, such the access) available to (almost) everybody free of charge, or at modest cost. Universal access should not require any particular specialised effort, knowledge or skill.
Web Accessibility Initiative (WAI)	The initiative and commitment by the World Wide Web Consortium (W3C) to achieve the Web’s full potential, particularly by promoting a high degree of its usability for people with disabilities. The work of the WAI spans five major areas : technology, guidelines, tools, education and outreach, and research and development.

²⁹ (although doing it this way is not necessarily correct in sociological arena)

11.8 eCommerce Definitions

Term	Definition
Authentication	a mechanism that allows the receiver of an electronic transmission to verify the sender and the integrity of the content of the transmission through the use of an electronic "key" or algorithm shared by the trading partner. That algorithm is sometimes referred to as an electronic signature.
Encryption	a process of transforming clear text (data in its original form) into cipher text encryption output of a cryptographic algorithm) for security or privacy.
EDI	Electronic Data Interchange - the computer-application- to-computer-application exchange of business information in a standard electronic format. Translation software aids in the exchange by converting data extracted from the application data base into standard EDI format for transmission to one or more trading partners.
E-tailing	is the selling of retail goods on the Internet. Short for "electronic retailing," e-tailing is synonymous with business-to-consumer (B2C) transaction.
Extranet	An extranet is a private network that uses the Internet protocol and the public telecommunication system to securely share part of a business's information or operations with suppliers, vendors, partners, customers, or other businesses. An extranet can be viewed as part of a company's intranet that is extended to users outside the company.
Firewall	A firewall is a set of related programs, located at a network gateway server, that protects the resources of a private network from users from other networks.
Intranet	An intranet is a private network that is contained within an enterprise. It may consist of many interlinked local area networks and also use leased lines in the wide area network. The main purpose of an intranet is to share company information and computing resources among employees. An intranet can also be used to facilitate working in groups and for teleconferences.

11.9 eGovernment Definitions

Term	Definition
Climate for eBusiness	<p>This is covered elsewhere to some degree. The focus here is on government policy that provides a good business climate. Key elements include:</p> <ul style="list-style-type: none"> • Existence of policies and regulation ensuring effective competition among communication and information services providers. • Transparency and predictability of regulatory implementation, openness of government, rule of law, and general business risk (political stability, financial soundness). • Adaptation of competition, consumer protection, etc. frameworks to eBusiness needs. • Adequacy of the taxation system to cope with eCommerce. • Openness to financial and personal participation by foreign investors in ICT businesses. • Ability of the financial system to support electronic business transactions.
Connectivity	<p>The ability to exchange information, goods, and services with the rest of the world, including affordable information and communications technology and services, reliable electrical power, and a reasonable transportation system for people and goods, is a necessary but not sufficient condition for participation in the networked economy. Connectivity addresses the overall availability and reliability of these infrastructures. Key elements include:</p> <ul style="list-style-type: none"> • Availability of wire line (fixed) and wireless (mobile) communication services, community access centres (free and paid), and networked computers in businesses, schools, and homes. • Affordability and reliability of network access, including the cost of service, downtime, and the prevalence of sharing access among individuals. • Underlying infrastructure, including the reliability of electrical supply for business-critical computer operations, and the ease of importing and exporting goods and of transporting them within a country.
Digital Divide	<p>Term used to refer to division of citizens in terms of their 'proximity' to the Information Society. The term has been introduced in a range of studies and refers especially to divisions along ethnicity and income lines (though it may also have geographical and other dimensions). The division can combine:</p> <ul style="list-style-type: none"> • Motivation –groups differ in terms of their reasons to engage with the IS • Access –wealth, infrastructure penetration, etc. may result in differential technical (outside the individual's capability) ability to participate in the IS. • Skills – differences in the possession of ICT skills. <p>This term is included in eGovernment because it is a key target of many eGovernment initiatives and because the digital divide strongly affects the focus, success prospects and performance of such policies.</p>

Term	Definition
Efficiency	<p>A potential measure of the size and distribution cost of costs associated with electronic transactions. This should reflect the resources required to complete an end-to-end transaction with the government, <i>as measured by the citizen, business or other initiating party</i>. This qualification is added because eGovernment often results in massive reallocation of activity and responsibility in ways that increase or decrease transaction counts as measured by the government.</p>
eGovernment	<p>The use of ICT to improve the efficiency, effectiveness, transparency and accountability of government. This can be divided in various ways. One popular scheme divides communications with different parties:</p> <ul style="list-style-type: none"> • citizens. This can be further divided to separate G2C (information access, eDemocracy, service delivery, etc.) and C2G (e.g. tax filing, census, etc.) or by ministry/sector of government activity (e.g. tax, health, safety, transport,...) • business. Again, can divide G2B and B2G, or divide by sector of government activity. • other government agencies at the same 'level.' This means inter/intra-agency communication. • other levels of government. This means communication between e.g. federal and regional/local government. • the wider public sector. This can subsume the 'other level' type, and can also be interpreted to include NGOs as well. • foreign governments and supranational entities (including EU)
eLeadership	<p>The scope and nature of government efforts to promote the networked world within a country and to promote the country as a regional or global centre in the networked world. (The current regulatory and institutional environment for e-business is rated under E-Business Climate, below.) Key elements include:</p> <ul style="list-style-type: none"> • Priority given by government to promoting the development of an e-society on a national level. • Extent of demonstrated progress on e-government, including efforts to automate governmental processes. • Quality of partnerships between industry leaders and government to improve E-Readiness. • Level of effort to promote access for all citizens.

Term	Definition
Electronic transactions	<p>A frequent target of government web strategies or eGovernment initiatives. The broadest definition of electronic transactions includes systematic phone dealings (for instance, via a call centre), existing ,electronic data interchange (used between some large companies and government agencies), computer payments, kiosk or ATM transactions, and Web or e-mail connections. It also includes all payments by departments made to citizens through bank accounts, even though departments have been developing this kind of capability for many years, which hence has little to do with information age government. For measurement purposes, it is useful to fix on a narrow definition, and to measure separately the</p> <ul style="list-style-type: none"> • current 'workload' of transactions • percentage of transactions completed electronically • capacity for completing transactions electronically. <p>It should be remarked that transaction counts are very technology-dependent: a single face-to-face transaction may require several electronic transactions, or <i>vice versa</i>. The 'efficiency' of electronic transactions (see below) is an attempt to capture this.</p>
Freedom of Information Acts (FOIA)	<p>Legal provisions for citizen access to government (and other public or publicly-held) information. The ICT connection comes from:</p> <ul style="list-style-type: none"> • the fact that electronic databases facilitate (and in some cases automate) FOI • the fact that on-line or electronic provision of data has different characteristics (in terms of scope, authority, usability, etc. • the practice of making some FOI information available via electronic 'reading rooms' rather than on request.
Human Capital	<p>This is also covered in other SIBIS topics. The key aspects for eGovernment cover the policies designed to build and preserve necessary skills, motivation and labour markets that operate in the public interest.</p>
Information Security	<p>(Not quite the same as network security) At base the question is one of trust. Obsolete laws or weak enforcement to protect the creation, maintenance, and dissemination of information make an inhospitable environment in which to conduct e-business. Poor protection of intellectual property can stunt the growth of the national software development industry. Inadequate protection of personal data creates barriers to information exchange. Failure to recognise electronic signatures or to permit the use of encryption undercuts trust in the new ways of doing business. Key elements include:</p> <ul style="list-style-type: none"> • Strength of legal protections and progress in protecting intellectual property rights, especially for software. • Extent of efforts to protect electronic privacy. • Strength and effectiveness of the legal framework to address and prosecute computer crimes, authorise digital signatures, and enable public key infrastructures.
Specific attributes (Candidates for additional indicators)	
Disability access	<p>Accessibility of sites to citizens with disabilities.</p>
eDemocracy	<p>This touches on FOI and other sub-topics. Specific services fostering G2C interaction include: Email; comment, consultation; Email updates/lists; push technology; search; chat rooms; broadcast; personalisation.</p>

Term	Definition
ePayment	Whether government sites allow on-line payment of user charges, licence fees, etc.
Foreign language access	Self-evident.
Privacy	Availability (and extent) of privacy policy, protecting personal information from unauthorised access, reuse for unintended purposes, etc. may include rights relating to <ul style="list-style-type: none"> • access (letting citizens see government database information relating to themselves) • correction (letting citizens demand correction of inaccurate or outdated information) • timeliness (putting a time limit on the holding of information) • etc.
Publications	Availability of government publications online. May include: <ul style="list-style-type: none"> • Legal documents (laws, regulations, etc.) • Legal decisions (from courts, regulatory bodies, etc.) • Forms (keep separate track of whether they can be filled out and submitted online) • Databases of statistics, ratings and other public information • Policy documents (e.g. green and white papers) – keep separate track of whether electronic consultation is used • Links to publications of related agencies, organisations
Range of services provided	May include, e.g. <ul style="list-style-type: none"> • Ordering publications • Subscription to case information • Filing complaints • Filing (and/or paying) taxes • Reserving lodging • Ordering vital records • Renewing vehicle registration
Security	Availability of policies (and information) regarding site security. Can cover authentication, privacy, integrity. Typically requires use of special technology (e.g. SSL)
Website Attributes (cf. http://www.cyprg.arizona.edu/waes.html)	
<i>Transparency</i>	<i>The effort an agency makes to make information available through its web-site.</i>
Citizen consequences, responses	Responsibilities placed on citizens by the organisation, responses a citizen can or must make.
Contacts/reachability	How and whom to contact with regard to the organisation's operations
Issue information	Policy issues addressed by the organisation.

Term	Definition
Organisational information	Organisational structure and operation
Ownership	Evidence that the organisation cares about the site.
<i>Interactivity</i>	<i>The ease with which visitors can use information provided on the website</i>
Citizen consequences, responses	Ability to easily follow chains of responsibility, accountability.
Contacts/reachability	Evidence that the organisation is willing to receive input at the gateway (the webmaster within the agency) and the senior level
Issue information	How the organisation deals with its policy issues.
Organisational information	Ability to easily contact members of the organisation.
Information Security	
Security and Privacy	The more accessible the site, the less citizens or visitors are obliged to provide personal information in order to easily download or upload material and responses
Communication infrastructure	The collection of hardware equipment and procedures (software, management) for transporting data needed by an application to deliver specified services to the users. Synonymous with information infrastructure.
Complex system	Collection of a large number of functional entities (equipment, procedures and humans) with a large number of interconnections among them.
Closed system	A system consisting of a known number of components or nodes, their characteristics both physical and as data sources or sinks, their location and their interconnections.
Open system	A system consisting of an unknown or partially known number of nodes or their characteristics both physical and as data sources or sinks. Connectivity is generally unknown or partially known.
Dependability	Property of a system that indicates its ability to deliver specified services to the user
Quality of service	The term (QoS) is used to measure the performance of data networks with respect to the transport of data.
Vulnerability	vulnerability of a system to a threat can be understood as a weakness or flaw in the system that eliminates or reduces its ability to deliver the specified services, or (in the context of critical infrastructures) is related to interdependencies between systems due to massive interconnections in systems-of-systems.

11.10 Health Definitions

Term	Definition
Acute condition	A medical condition that has lasted less than 3 months and has involved either a GP / physician visit (i. e. medical attention) or restricted activity.
Assistive technologies (AT)	The term describing technological products / systems especially designed to assist people with disabilities and elderly people allowing them to use and benefit from ICTs. In principle, ATs can be any product / system / piece of equipment that increases, maintains, or improves functional capabilities of individuals with cognitive, physical, sensory or communication disabilities. The most relevant ATs for online participation of people with disabilities are screen readers and magnifiers, speech synthesisers, voice input software operating in conjunction with graphical desktop browsers, and alternative keyboard devices.
Asynchronous communication of health information	Communication which takes place on a "store and forward" basis, using some type of pre-recording. The examples include accessing health information on the web, transferring electronic patients records, electrocardiography recordings, still images (dermatology / pathology, X-ray radiographs and ultrasound, CT / MR scans)
ATM (an acronym for Asynchronous Transfer Mode)	A high-speed broadband network which is used mostly in large hospitals. It allows massive X-ray files, like thorax X-rays, to be transferred in a matter of seconds from one hospital to another. ATM also allows the simultaneous use of several applications, for instance one could use real-time videoconferencing while transferring X-ray and microscopic images..
Biostatistics	Applied statistics in the medical and biological domains used to plan and interpret experiments and observations. (also used – biometry).
Chronic condition	Refers to any medical condition lasting 3 months or more but any condition can be classified as chronic regardless of its time of onset (for example, diabetes, heart conditions, emphysema, and arthritis).
DataNet	A LAN interconnection service (used widely in Finland) which is suitable for transferring still-images, particularly when the volume is large, as is usually the case in teleradiology. It is ideal for hospitals and large health care centres which have significant data transfer needs
Disability	Any condition, physical or psychological, which leads to the social construction of disability. Reductions in physical or psychological functional capacity lead to reduced abilities to interact with the world, expressing themselves as disability.
Dispensing doctor	Doctor authorised to prescribe and dispense prescriptions for patients who either have difficulty reaching a chemist due to inadequate transport means, their disability, living in a rural area
Computer-based patient record (CPR)	Administrative and medical patient data electronically stored in a consistent way. A computer-based patient record may contain characters, signals, images, and sounds
Consumer empowerment (in health area)	Providing conditions and removing constraints for access to information and resources that enables and compels action that is in the best interest of general public / consumers (This initiative should also be accompanied by the drive to enhance accountability of health care providers) From the consumer's point of view , it relates to gaining knowledge and playing a more active role in managing own health and making informed healthcare decisions, thus increasing the ownership of such decisions.

Term	Definition
Definition study	The investigation at the beginning of the development of an information system in which the user demands are inventoried, how these demands can be fitted within their organisation and what is the connection with other information systems
Distributed System	A set of computer systems interacting via a network and using data communications standards in which various computers collaborate in common tasks
eHealth	Any health related service provided / accessed remotely, usually via the Internet. Ranges in form from information provision, remote diagnosis and monitoring, to information transmission.
Employability	This term unifies both health perspective and labour market perspective. The former refers to the promoting individual's well-being through sound health and safety practices and reintegrating and rehabilitating the groups of workers most at risk of exclusion such as older workers and physically impaired workers. The latter refers to individuals' possession of the skills and the existence of retraining opportunities in the socio-economic context needed to allow people to change / get jobs. The concept of employability is relevant to determine whether or not someone is employable in today's competitive marketplace and knowledge economy, and if rehabilitative training is necessary (e.g. after the spell of illness or occupational injury, to help people, including people with disabilities, to prepare for, obtain and maintain employment).
Ethical issues in eHealth	Comprises accountability of health care providers and confidentiality in relation to privacy and security of patient data
Geographic Information Systems (GIS)	A system designed for the collection, storage, and analysis of objects and phenomena where geographic location is an important characteristic. Data in a GIS has two components – spatial data (representation of features that have a known location on earth expressed in tangible quantitative terms e.g. longitude and latitude) and attributed data (any relevant information linked to the spatial data). The term is increasingly relevant for eHealth, since modern health systems are increasingly using GIS.
General Practitioner (GP)	a) A primary care physician, providing, health care services and practising in the context of family and community b) A graduate of a faculty or school of medicine working in the country providing primary health care to the general public, having satisfied the regulations of national health authorities. GPs can either be office-based or community / municipality health centre-based; can be self –employed or salaried public employees (self-employed generally treat public patients for a capitation fee). In most EU countries they are the first point of call and the focal point in primary medical care provision, both as family doctors providing continuity in health care and as gatekeepers to specialist and hospital care
GP partnership practice	A partnership backed by financial arrangement between two or more practitioners
HIS - Hospital Information System	An information system used to collect, store, process, retrieve, and communicate patient care and administrative information for all hospital-affiliated activities and to satisfy the functional requirements of all authorised users
Health Information Systems	A set-up that provides information for the management of a health programme or health system and for monitoring health activities, with the aim to make it an integral part of the health system

Term	Definition
Health and Medical Informatics - HMI	<p>Health and Medical Informatics (previously referred to as ‘medical informatics’ or ‘health informatics’) comprises the knowledge, skills and tools that enable the sharing and use of information to deliver healthcare and promote health, reflecting a widespread concern to define an information agenda for health services which recognises the role of citizens as agents in their own care, as well as the major information-handling roles of the non-medical healthcare professions.</p> <p>Health informatics is thus an essential and pervasive element in all healthcare activity. It is also the name of an academic discipline developed and pursued over the past decades by a world-wide scientific community engaged in advancing and teaching knowledge about the application of information and communication technologies to healthcare – the place where health, information and computer sciences, psychology, epidemiology and engineering intersect.</p>
Instrumental Activities of Daily Living (IADL)	<p>Instrumental activities of daily living (IADL) are activities related to independent living (e.g. preparing meals, managing money, shopping or personal items, performing light or heavy housework, and using telephone). Relevant term for identifying people with disabilities in surveys is as follows – If a person has any difficulty performing an activity by himself or herself and without special equipment, or did not perform the activity at all because of health problems, and this condition is chronic, then the person can be categorised as having a limitation in that activity.</p>
Interactive health Communications (IHC)	<p>a) The interaction of an individual (consumer, patient, caregiver, professional) with or through an electronic device or communication technology to access or transmit health information, or to receive or provide guidance and support on health related issues.</p> <p>b) Technologies and applications that allow user / customer to locate, share, search, select, and access the desired health information (e.g. using www, listservers, CD-ROMs, stand alone kiosks, dial online services)</p>
Interoperability	<p>a) The ability of systems, units, or forces to provide services to and accept services from other systems, units or forces and to use the services so exchanged to enable them to operate effectively together</p> <p>b) The condition achieved among communications-electronic systems or items of communications-electronics equipment when information or services can be exchanged directly and satisfactorily between them and/or their users. The degree of interoperability should be defined in relation to specific cases</p>
Isochronous mode of communication (relevant to eHealth)	<p>Communication takes place in real time. Typical examples include audio (teleconsultations, transmitting of cardiac and pulmonary sounds) and video communication (telesurgery, teleophthalmology, teleeducation, video teleconsultation) while some can be either and / or combination of both (e.g. remote home motoring). In addition, some asynchronous modes of communications can take place in real time (e.g. transferring patients’ ECG, EEG data in real time)</p>
Limitation of activity	<p>Refers to a long-term reduction in a person’s capacity to perform the usual kind or amount of activities associated with his or her age group that has arisen due to a chronic condition.</p> <p>It can be operationalised by gauging limitations in ability to perform activities due to physical, mental, or emotional problems, limitations in daily activities and instrumental activities of daily living, leisure, education, work, and difficulty in walking or remembering.</p>

Term	Definition
National health expenditure	National health expenditures estimate the amount spent for all health services and supplies and health-related research and construction activities consumed during the calendar year / budget year. Detailed estimates are available by source of expenditures (for example, out-of-pocket payments, private health insurance, and government programs)
Open system architecture	The layered hierarchical structure, configuration, or model of communications or distributed data processing system that (a) enables system description, design, development, installation, maintenance, to be performed at a given layer / layers, (b) that allows each layer to provide a set of accessible functions that can be controlled and used by the functions in the layer above (c) enables each layer to be implemented without affecting the implementation of other layers, and (d) allows the alteration of system performance by the modification of one or more layers without altering the existing equipment, procedures and protocols at the remaining layers
Physician	Graduate of any faculty or school of medicine working in the country in any medical field (practice, teaching, research).
Private health expenditures	Private health expenditures are outlays for services provided or paid for by non-governmental sources--consumers, insurance companies, private industry, philanthropic, and other non-patient care sources.
Public expenditure on health	Recurrent and capital spending from government budget, external borrowing, grants and social health insurance funds.
Public expenditure on social security	Indicates the level of governments' intervention in relation to providing compensation for loss of income to the vulnerable groups (the unemployed, the disabled, the elderly, the children). It is measured as a percentage of total government expenditure ³⁰
Scalability	The term denoting the ability of technology to "migrate" into / acquire / be compatible with expanded capabilities without total replacement. The ability to acquire special features / functions on optional, add-on basis is also considered as an integral part of scalability of technology
Social Insurance	Public sector provided insurance funds and services to combat ill health, disability and unemployment. Also known sometimes as Social Welfare.
Telemedicine	Telemedicine is the location independent and technology mediated delivery of care to patients where critical medical expertise is combined with appropriate ICTs. The term care is used broadly and comprises for example, the transmission of information to provide that care. It also includes the diagnosis, treatment, monitoring, and education of patients using systems that allow ready access to expert advice and patient information. It involves a spectrum of technologies including facsimile, medical data transmission, audio-only format (telephone and radio), still images, and full-motion video. Robotics and virtual reality interfaces have been introduced into some experimental applications. Telemedicine should be understood as a process, not just a technology that enhances the proximity of the expert knowledge and the patient.

³⁰ (a note of caution is in order here since higher expenditure can also be a result of a high unemployment rate)

11.11 Statistical Terms

Name	Definition
Coverage	The scope of the data in terms of geographical regions, sectors, time periods, etc.
Indicator	A measurement constructed from statistical or other data and used to provide an indirect measurement of a quantity or quality that cannot be directly measured.
Pilot indicator	A test specification of an indicator used to investigate stability, robustness, validity and other properties.
Price deflator	A conversion factor used to place prices measured in different time periods on a common footing. Price deflators are usually quantity-weighted averages of specific prices (based on a 'bundle' of goods and services defined in the 'base period'). Price deflators adjust for overall inflation. To deal with issues of changing patterns of demand (e.g. convergence, appearance/disappearance of goods/services, etc.) it is necessary to compute price indices.
Region	A geographical area. The EU has defined several different levels of regions, indicated by the so-called NUTS level.
Efficiency	An efficient estimator has minimum variance among unbiased estimators in its class.
Unbiased	An estimator of a quantity is unbiased if its expected value equals the true value
Consistency	An estimator is consistent if it approaches the true value as the sample size increases. (In other words, it is unbiased and the variance disappears).
Significance	An estimate is statistically significant if the probability that it differs from 0 (in the true population) is less than a threshold (the significance level) based on the sample size and other properties.
Sample	A sample is a proportion of a larger group (the population) selected for measurement. If the characteristics of the sample are similar to those of the population, the sample is unbiased. The quality of a sample increases with the sample size (up to the population). Typically, samples are not unbiased: what matters is whether the bias is correlated with the quantity being measured. If individual entities (sample points) nominate themselves for inclusion, for example, we may suspect <i>selection bias</i> .

11.12 A Glossary of Terms

The following Table lists a variety of ICT-related terms drawn from a variety of sources, including the Fifth Framework Programme, the ISPO, the WTO, the ITU and the World Bank. They may be considered for eventual inclusion in the more focused tables above.

Name	Definition
3D	Three Dimensional
ACTS	Advanced Communications Technologies and Services (FP4 Programme)
Adapter	It is the PC translator that converts information to tidy packages that neatly flow down networks wires. Every PC on a corporate network has one of these adapters, which comes in the form of circuit boards.
Addressability	The facility by which the subscriber's home equipment may be controlled remotely by a cable operator, in order to allow the provision of pay-per-view programmes, changes in the level of the service, or disconnection.
ADSL	Asymmetrical Digital Subscriber Line
AL	Action Line
Allowable costs	See Eligible Costs
Ambient Intelligence	A concept in IST that explores what should come beyond the current "key-board and screen" interfaces to enable ALL citizens to access IST services wherever they are, whenever they want, and in the form that is most natural for them. It involves new technologies and applications both for the access to, and for the provision of applications and services. It calls for the development of multi-sensorial interfaces which are supported by computing and networking technologies present everywhere and embedded in everyday objects. It also requires new tools and business models for service development and provision and for content creation and delivery.
analogue	A method of data transmission which is wave like. It decides values by pitch. For example, take a sound wave - the greater the voltage and frequency the louder/higher the sound, not just on or off. (see also digital)
Applications	Telematic services available in the professional and private spheres such as telework, telemedicine, tele-education and teletraining or telemanagement of traffic.
ASCII (American Standard Code for Information Interchange)	It is the standard code system used on PCs. This is the de facto world-wide standard for the code numbers used by computers to represent all the upper and lower-case Latin letters, numbers, punctuation, etc. There are 128 standard ASCII codes each of which can be represented by a 7 digit binary number: 0000000 through 1111111.
ASICs	Applications Specific Integrated Components
Assessments:	Type of Take-up measure. See definition in Annex 1.
ASYMMETRICAL Digital Subscriber Line (ADSL)	Existing telephone networks upgraded to allow VCR-quality video images (but not live or high-definition signals) to be transmitted.

Name	Definition
ATM	Asynchronous Transfer Mode, or Automatic Teller Machine, or Air Traffic Management Asynchronous Transfer Mode is an international packet switching standard established by the CCITT. It is a system for organising a digital signal in such a way as to allow very high speed transmission of the signal while making optimum use of the network's transmission capacity. A standard agreed for B-ISDN networks.
ATP	Advanced Technology Program (US - NIST)
authentication	Security feature that determines a user's identity and therefore access to systems by using various digital methods.
bandwidth	The range of transmission frequencies that a network can carry. The greater the bandwidth, the greater the amount of data that a cable can carry. Bandwidth is measured in bits per second (bps) for digital signals, or in hertz (Hz) for analogue signals. Highest for fibre optic, lowest for copper telephone wire.
Baud	Numerical data transmission speed unit. 1 baud correspond to 1 bit/second. The minimum speed of a modem is 9,600 bauds nowadays.
Best Practice actions	Type of Take-up measure. See definition in Annex 1.
bin hex	A method for encoding an email message for transmission predominantly used by Macintosh users.
B-ISDN (Broadband ISDN)	A single network capable of carrying several different types of service, based on voice, data, still or moving image - by means of digital transmission techniques. The ISDN (Integrated Services Digital Network) currently being deployed in Europe carries a communication of up to 2 Mega-bits/second (Narrowband ISDN). Future networks will carry higher speed communications (Broadband ISDN).
Bits/Bytes	The smallest discrete elements in a binary system: eight bits comprise one byte.
bookmarks	A feature built into web browsers that allow users to keep a record of pages they want to revisit.
bounce (email)	The action of an email which was not delivered to the intended recipient, either because it was addressed incorrectly or because of a technical glitch.
bps	Acronym for bits per second - the rate at which data is transmitted between computers.
BRI	Basic Rate Interface
Broadband	A popular way to move large amounts of voice, data and video. Broadband technology lets different networks coexist on a single piece of heavy-duty wiring. It isolates signal as a radio does; each one vibrates at a different frequency as it moves down the line. Its opposite is baseband, which separates signals by sending them at timed intervals.
browser	A specialist software package through which users can view the World Wide Web.
bulletin board (Web) aka discussion group	A web page which allows people to interact with each other on various topics via email.
Bureautique	Hardware and software used in the framework of an office (e.g. word processing).

Name	Definition
Bursary: (international co-operation training bursary)	Granted for training activities only e.g. to allow the applicant to learn a new scientific technique or to work on a particular experiment or set of experiments where the host institution has particular expertise and which cannot be performed in the home institution of the candidate.
byte	A measurement unit of data made up of eight bits (1's or 0's) in a certain order which reflects a known entity (for example, a capital A).
Cable	A reception system available in areas that are cabled. Opposite to the satellite, the reception of a cable broadcast does not need an aerial on the roof or balcony.
Call for Proposals	As published in the Official Journal. Opens parts of the workprogramme for proposals, indicating what types of actions (RTD projects, Accompanying measures etc.) are required. A provisional timetable for such Calls is included in the workprogramme
CALS	Computer-aided Acquisition and Logistic Support
Carte à puce (Smart Card)	It is a card that is able to store digital information. It was created in 1974 and used for many purposes since (e.g. credit cards, telephone cards).
CATV	Community Antenna Television, Cable Television
CEN/CENELEC	Comite Europeen de Normalisation / Comite Europeen de Normalisation Electrotechnique (www.cenorm.be)
CEN-ISSS	Information Society Standardization System. The mission of CEN/ISSS is to provide market players with a comprehensive and integrated range of standardization-oriented services and products, in order to contribute to the success of the Information Society in Europe.
Certification (of a proposal)	The process by which the Co-ordinator may apply a digital signature to the proposal, before it is submitted to the Commission.
CGI	Acronym for Common Gateway Interface. A 'behind the scenes' programming system which allows internet users to interact with web pages by, for instance filling in web forms and entering search queries.
Client	A client is usually a PC that communicates over a network both with its peers, other clients, and with a large computer, called a server, which typically stores data that many workers need to use. The client has just one user, the server many. Alternatively, type of program which receives information from a centralised electronic point, for example a web browser (client) receiving information from a server.
Cluster	A group of RTD projects and/or other cost-shared actions and/or accompanying measures that address a common theme or area of interest.
CMOS	Complementary metal-oxide semiconductor
Coaxial Cable	Better known as coax, this is the old fat wire used by cable TV companies and some data networks. It has more capacity than standard copper phone wire, but quite a bit less than fiber-optic lines.
Community Antenna Television, Cable Television (CATV)	A public network for the delivery of television programmes to the home by cable. Existing systems use coaxial cable and are limited in Europe to approximately 30 channels of television. Future Broadband systems will carry up to 500 channels.

Name	Definition
Compact Disc Interactive (CD-I)	The interactive multimedia platform developed by Philips, based on a Motorola 68000 processor and compact disc drive, with universal technical specifications. CD-I supports three levels of audio in stereo and mono, four graphics formats at various levels, four images planes, in/out devices including a remote control unit and keyboard, and output to ordinary TV sets, under its own dedicated operating system (CD-RTOS).
Compact Disc Read Only Memory (CD-ROM)	The CD format principally devoted to text and data (and occasionally, audio and graphics).
Compression	The technique of reducing the amount of data in a signal in order to reduce the amount of required transmission capacity, the signal being reconstructed in its original form at the receiving end. A device to do this is a "codec" (coder-decoder).
Concerted Actions	Type of actions supported by the Programme: See definition in Annex 1.
Continuously Open Call	One having no fixed closure date, but with a periodic evaluation of received proposals.
Contractor	a project participant who has a wide-ranging role in the project throughout its lifetime
Convergence	One of the driving socio-economic forces necessitating research under the Fifth Framework Programme. Generic term that covers: <ol style="list-style-type: none"> 1. Technological Convergence 2. Market Convergence 3. Regulatory Convergence 4. Policy Convergence
Co-operative research project (for SMEs)	Projects enabling at least three mutually independent SMEs from at least two Member States or one Member State and an Associated State to jointly commission research carried out by a third party.
Co-ordinator (Co-ordinating contractor)	Lead contractor in a Community action, delegated by the consortium for the role of co-ordination with the Commission.
COST	Cooperation europeenne dans le domaine de la recherche scientifique et technique (www.belspo.be/cost/)
CPA or CPC or CPT	Cross-programme Action or Cluster or Theme (in IST Programme)
CT2-CAI	Second generation Cordless Telephone ; also used in " telepoint-phonpoint " systems
CUG	Closed User Group
Cyberspace	Word invented by the writer William Gibson in his play "le Neuromancien". It describes the virtual space in which the electronic data of worldwide PCs circulate.
Data Discman	A portable device created by Sony that allows book reading. The books are under the shape of small laserdiscs (8 cm diameter).
DAVIC	Digital Audio-Visual Council (www.davic.or)
DBS	Direct Broadcasting by Satellite
DCS 1800	Digital Cellular System at 1800 MHz
dial-up connection	Also called a switched line. A low-cost connection to the Internet through a communications line (telephone line) which is not strictly dedicated to being an internet connection.

Name	Definition
Didactic Software	Educative Software
Diffusion	Making information available to a wider audience about the work and outcome of a project with the aim of increasing the speed of uptake of its results.
digital	A method of data transmission where the data is sent in a combination of 1's and 0's, or either on or off.
Digital Compression	A way of reducing the number of bits (ones and zeros) in a digital signal by using mathematical algorithms to eliminate redundant information thereby reducing the space it occupies when being transmitted or recorded.
Digital European Cordless Telecommunications (DECT)	DECT is the time division multiple access (TDMA)-based digital standard chosen by the European Telecommunications Standards Institute (ETSI) for future advanced wireless phones, wireless PBX, and radio-based public access telecom services.
Digital Transmission	In a digital telecommunication service, the original source is transformed into and transmitted as a series of digits in binary code (i.e. 0s or 1s). Voice, text, image or data are all equally capable of being coded as a digital signal, so that a single network can handle all four forms of transmission (multimedia). The string of binary digits can be abbreviated and then re-expanded on arrival, thus economising transmission capacity. Different strings of binary digits can be interleaved and transmitted together, thus permitting several separate conversations on a single line (multiplexing). The string of digits can be encrypted prior to transmission, to ensure a high level of information security and privacy. Through digitalization, even a severely degraded transmission can be reconstructed to reproduce perfectly the original source.
Digital Video Interactive (DVI)	DVI is a mode of image compression conceived by Intel for use by PC micro-computers. Microsoft adopted it for their software Video for Windows, Apple for QuickTime, etc.
Direct Broadcasting by Satellite (DBS)	The use of satellite to transmit high-power TV signals in the BSS band for reception via small antennae direct to home (DTH). Such services can also be carried on cable.
Diskette	Storing device used to save information from computers and other instruments such as digital picture cameras.
DNS	Acronym for Domain Name System. The distributed naming service used on the Internet. For example, open.gov.uk is the domain name for the UK Government's home page. The DNS organises groups of computers on the Internet using a specific hierarchy of domains.
domain	The most detailed subdivision of the Internet, which is usually by country (for example, .uk for United Kingdom, .au for Australia, .fr for France) or type of entity (for example, gov for government or com for commercial).
domain name	The complete domain name address, including the domain and the unique name of the organisation.
Domotique	Control over the house appliances via a PC.
download	The act of one computer transferring data to another computer that is remotely located.
DVB	Digital Video Broadcasting
EC	European Commission (europa.eu.int)

Name	Definition
EC	Electronic Commerce
EDI	Electronic Data Interchange
eEurope Initiative	On 8 December 1999 the European Commission has launched an initiative entitled "eEurope: An Information Society for All", which proposes ambitious targets to bring the benefits of the Information Society within reach of all Europeans. The initiative focuses on ten priority areas, from education to transport and from healthcare to the disabled.
Electronic data interchange (EDI)	A way for unaffiliated companies to use networks to link their businesses. While electronic mail between companies is common, electronic data interchange passes bigger bundles that replace large paper documents such as bills and contracts. Besides saving paper, computers could save time by taking over transactions like regular purchase orders that now require human intervention.
Electronic-mail (E-mail)	The most common use of networks. It is a service which allow computer users to send electronic messages to other computer users. The use of sophisticated software ensures that the sent message will find its way along different networks until it reaches the address.
Eligible costs	Costs that are reimbursable in full or in part by the Commission, under the terms of the Contract that is the basis for the project.
encryption	A method of securing privacy on networks through the use of complex mathematical codes.
Enhanced Television	Designates a TV system which retains the scanning standards of the existing 625-line 50-field or 525-line 60-field systems, whilst providing various improvements in the quality of the picture and additional features, such as the wide screen 16:9 aspect ratio, resulting from new signal processing, with or without modification of the transmission standards.
EPN	Electronic Platform Highway
ESA	European Space Agency (www.estec.esa.nl)
ESPRIT	FP4 Programme - European Strategic Programme for R&D in IT
Ethernet	The most common sort of network used in corporations. Its op speed is 10 million bits/second. Because it works like a party line, if too many people try to send messages at once, the network slows dramatically.
ETSI	European Telecommunications Standards Institute (www.etsi.org)
EU	European Union
EUREKA	A Europe-wide Network for Industrial R&D (www.eureka.be)
Evaluation	The process by which proposals are retained with a view to selection as projects, or are not retained. Evaluation procedures are fully transparent and published in the Evaluation Manual. Evaluation is conducted through the application of published Evaluation Criteria.
FAQ	Acronym for Frequently Asked Questions. Often seen on web sites.
Fiber	Fiber-optic cable, made of glass fibers instead of copper strands. Data, expressed as pulses of light rather than electrons, is transmitted by lasers or other devices. Optical fiber can carry billions of bits a second, many times more than coaxial or copper wire, and is less sensitive to electrical interference.

Name	Definition
Fiber to the Curb (FTTC), Fibre to the Home (FTTH)	Future optical fibre networks may extend the optical fibre to the individual home (FTTH), or the fibre may terminate at a "blackbox" located in the street, where the optical signal is converted to an electrical signal and carried the remaining distance to each home on the pre-existing copper wiring (FTTC).
firewall	A mechanism that protects parts of a network that is connected to the Internet from being accessed by unauthorised users.
Flaming	Bombardment with messages by users of the Internet of any other user or advertiser who breaks the "etiquette" of the network. Can run to billions of bites of useless data, intended to clog up the offender's computer.
FP	Framework Programme (EU - Fourth FP is FP4, etc.. - www.cordis.lu)
FPGAs	Field Programmable Gate Arrays
freeware	Software and other goodies made available free to users over the Internet.
FTP	Acronym for File Transfer Protocol. The standard method used to transfer files from one computer to another.
Full motion	Video images that run in "real time". Full motion is defined as 30 frames per second, double the current rate possible on most multi-media applications, such as video conferencing.
Galileo	A constellation of 24 to 30 Medium Earth Orbit (MEO) Satellites supporting a Global Navigation service. This primary vocation will, in time, permit the developmemnt of various Value Added Services.
Gateway	The most common usage for the term is an on-line service company that gives customers access to a server or a network as Internet. Inside a company, the term usually refers to special hardware that connects two different types of systems, such as a main-frame to a local-area network. Alternatively, a machine which translates from one service to another. Sometimes the term is used incorrectly to refer to firewalls.
Gb (or 'Gig')	Acronym for gigabyte. A measurement unit for data, usually found when describing either the data capacity (bandwidth) of an internet connection or the memory/hard drive capacity of a computer.
Generic Service	A service, such as electronic mail, that can be used for a multitude of purposes and adapted to the needs of a particular application.
GIF	Acronym for Graphical Interface File. A type of graphic file commonly used on the Web.
Gigabit Network	A gigabit network means one that operates at a billion bits a second-100 times Ethernet's speed.
GIP	Global Inventory Project
GIS	Geographic Information System
Global System for Mobile Communications (GSM)	GSM is a pan-European standard for digital mobile telephony which provides a much higher capacity than traditional analogue telephones as well as diversified services (voice, data) and a greater transmission security through information encoding for users across Europe.
GMES:	Global Monitoring for Environment and Security - http://gmes.jrc.it/
GNSS	Global Navigation Satellite Systems

Name	Definition
gopher	A popular service developed by the University of Minnesota that allows clients to access files and directories across the Internet. A Gopher client can search and retrieve information from gopher servers, but does not have a graphical interface.
GPL	General Public Licence
GPRS	General Packet Radio Service
GSDI:	Global Spatial Data Infrastructure - http://www.gsdi.org
GSM	Global System for Mobile Communication
hacker	A person who explores other people's computer systems and networks from a sense of personal passion.
Hard Disc	High capacity (up to 4 giga-octets= million characters) storing device for computers.
HD-Mac	Europe's HDTV broadcast transmission standard supporting 1250-line resolution pictures, 50 Hz, in the 16:9 aspect ratio with digital stereo sound.
HFSP	Human Frontier Science Program (www.hfsp.org)
High Definition Television (HDTV)	System designed to allow viewing at about three times the picture height, such that the system is virtually, or nearly, transparent to the quality of portrayal that would have been perceived in the original scene or performance by a discerning viewer with normal visual acuity. Such factors include improved perception of depth.
homepage	The 'entry' or 'main' page of a website.
host	Any computer system or device attached to the Internet.
HTML	Acronym for Hypertext Markup Language. The scripting language used to create web documents. Some confusion may develop when you notice that some file names have .htm as an extension and some have .html. All this means is that the author has used a PC or Macintosh respectively to create the document.
HTTP	Acronym for HyperText Transport Protocol. The network protocol used by the World Wide Web.
hypertext (aka hotink hyperlink)	A link between one document and other related documents located either in the same website, or elsewhere on the Web. By clicking on a word or phrase that has been highlighted, a user can skip directly to files related to that subject.
IBC	Integrated Broadband Communications
ICT	Information and communications technology - an acronym applied to the combined developing telecommunications and information technology
IDEIS	International Dialogue and Information Exchange for the Development of a Global Information Society
IETF	Internet Engineering Task Force (www.ietf.org)
IMS	Intelligent Manufacturing Systems Initiative (http://www.ims.org/)
IN	Intelligent Network

Name	Definition
Information Super-highway	Something that can't be seen or touched, though it can be talked about ad nauseam. Networking devices and computers, allowing them to operate at a higher speed and carry heavy traffic such as video files.
Integrated Broadband Communications (IBC)	The global term for the future overall communications environment, embracing Broadband-ISDN, Narrowband-ISDN, mobile telephony and existing conventional telephone services together with data communications and cable TV.
Integration	Application of synergy, by which different fields of endeavour are brought together to yield results of far greater significance than would have been possible through individual and independent actions.
Inter-activity	Interactivity in a service implies a close control by the user of the service by means of ongoing system of two-way communication between the user and the service provider.
Inter-connectivity	Devices (computers, lines, application programmes, etc) are inter-connected when they can communicate with each other, that is send and receive data. They use the same communication protocols, for example OSI (Open Systems Inter-Connection).
Interface	That which facilitates the communication between the computer and its user. It may be a graphic interface or a textual interface. An interface can also be that which facilitates communication between two appliances (e.g. the PERITEL jack links a TV to a videotape recorder or a videodisc player).
internet service provider (ISP)	A company or other organisation that offers connections to the Internet through its own computers, which are part of the Internet.
Inter-operability	Devices, in particular application programmes, are inter-operable when, in addition to communicating with each others, they can also execute together a common task. They co-operate. This requires additional standards, such as API (Application Programme Interfaces) .
intranet	An internal corporate web site that operates using the same protocols as the Internet. Intranets are either not connected to the Internet or are shielded from external internet users by a firewall.
IP	Internet Protocol; sometimes Intellectual Property (in the context of Micro and Opto-electronics)
IPR	Intellectual Property Rights)
IPv6	Internet Protocol version 6
IS	Information Society
ISDN	Acronym for Integrated Services Digital Network. A telecommunications standard being offered by telephone companies which enables the rapid transmission of voice, data, and certain images over telephone lines.
ISDN (Integrated Services Digital Network), N-ISDN, B-ISDN	A single network capable of carrying several different types of service, based on voice, data, still or moving image - by means of digital transmission techniques. The ISDN currently being deployed in Europe carries a communication of up to 2 Megabits/second (Narrowband ISDN). Future networks will carry higher speed communications (Broadband ISDN).
ISO:	International Standard Organisation - http://www.iso.org

Name	Definition
IST	Information Society Technologies. The 2nd Thematic Programme of research and technological development within the European Union's Fifth RTD Framework Programme (1998-2002), addressing research issues towards a user-friendly Information Society.
ISTAG	Information Society Technologies Advisory Group
ISTC	Information Society Technologies Committee
IT	Information Technology
ITU	International Telecommunications Union (www.itu.org)
java	A scripting language used to add features, such as animation, to web documents.
JPEG, MPEG	Compression standards for still (JPEG) and moving pictures (MEPG) expert groups.
JRC	Joint Research Centre (EC)
JTC:	Join Technical Committee, an association between ISO and the IEC (Information Engineering Committee)
JV	Joint Venture
KA	Key Action (in FP5)
keywords	key words that are used when searching for information on the Internet (for example, when using a search engine)
Kiosk	A freestanding electronic information point which aims to provide information or services to users without the need for the assistance of staff. Kiosks can incorporate touch-screen technology and video conferencing facilities
KPBS	Acronym for Kilobits per second. A rate of transmission for data most commonly found when describing modem speed.
LAN	Acronym for Local Area Network. A group of computers and other devices that are directly connected to each other to enable data to pass between them over limited geographical areas. Most local authorities will have a number of LANs networking computers, printers, plotters and scanners in the office.
Laserdisc	Also known as CDV (Compact Disc Video) or Video Disc. Originally launched by Philips. It was renamed Laserdisc by Pioneer, Philips, Matsushita and Sony in 1990. It stores analogous images and digital sound. The quality of the images is excellent. Laserdisc players can be connected to TVs and Hi-fi systems.
Latency	Time which elapses between ordering information and receiving it through an interactive system. PC users on a crowded Ethernet network get a demonstration of latency.
LEO	Low Earth Orbit
Letterbox	Format used to describe a TV image with black bands at the top bottom of the screen to fit a movie format into a 4:3 TV screen format.
list serv (or list server)	A type of group discussion that is email based. A user subscribes to a list serv and joins the mailing list for information and discussion. A list serv can be moderated (all emails are filtered by an administrator) or unmoderated (free-for-all).

Name	Definition
Local Area Network (LAN)	A network for communication between computers confined to a single building or in a closely located group of buildings, permitting users to exchange data, share a common printer or master a common computer, etc. Linked groups of LANs extended over a larger area are termed Wide Area Networks (WANs). WANS may connect users in different buildings or countries. Networks which extend over city-wide areas are called Metropolitan Area Networks (MANs).
Local loop	The section of the telephone transmission network between the local telephone exchange and the subscriber's premises, which currently consists of copper wiring. In the future, optical fibre or wireless will also be used.
Low Earth Orbit (LEO), LEOS (Low Earth Orbit Satellite)	Proposed system of personal telecommunications based on communication via a number of satellites in low orbit. The best known of these proposal is called the "Iridium" project.
MAN	Metropolitan Area Network
Marie Curie	Training fellowships supported by FP-5. Of these, IST itself only supports "Host" fellowships for young researchers.
Mb (aka 'Meg')	Acronym for megabyte. A measurement unit for data, usually found when describing either the data capacity (bandwidth) of an internet connection or the memory/hard drive capacity of a computer.
MEO	Medium Earth Orbit
Metropolitan Area Network (MAN)	Network which extends over city-wide area.
MIME	Acronym for Multipurpose Internet Mail Extensions. A method of encoding an email message for transmission widely used by PC users.
Minitel	It is the first global experience of telematics and started in France in 1984. It was the precursor of the electronic highway. France Telecom is currently working on a network "Télétel Vitesse Rapide" which allows to obtain information far more quickly.
MITI	Ministry of International Trade and Industry (www.miti.go.jp)
MM	Multimedia: The concept of closely combining voice, text, data, as well as still and moving image. A multimedia database, for example, would contain textual information, images, video clips, tables of data, all equally easy to access. A multimedia telecommunications service (such as B-ISDN) would permit the user to send or receive any of these forms of information, interchangeability at will. (Multimedia on ISPO)
Mobile Telephone, Cellular	A system of mobile telephony whereby a country is divided into thousands of small areas (cells), each of which is served by its own "base station" for low-powered radio transmissions. This allows a user in one cell to transmit on the same frequency as another user in another cell without interfering in each other's conversation. Cellular networks may employ analogue or digital transmission. Existing networks are largely analogue, while new networks use the European GSM digital standard.
Mobile Telephone, CT2 (2nd Generation Cordless Telephone, "Telepoint")	An economical system of cellular telephony. Unlike full cellular, the user may not move from cell to cell during the call. The service is commercialized as "Bi-Bop" in France, "Greenpoint" in the Netherlands, "Pointer" in Finland, etc.

Name	Definition
modem	(From modulation-demodulation). A piece of equipment that connects a computer to the Internet or other remote service via a telecommunications line, translating the digital data to analogue for transmission, and back to digital again for use.
Modem (MODulator-DEModulator)	Device which transforms analogous signals transmitted by telephone lines into digital signals which can be transmitted by computer and vice versa.
MOEMS	micro-opto-electro-mechanical
MPT	Ministry of Posts and Telecommunications (www.mpt.go.jp)
Multimedia (MM)	The concept of closely combining voice, text, data, as well as still and moving image. A multimedia database, for example, would contain textual information, images, video clips, tables of data, all equally easy to access. A multimedia telecommunications service (such as B-ISDN) would permit the user to send or receive any of these forms of information, interchangeability at will.
Multiplexed Analogue Components (MAC)	TV transmission system, pioneered in the UK in the early 1980s, in which the colour signals are time division multiplexed, thus, interference between chrominance and luminance does not occur as in PAL. In the D2-MAC version, sound is carried as digital data sent in a duobinary form (hence the "D" letter) at 10.125 Mbits/s.
Multiplexing	In telecommunications terminology, this term means carrying multiple signals on a communications carrier channel. In recent cable programming terminology, it refers to "cloning" one cable channel, like MTV or HBO, into multiple, complementary channels to reach a broader audience. The device that makes this possible is called a "multiplexer" or "mux".
MUSE (Multiple Sub-Nyquist Encoding)	The signal compression methods developed in Japan for the satellite delivery of HDTV signals.
Natural Language	Possibility of interact with a PC using words of daily language.
Navigator's Guide	In interactive TV it is the system to choose among the proposed programme.
Network	Communication Networks correspond to a complete system of communications between user's terminals. Networks may be "point to point" (the transmission goes from a fixed origin to a fixed destination), "switched" (the transmission is switched so as to reach a single destination out of many) or "broadcast" (the transmission goes simultaneously to multiple destinations). Networks may be "public" (owned by an operator and open to any member of the public that subscribes) or "private" (owned or leased by an individual or company or group of companies exclusively for its own use).
Network Operating System	Software that allows a PC or a larger server machine to manage files and handle other central networking functions.
Network, Data	A network specialised in the transmission of data rather than voice. Among such networks are Circuit Switched Data Networks (CSDN), Packet Switched Data Networks (PSDN), Frame Relay Networks and Switched Multimegabit Data Service Networks (SMDS).

Name	Definition
Network, Intelligent	An intelligent network includes sophisticated features superior to those of the ordinary telephone service, such as advanced software allowing the customisation of the services provided to individual customers. For example, it allows the called party to redirect calls intended to another terminal (e.g. from a home phone to an office phone). It allows calls to be billed wholly or in part to somebody else than the caller ("free phone" services). It also provides virtual private network services.
newsgroup (aka discussion group)	A discussion forum using the Internet as an interface. Users are able to respond to each other using a method similar to email.
N-ISDN (Narrowband ISDN)	A single network capable of carrying several different types of service, based on voice, data, still or moving image - by means of digital transmission techniques. The ISDN (Integrated Services Digital Network) currently being deployed in Europe carries a communication of up to 2 Mega-bits/second (Narrowband ISDN). Future networks will carry higher speed communications (Broadband ISDN).
NIST	National Institute of Standards and Technology (www.nist.gov)
Node	Point of connection and conversion between fibre optic and coaxial cable.
NSF	National Science Foundation (http://212.208.8.14/nsf.htm)
NVOD	Near Video On Demand
OECD	Organisation for Economic Co-operation and Development (www.oecd.org)
OEM	Original Equipment Manufacturer
OGC:	Open GIS Consortium - http://www.opengis.org
OMG	Object Management Group (www.omg.org)
ONP	Open Network Provision
Open Network Provision (ONP)	Principle of non-discriminatory opening of telecommunication networks to all telecom operators and service providers on the basis of the harmonisation of access and usage conditions of telecommunications infrastructures with the view to develop a trans-European information market. The ONP is being applied to leased lines, packet switching transmission services and ISDN, and will be applied to voice telephony in 1998.
Optical Fibre Network	Telecommunication networks based on fined glass fibres, down which signals may be sent by flashing a laser.
ORA*	Opportunities for applications of information and communication technologies in Rural Areas (1990-1994); Specific programme of research and technological development (EEC) in the field of telematic systems in areas of general interest - Telematics systems for rural areas.
PABX (Private Automatic Branch Exchange), PBX (Private Branch Exchange)	The private switchboard located on one's premises and by which a business subscriber controls the calls on his own internal telephones.
PAL (Phase Alternation Line)	West German-developed colour TV systems used in most of Europe, Africa, Australasia and South America. Like SECAM, PAL produce interlaced 625-line, 25 frame/second pictures.

Name	Definition
Pay-per-view	Programming sold on a per-occasion or per-title basis. Access can be controlled electronically in response to subscriber orders using an addressable cable converter. Digital Signals switching the service off or on are sent to that converter's unique "address".
PC	Personal Computer
PCM (Pulse code modulation)	The most common way of converting an analogue source into a digital form.
PDF	Acronym for Portable Document Format. A type of file that takes large documents and represents them graphically. If you encounter a document with this extension, you will need a special program called Adobe Acrobat Reader to open it. You can download the Acrobat Reader free from http://www.adobe.com to your own computer.
permanent modem connection	An internet connection that is permanently dialled up through an Internet Service Provider to the Internet, allowing 24 hour access for users.
Personal Communication Network (PCN)	A form of cellular telephone network specifically adapted for personal portable use based on a technology known as DCS 1800. Such services are currently being deployed in Europe. Similar services in the USA are referred to as PCS (Personal Communication Services).
Personal Digital Assistant (PDA)	A pocket sized personal computer with advanced features and communications facilities, where text is introduced by handwriting on a screen, also referred to as "notepad" computer.
plug-in	A specialist piece of software that 'connects' itself to a web browser to enhance its capabilities. Plug-ins are usually available via the web.
POP	Acronym for Point of Presence. The regional hub used by an Internet Service Provider to connect users to a network. Acronym for Post Office Protocol. A protocol which allows a user to access their email.
Portability	Used in reference to a computer programme, portability means that the programme can be executed on a number of different computers without or with only minimal changes.
Pre - Registration	Procedure by which proposers notify the Commission of their intention to submit a proposal
PRI	Primary Rate Interface
Protocol	Standard rules that govern how computers talk together.
PSTN (Public Switched Telephone Network)	The everyday telephone network used for the transmission of voice conversations, fax images and for low speed data transmission.
PTO	Public Telecommunication Operator
Radio messaging	Sending of messages via radio waves.
RAM	Acronym for Random Access Memory. Memory capacity of a computer that can be used for carrying out functions.
RAS	Acronym for Remote Access Server. A product which allows remote computers to dial into a particular LAN server in order to access files and run programs. This mechanism requires a certain level of security to be implemented onto the IAN. Your network administrator should be able to provide more information on security issues.

Name	Definition
Research Infrastructures	Facilities necessary for conducting research or for supporting the researchers. These may include research institutions, laboratories, test beds and other specialised research equipment, communications networks dedicated to research (including the Internet), libraries, learned bodies and other sources of knowledge.
Research Training Networks	Promote training through research especially of researchers at pre-doctoral and at post-doctoral level
Roadmap	Part of the workprogramme indicating which Action Lines are opened in each Call for Proposals, and at which time. The roadmap provides a means of focusing attention on areas or sub-areas of the Programme in any specific Call, thereby optimising opportunities for launching collaborative projects and establishing thematic networks.
RPI	Retail Price Index
RTD	Research and Technology Development. RTD is also used to indicate one of the "types of actions addressed" in the Action Lines description. It then refers to R&D, Demonstration or Combined projects as defined in the Guide for Proposers.
Sampling	The transformation of an analogous signal (Sound Image) into a digital code. Sampling consists of the analysis of electronic signals at regular and brief intervals. A large number of synthesisers produce sounds created by sampling.
Satellite Dish	Device necessary to get channels broadcast via satellite. The diameter varies from 60cm on.
SDH	Synchronised Digital Hierarchy
search engine	Website designed specifically to allow users to search the web by entering key words, which the engine then uses to locate matching sites.
Security of Information and Systems	It has three basic components: confidentiality, integrity and availability. Confidentiality refers to the protection of sensitive information from unauthorised disclosure. Integrity means safeguarding the accuracy and completeness of information and computer software. Availability relates to ensuring that information and vital services are available to users when required.
Server	The machine that talks to clients. More precisely, anything from a PC to a supercomputer that shares files and other services with multiple users.
shareware	Free evaluation copies of software made available via the Internet by software developers. The most useful types of programs include graphics programs, HTML editors and web design programs. A good site to start looking for shareware is Shareware.com which you can find at http://www.shareware.com
SiC	Silicon Carbide
SiGe	Silicon Germanium
Smart Card	It is a card that is able to store digital information. It was created in 1974 and used for many purposes since (e.g. credit cards, telephone cards).
SMTP	Acronym for Simple Mail Transfer Protocol. The standard internet protocol for sending and receiving email.
SOC	Systems on a chip

Name	Definition
Software	That which belongs to the domain of intellectual creation in contrast to the appliances which facilitates their reproduction. The programmes for computers, CD-ROM and video games are all software.
SOI	Silicon on -insulator
Subcontractor	For specific tasks of a fixed duration, a proposal / project may include subcontractors, who do not participate in the project and do not benefit from the intellectual property rights acquired through achievements of the project.
Submission Date	Equivalent to the closure date of a Call. The precise date and time by when proposals need to have been received by the Commission Services.
S-UMTS	Satellite-Universal Mobile Telecommunications System
Switchable	Ability of a communication network to allow subscribers to conduct two-way dialogue, or the number of screens on a network.
Synthetic Image	An image created by computer software. Many of the sequences featuring dinosaurs in Jurassic Park were created using 3D synthetic images.
Take-up measures	Measures stimulating diffusion and utilisation of technologies developed under RTD projects. A specific form of Accompanying Measure
TCP/IP	Acronym for Transmission Control Protocol/Internet Protocol. Default protocol used by UNIX systems to route information packets over a local or wide area network. The standard protocol upon which the Internet is based.
TDAB	Digital Audio Broadcasting
TDVB	Terrestrial Digital Video Broadcasting
Telematics	The application of information and communications technologies and services, usually in direct combination. A Telematics Application is a system or service meeting User needs. (Telematics Applications within the 4th Framework Programme)
Telematics Infrastructure	The assemblage of telecommunications and information-processing systems and services that offers a base for telematics applications.
Teleservice	A service provided from a remote location using the telematics infrastructure.
Teleworking	Work carried out using the telematics infrastructure at a place other than that where the results of the work are needed. This definition covers home, mobile or "telecottage"-based teleworkers employed by an organisation, independent workers and teleservice companies offering specific services to both firms and individuals.
Telnet	Internet service similar to Gopher which provides access to, and use of, the services of a remote computer.
TIC	Technologies of Information and Communication
Token Ring	The networking scheme most closely associated with International Business Machines Corp. The term comes from a type of data packet, called a token, that is used to keep multiple computers on a network from talking at once. Each user's turn comes as the token passes in turn around the ring of computers of the network.
Trials (for users and suppliers)	Type of Take-up measure supported by the Programme: See definition in Annex 1
Ubiquitous	Refers to "anywhere any time"

Name	Definition
UMTS	Universal Mobile Telecommunications System
Universal Service	A set of basic services that must be made available at an affordable price to all users by public or private operators irrespective of the user's geographical location.
UNIX	a standard operating system which runs on many servers and minicomputers
URL	Acronym for Uniform Resource Locator. An address for a web site. For example, typing http://london-research.gov.uk brings you to the opening screen, or homepage, of the London Research Centre.
USENET	A distributed, internet-wide bulletin board system that is the basis of network news.
User	A person or organisation using a Telematics Application.
uuencode	A method for encoding an email message for transmission. Not suitable for use with some email programs, as the receiver requires a program called uudecode to turn the email into readable data.
Value Added Service (VAS), Value Added Network Service (VANS)	Services other than those under monopoly may be offered by other service suppliers which use national network as the basic transmission medium but "add value" to the basic transmission facility. What is exactly included in the notion depends on the regulatory situation of each country.
VANS	Value Added Network Services
VAS	Value Added Services
Video-on demand	Systems that enable the viewers to order and see a given programme at the exact time the viewer specifies. Near-video-on-demand (NVOD) systems approximate this capacity. This can be accomplished by staggering the start of a programme every 15 or 30 minutes.
Virtual Reality	Computer-based systems that supply the visual and aural effects to project the viewer into an imaginary environment beyond the screen. The user is supplied with computer-generated images and sounds giving the impression of reality. The user interacts with the artificial world by means of sensors and apparatus including helmets ("visiocasque") and gloves which link the user's perceptions and movements and the audio-visual effects. Future work in virtual reality is directed towards increasing the impression of reality, for example by means of 3D images, and transmitting "virtual reality worlds" to users located remotely from the source computer.
Virus	Small informatics programme able to disrupt the functioning of other programmes.
Visiopass	It is a decodificator that enables the user to contact a video on demand service.
VOD	Video On Demand
VPN	Virtual Private Network
VR	Virtual reality
VSAT	Very Small Aperture Terminal, digital satellite data network with small antenna – diameter
W3C	World-Wide Web Consortium

Name	Definition
WAN	Acronym for Wide Area Network. A physical communications network that operates across large geographical distances.
WAP	Wireless Application Protocol
WDM	Wavelength Division Multiplexing
Wide-Area Network (WAN)	A complement to LAN. A WAN consists of multiple local networks tied together, typically using telephone-company services. WANs may connect users in different buildings or countries.
Winsock	(From Windows Sockets). A protocol for allowing Windows programs to communicate with the Internet.
WWW	Acronym for World Wide Web (or just plain Web). An internet service that allows users to view and interact with documents, through graphical interface software called a web browser.
XML	Extensible mark-up language

12 Methodologies and Approximations

This section collects some methodological remarks on indicator construction. They are included here as an *aide-memoire*, and contributions are encouraged.

In compiling statistics on the ICT sector, a number of methodologies and approximations have to be adopted. The most important of these are outlined below and should be added to as appropriate, and borne in mind in developing indicators. Statistics will be compiled on the basis of information made available by Member countries, in most cases the national statistical agencies, and by utilising indicators developed from data held in other internationally available databases.

Alignment of Sector Definitions

It is not always possible to develop indicators that align precisely to the standard definition. This is mainly because countries generally use an industrial classification developed specifically for their own country and this often differs to some degree to the International Standard Industrial Classification (ISIC). Data are also shown for different time periods and hence there may be some differences occurring because of changes in industrial classification over the period under review. We should note where definitions differ from those used in national statistical publications; the statistics reported will be different.

Telecommunications Industry Data

In some cases, data are not available for the telecommunications industry from national sources. In such cases, data must be compiled from other databases designed to measure the telecommunications industry. In these cases the original data source is generally the published reports of the major telecommunications carriers operating in a particular country.

International Trade Data

International trade data can be derived from the OECD's Foreign Trade Statistics database and the IMF's Balance of Payments database. These databases contain information about commodities. Industrially classified international trade data is derived by summing commodities into industries on the basis of the industry of which each particular commodity is considered to be "primary". Within ISIC, commodities are "primary" to one, and only one, industrial class. For trade in ICT services, the following categories have been selected by OECD: Communications services, and Computer and information services. For trade in ICT goods, data are from the manufacturing industries (in ISIC Rev. 3) included in the OECD ICT sector definition.

Research and Development

Research and development expenditure data are mainly derived from OECD databases (the R&D and ANBERD databases) containing business expenditure R&D data. The original source for these data are the agencies that undertake national R&D surveys in Member countries. In this connection, we should note that some countries go far beyond the common level. We may wish to use these as indicators, acknowledging that coverage is limited. Where data are only available at a more aggregated level than required to meet the ICT sector definition, data can be prorated to industrial classes.

Data should be placed on a common currency basis on the basis of OECD derived purchasing power parity price indices. OECD's economy-wide PPPs are not the most suitable for sectoral price comparisons, as they do not reflect price differences at the sectoral level. However, they are the only measure that is available to adjust for aggregate price differences between countries.

Derivation of ICT Intensity Measures

To present an indication of the importance of the ICT sector it is necessary to develop measures of ICT intensity in each country. This can be approximated (cf OECD report) by comparing the ICT sector to the the business enterprise sector along a range of dimensions – employment, value added, research and development and total trade (imports plus exports). This gives a set of measures of ICT intensity. To arrive at an overall measure, individual ICT intensity measures can be broken into groups containing approximately equal numbers of countries: high, medium and low intensity measures. These indicators can be brought together in such a way as to enable broad country groupings to be formed. This implicitly involves *weighting* the indicators. As there is no objective way of arriving at a precise set of weights, final groupings are somewhat subjective. Thus, no attempt should be made to rank countries within their final groupings.