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LISBON MANUAL

Guidelines for the interpretation of the available statistical data and the design of the indicators concerning the transition of Iberian America towards an Information Society

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12th September 2005

Chapter 1: Measuring the development of the Knowledge and Information Society

A. Purpose

The recent revolution in the field of information and communication technologies has started a process of severe political, cultural and economic change. The development of this process, which will lead us to a so-called "Information Society", has raised great interest in political, media, business and academic circles. Thus, the need for trustworthy information has become vital[1].

One important step in that direction would be to homogenise the criteria and methods used in this region for gathering information and setting up information society indicators. Such is the proposal presented here, which intends to contribute to the design of a Manual or procedural guide, that will deal with all the questions pertaining to why, who and how to measure the information society, as well as a set of recommendations for the interpretation and analysis of these indicators.

Firstly, it is crucial to note that this proposal defines not only a list of indicators, but rather intends to be an inclusive approach both to methodological issues (what and how to measure) and to institutional ones (who measures it and with what). This clearly differentiates this proposal from other initiatives. At the same time, and according to the available elements of analysis[2], it might be said that this type of approach is an indispensable pre-requisite to assure the viability and sustainability of any initiative that attempts to establish a system of indicators for the iberoamerican context. Therefore, we assume that this scheme must be modular, flexible and cooperative, which will allow its gradual implementation.

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[1] See, for instance, item 17 of the Florianopolis Declaration (United Nations Secretariat of the Economic Commission for Latin America and the Caribbean - CEPAL – 20th and 21st June 2000); item u of the Bavaro Declaration (Document WSIS/PC-2/DOC/7-S, Executive Secretariat of CMSI, 5th February 2003); or item 7 of the Seville Declaration (European Union – Latin America and the Caribbean Ministerial Meeting on the Information society, 26th and 27th April 2002).

[2] In order to know the difficulties that must be overcome in this kind of initiatives, see the CAIBI experience presented by Elvira Fragoso "Indicadores de Tecnología de la Información y las comunicaciones en países de la CAIBI: problemas conceptuales y metodológicos", Second Ricyt Workshop on Information Society Indicators, Lisbon, the 27th and 28th February 2003. As to the sustainability problems of an information system, see Esperanza Magpanty "ITU Data collection and processing", Powerpoint presented at the *3rd. World Telecommunication/ICT Indicators Meeting*, 15-17/01/2003, Geneva, January 2003.

Secondly, it must be stated that this Manual is intended as a tool for analysing different measurements and methodologies already in existence. Therefore, its main purpose is to supply statistical data users with a better understanding of the available information, by combining and supplementing former contributions to the measurement of the Information Society.

The conceptual aspects are based on the methodological proposal entitled "Information Society Indicators Matrix" (see Figure 1). This proposal has been designed in the context of the research and development activities of the Iberoamerican Network of Science and Technology Indicators (RICYT)[3].

These research activities were complemented with the organization of two international workshops on Information Society Indicators, which were held in Lisbon in 2001 and 2003, and will be furthered by a third workshop in 2005, with the main purpose of diffusing and enriching the outcome of this work, based on the contributions and concerns of the 28 member countries or the Network, as well as of external participants.

Considering the institutional framework, this work has benefited from the interaction with several research projects and technical support activities occurred between 2002 and 2004, under the auspices of the following multilateral institutions – OEA, CEPAL, PNUD, ICA and Regulatel – and nacional ones – Colciencias (Colombia), UMIC (Portugal) and INEI (Peru).

This proposal has been discussed at the MERCOSUR Science and Technology Specialized Network and the members of the Information Society Commission have agreed on adopting it as a frame of reference for guiding their recommendations regarding the production of statistical information[4].

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[3] By Gustavo Lugones, Carlos Bianco and Fernando Peirano, see different version of the methological proposal at: paper at the Second Ricyt Workshop on Information Society Indicators, Lisbon, the 27th and 28th February 2003, Statistical Yearbook El Estado de la Ciencia 2003 (RICYT), Otro lado de la brecha – Perspectivas Latinoamericanas y del Caribe en la CMSI (Redistic, 2003); Final report of the project "Sistemas de Indicadores de Tecnología de la Información y Comunicaciones" (INEI-Perú, PNUD, CEPAL 2003), Revista Iberoamericana de Ciencia, Tecnología y Sociedad N° 1, Vol. 1 (OEI, REDES, Univ. Salamanca, 2003).

[4] MERCOSUR Seminar : "Experiencias de Políticas Públicas en Ciencia, Tecnología e Innovación - La Transición hacia la Sociedad de la Información", Red Especializada de Ciencia y Tecnología del MERCOSUR. Buenos Aires – 29th to 31st March 2004

B. Background and general features of the proposal

This proposal has two components. On the one hand, it intends to be a general conceptual framework for measuring the Information Society with a comprehensive approach to the analysis of these processes in order to foster its adoption as a common base for unifying criteria, coordinating actions and combining efforts, with the aim of facilitating joint and complementary endeavours by different groups, teams and individuals.

On the other hand, and already inside this conceptual framework, the proposal intends to give a focused contribution on how to approach the agents' performance in this new paradigm, characterized by the deep transformations in the production, management and circulation of information and knowledge.

We can say that the dual character of this proposal makes it as ambitious as cautious. It is ambitious because it springs from the intention to conceive a proposal that will fully encompass the whole of the phenomenon under analysis, intending to reach further than all the partial approaches that characterise much of the more common methodologies for measuring the Information Society. It is also more extensive, since it combines both quantitative and qualitative procedures instead of opting between them, as it is customary in the above-mentioned methodologies. Caution lies in the definition of the operative features and in the procedures for designing specific indicators.

A general conceptual framework is unavoidable, is order to establish the basic foundations and to guide the work in whichever precise or specific field. Additionally, the different contributions issued by various work groups concentrating on the design of specific indicators can only be brought together if they share a common conceptual basis.

C. Knowledge and Information Society Indicators Matrix

As mentioned above, the presentation of the conceptual framework will follow what we have called a "Knowledge and Information Society Indicators Matrix". Among the main contributions for the development of this matrix are the study "Knowledge Society Indicators: conceptual and methodological features" (Bianco, Lugones, Peirano y

Salazar; 2002[5]), included in the Project Knowledge Networks[6], as well as two rounds of consultation with experts, with whom some preliminary proposals were debated.

This study has comprised the identification and analysis of nearly twenty of the most common methodologies for measuring the Knowledge or Information Society, designed or used by internationally acknowledged institutions. Undoubtedly, this has been one of the key inputs.

The ascertainment of the limitations of the Iberoamerican statistical systems, as well as the restrictions (and resistance) to changing or expanding the set of available statistical information, which was accomplished with the cooperation of several members of the Iberoamerican Network of Science and Technology Indicators (RICYT), should also be mentioned. Therefore, documents, reports and papers by different authors and institutions were reviewed and combined with expert opinions in order to draw nearer to the identification of the features that characterize the transition process towards an Information Society in Latin America.

Based on these items, a conceptual framework was reached, which intends to assist the analysis and measurement of such a complex and broad phenomenon as the constitution of an Information Society in Iberoamerica. This methodological proposal is expressed by and synthesized in a matrix-like diagram. This presentation device allows to highlight, to convey and to set against a backdrop the main concepts and features.

As this presentation will show, this methodological proposal can be considered modular, gradual, flexible and cooperative. The diagram shown on Figure 1 is made up of two areas. On the one hand, there are four sectors or activities, which form the basis for the constitution of a dynamic and widely disseminated Information Society: Education, Science and Technology, Information Technologies (IT) and High Value Added Services and Telecommunications. Theses four activities or sectors frame the "Knowledge and Information Use and Dissemination Sub-Matrix", which occupies the second area mentioned above, and as such is shown on top in the diagram. This sub-matrix is organised around four axes – infrastructure, skills, investments and accumulative efforts and applications – which intersect four rows concerning the actors: enterprises, households, government and other institutions.

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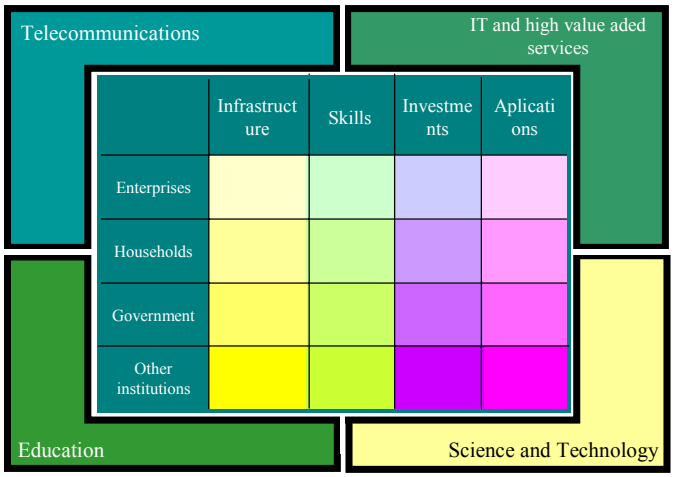
[5] BIANCO, C.; LUGONES, G.; PEIRANO, F. y SALAZAR, M. (2002): "Indicadores de la Sociedad del Conocimiento: aspectos conceptuales y metodológicos", Documento presentado en el II Taller Internacional sobre indicadores de la Sociedad de la Información, Lisboa 2003. Disponible como Documento de Trabajo Nº2 en www.centroredes.org.ar.

[6] COLCIENCIAS/OCT/OEA

Figure 1

Information Society Indicators Matrix



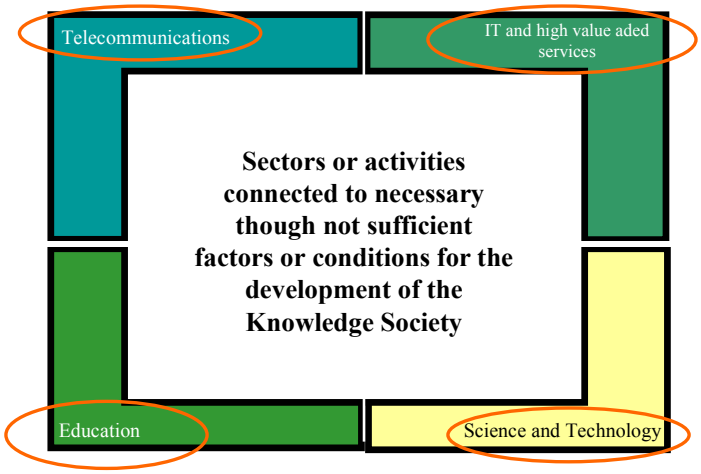
Ground sectors or activities

The education and science and technology levels attained by a society, as well as the development of the software industry and telecommunications, influence, either favouring or hindering, the development of the KS. These are precisely the sectors that constitute the framework within which the social agents and actors try to take advantage of the available tools, in the best and simplest way, to create and manage information, as well as of the growing supply of knowledge-intensive goods and services.

Accordingly, the telecommunications sector is responsible for the basic equipment and services needed for establishing networks that make possible the connection between different actors and the circulation of knowledge and information. The information technologies and high value added services sector supplies the necessary tools for processing, managing and storing knowledge and information. The analysis of the educational profile of the population allows the identification of the strengths and weaknesses of the manpower to take advantage of the tools for the production and management of knowledge and information. Also, the science and technology sector reveals the system's abilities to absorb, multiply and create knowledge and information, in order to sustain the new technical-productive paradigm.

The inclusion of theses sectors aims to highlight the situation and main trends of certain activities that are necessary, though not sufficient, to the constitution and consolidation of the KS. The underlying idea is simple: the lower the level of development of these sectors, the more obstacles and difficulties will the economic and social agents find in order to incorporate the KS distinctive practices and tools. Additionally, even when it is granted that many of these elements are created and produced in more developed societies, local abilities play a fundamental role in the pace and orientation of these processes.

Figure 2
Ground sectors or activities of the Knwoledge Society

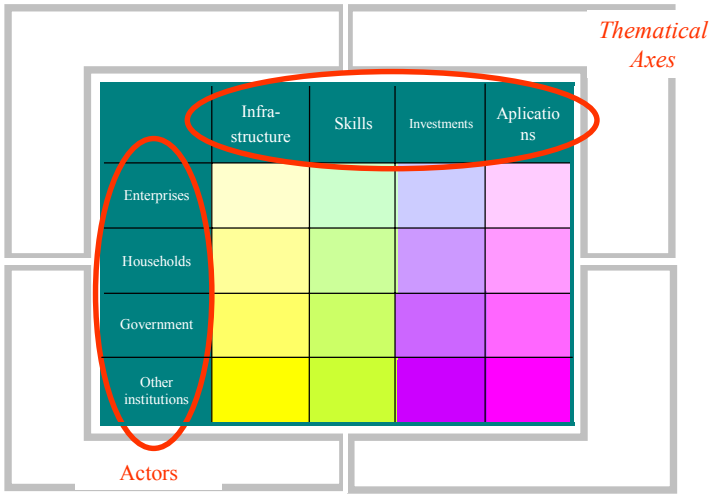


Finally, it must be noticed that though it has not been explicitly included, one other necessary though not sufficient factor for the development of the KS is the institutional or regulatory element. Nevertheless, it does not seem possible or even suitable to approach these issues from a quantitative-centred standpoint, although this does not mean that this matter will be excluded from the analysis. Therefore, it seems appropriate to state that any set of indicators is an invaluable contribution to the analysis but it cannot (nor should) replace an effort to consider and integrate all the features that make up this phenomenon. Such an endeavour must be based on statistical data but also requires the consideration of other elements that elude or surpass quantification.

Knowledge and Information Use and Dissemination Sub-Matrix

Following the presentation of the selected sectors that constitute the diagram's frame, the next step concerns the description of the Knowledge and Information Use and Dissemination Analysis Sub-Matrix (UDAS). As mentioned before, four columns and four rows form this matrix. The columns concern the main theoretical variables or thematic axes under assessment. The social and economical actors are situated in rows.

Figure 3
Knowledge and Information Use and Dissemination Sub-matrix



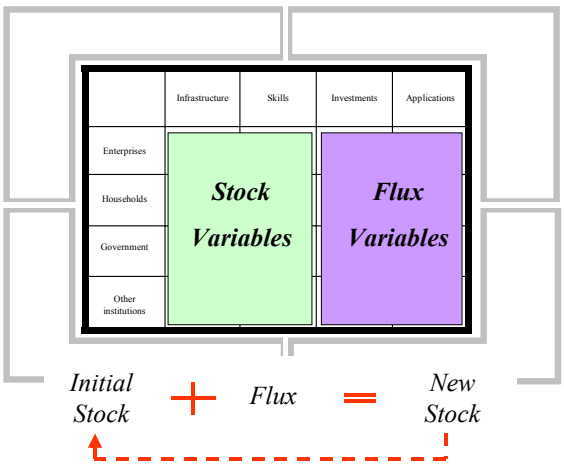
The UDAS comprises sixteen possible intersections that allow the highlighting of the main features involved in the constitution of KS. For instance, having obtained information for each of the pigeonholes on the first column, we would count on statistical information regarding infrastructure in enterprises, households, government, health institutions and education. On the cells of the second column we would have enough data to fill a situation table regarding skills (once again in enterprises, households, government, health institutions and education). Hence, we could have information concerning the investments and accumulative efforts that these actors make in order to improve not only their infrastructure but also their skills or the applications through which they take advantage of their resources.

The first two thematic axes or theoretical variables hint at issues concerning the resources stock owned by different actors. This can be made up of physical assets (equipment and other infrastructures) or intangible ones (relationships to other agents or practices that can improve the access or use of knowledge), as well as human resources.

The last two axes refer to fluxes, that is to say, actions, efforts and applications from which improvements in resources emanate, both because they are increased – investments, for example – and because they allow the development of new skills that instigate a better use of resources – expenditure in training, for instance. In other words, the two first axes bring information on what is already in existence, whereas the latter make possible the anticipation of scenarios and the identification of trends. Therefore, once they are brought together, the four axes permit a dynamic approach to this process.

Figure 4

Variables or thematic axes of UDAS



Regarding the actors that make up the rows, an attempt has been made to constitute categories that join different social actors according to the motivation or purpose for which they use knowledge and ICT. That is to say, we have tried to establish groups of agents that share certain behaviour patterns and pursue similar goals. As a result of this theoretical assignment, four categories or ideal type actors have been set up.

The "enterprises" row encompasses all organizations that act motivated by obtaining profit and use cost-benefit criteria for assessing their decisions. Thus, many enterprises approach ICT seeking to expand their profit margin. First, they try to obtain this

improvement by reducing costs (improving their efficiency). Once this source is exhausted, many proceed by increasing the aggregated value and differentiating their products.

The "households" row refers to individuals organised as a family, within which they make decisions that do not necessarily respond to a financial criterion. Possibly, the goods and services provided by the KC will allow them to save time, to find new ways of enjoying their spare time, to access some types of information and to improve their learning and training.

The "government" labelled row represents different official departments in diverse levels of government – central, regional and local. It must be clarified that not all state institutions are considered in this category. The criterion is to bring together all areas whose main function is administration. In general terms, this concerns the departments of executive, legislative and judicial power. State institutions which have other specific purposes, such as the provision of a good or service, are included in the last category; for instance, universities, schools, hospitals, armed forces, research centres.

Therefore, the last row comprises not only these public institutions but also non-governmental organizations, foundations and other types of organizations that do not pursue economic profit as their foremost aim[7].

An approach based on these four actors stems from a choice, thus it is not the sole method to deal with such a large and complex set of situations arising from the emergence of the KS. The preference for this option is sustained by the consideration that it is the best way to combine explicative ability and application viability. Further more, it is convenient to emphasize that, in the way it is devised, it facilitates the "debate" with other methodologies since these categories (rows) can be easily associated with the concepts of e–business, e-government, e-entertainment, e-learning, e-health, etcetera.

Undoubtedly, this is but one of the possible options. We have also considered the possibility of establishing four or five basic functions – for instance, research, business and production, administration, entertainment – as units of analysis. But considering how the statistical systems are currently organised, this alternative would involve

[7] It might be convenient to divide this category, which includes very different agents, into several rows. One possibility is to constitute four new groups: educational non-university institutions, universities, hospitals and other health providers and non-governmental organizations (NGOs). Nevertheless, for the moment it was considered more practical to keep this number of rows, though a different choice may be made further on.

questioning each agent on the infrastructure applied to research, to business and production, to administration, to entertainment, etc., thereby multiplying the required information. Though we find that the explicative ability of this approach might be more appealing than the “actor-centred” method, the latter is the logic under which much of the statistical information is produced and organised, considering the existing surveys to enterprises and households and the administrative records of activities and resources in the government and the education or health sectors.

Chapter 2: ICT Access, Usage and Training in Government

Introduction

According to the approach defined by the Matrix, the "government" row brings together different official departments from several government levels – national, regional and local. The areas that have public administration as their main function have been gathered in this row, which therefore encompasses the departments concerning the executive, legislative and judicial power.

Therefore, in order to analyse ICT penetration in the government row it will be necessary to measure both how these technologies are used for supporting the activities of these organizations and their impact on the type and quality of the interactions between the government and the community.

A. What is the e-government?

The study of e-government is commonly defined as the analysis of the transition of the government sector into the Information Society. This requires an analysis of the degree in which ICT are used as a support for the activities of public institutions both in what regards the application of these technologies in daily functioning and the extent in which they contribute to improve efficacy and efficiency in the services provided to citizens.

Nevertheless, despite this basic consensus, the definitions and scope allocated to the concept of e-government varies widely among countries and institutions. There are several causes for this variation but they can be loosely grouped in theoretical and methodological issues, on the one hand, and in issues linked to national and regional priorities and strategies, on the other hand.

The latter have constituted some of the main obstacles that OECD has faced in its intention to put forward and promote a basic group of indicators in order to guarantee international comparability. So, the definitions used by different member-States respond to three types of priority:

a) those that focus their attention on the use of the Internet as a basis for the interaction between government and citizens;
b) those that give preference to the analysis of ICT implementation in governmental departments and their consequences in terms of management efficiency;
c) those that define e-government as a new paradigm that will entail a change in public administration and its role in the social and economic space.

The following is the definition adopted by OECD, in order to design a comparable set of indicators and it is intended to be taken as a basis for specifying relevant features of different national circumstances:

> *"the use of information and communication technologies, and particularly the Internet, as tools to achieve better government"* (OECD, 2003: 11)

Despite the quoted definition, which confers great importance to the Internet, the same OECD document highlights the fact that e-government is something more than the use of the Internet. The term e-government alludes to the need for the government to join the households and companies in the transition to the Information Society. The impact of ICT in the citizens manifests itself in new needs and new ways of interaction with the public sector.

Overall, one can say that OECD focuses on the use of the Internet and other ICT tools as means for improving the relationship between government and citizens, that is to say, departing from the introduction of front office technologies.

A similar approach can be found in the definition agreed upon by the European Commission. In a document published in 2003, e-government is defined as:

> *"the use of information and communications technologies by public administration, combined with organizational change and new skills to improve public services and democratic procedures and to support public policies" (European Commission, 2003)*

According to this definition, though the importance of the Internet is not made explicit, more attention is paid to the potential of ICT as means for improving the quality of services rendered to citizens. This definition highlights the fact that the transition to an

Information Society requires both the introduction of ICT tools and the implementation of organizational change suited to new structures and work processes. Once again, the concept points out the need for the public sector to advance jointly with the private sector towards the full exploitation of the potential benefits of the Information Society. Nevertheless, this exploitation of the benefits is seen more as an efficiency and efficacy improvement in the interaction between government and citizens and less as a productivity increase in government departments.

In the case of Latin America, although there is no common definition in all the countries, institutions such as CEPAL have produced important contributions for establishing the theoretical basis for the concepts regarding the Information Society. As such, Hilbert (2001) defines e-government as

"the successful incorporation of ICT in all government activities"

It is important to notice that this definition focuses its attention in "all" government activities. That is to say, the impact of ICT both in the improvement of efficiency in the daily functioning of the institutions – back office – and in the interaction with the citizens – front office. This is partly due to the specific and idiosyncratic features of Latin-American countries, where more than once the inefficiency of the public sector and the need for improving its daily functioning have been criticised.

This does not mean that OECD and European member-States underestimate the impact of ICT in the functioning of the public administration nor that Latin-American countries minimise the importance of the impact of ICT in the interaction between government and citizens.

Since there is a close tie between the concept of e-government adopted in each case and the specific national needs and strategies, differences between definitions seem to largely respond to differences between development levels. Therefore, though in some countries e-government has attained an important development (noticeable in improvements such as electronic tax returns and payment), in other countries the need for creating information portals and even telephone helplines for citizens is still prevalent.

Therefore, the analysis of ICT penetration and impact on government still requires additional efforts in order to adopt a basic definition which may be used later as a starting point for the constitution of a common and homogeneous set of indicators.

B. Why measure the e-government?

Assuming that e-government is defined as the introduction of ICT in the government sector, whether as support for daily activities or as a means for improving the relationship with the citizens, it is important to analyse the causes that render necessary its measurement, in order to steer the construction of indicators.

Considering the European Union member countries, having information on this issue allows the assessment of the compliance to e-Europe premises and the orientation of the implementation of necessary adjustments and improvements. Inside the framework of different community plans and programmes, estimating the e-government level of progress makes possible to monitor the evolution of different member states, both among themselves and by comparison with former periods. At the same time, it is also a means for comparing the progress of the European Union with other developed countries. In other words, measuring e-government is motivated by the need for monitoring and assessing community policies and as an input for amendments and adjustments.

For developing countries, measuring e-government has a double function: to monitor improvements – or worsenings – in the government sector efficiency and to generate inputs for developing policies.

On the one hand, dissimilar to the European Union, the measurement of the level of penetration of ICT in government is steered towards relying on elements of judgment in order to develop policies for the promotion of the use of such technologies both in the front office and back office.

On the other hand, promoting the implementation of ICT in different social sectors is a task ascribed partly to the government. Several studies have shown the ability of this sector for encouraging TIC implementation in the remainder of the society. Therefore, the second function of these indicators in Latin America, and in general in other underdeveloped countries, is to be transformed into inputs for analysing the measurement and the best way for transmuting e-government development into an increase of ICT penetration in households and enterprises.

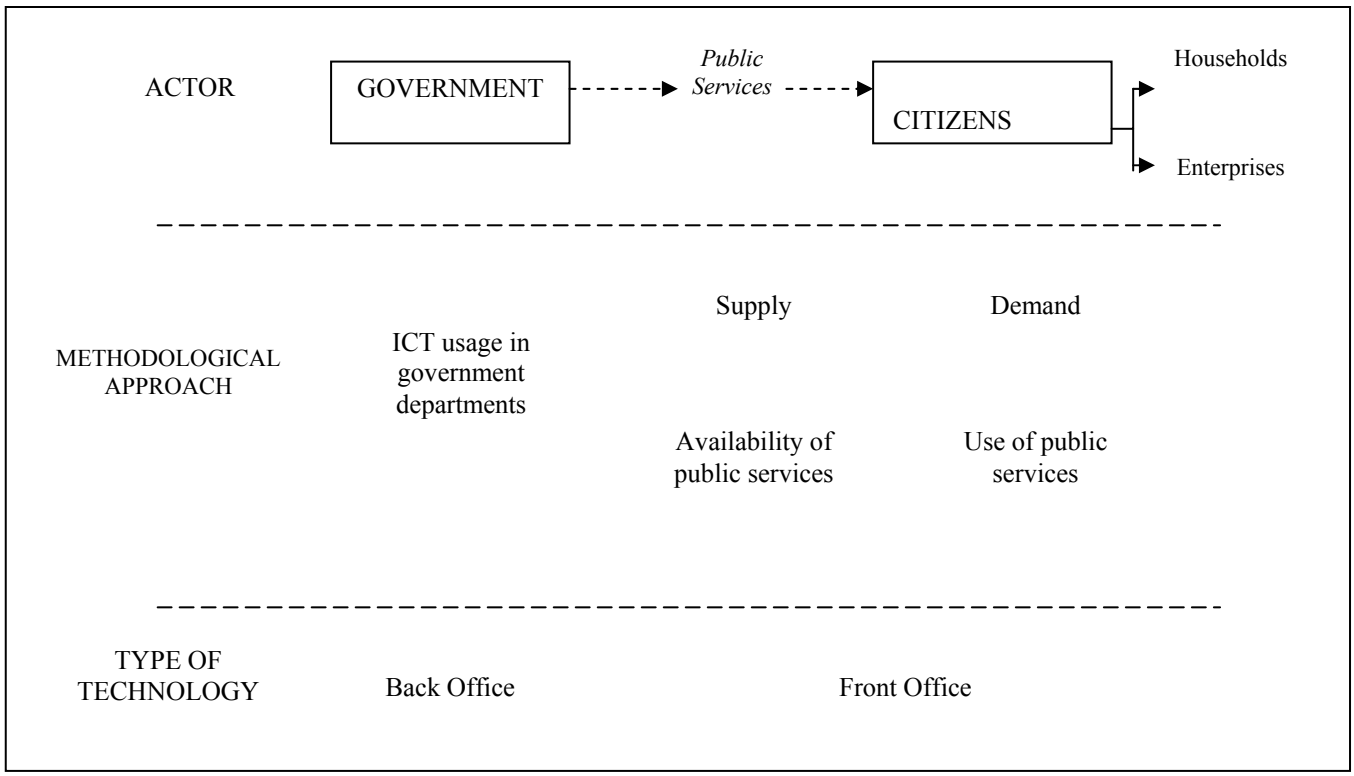
C. How to measure the e-government?

However, the main difficulty in trying to produce a set of indicators for measuring the e-government that can be compared internationally is the existence of different units of analysis in different countries, which also have different organization models, different functions and different ways of interacting with the public. Thus, in order to create an internationally comparable set of indicators, the analysis standpoint must be first defined.

In general terms, there are three ways of approaching the measurement of ICT level of penetration in the government sector: one departing from the demand side, the other from the supply side and another measuring ICT usage in these institutions. The first two options are based on the analysis of the so-called front office technologies, the latter studies the use of back office technologies.

A demand side analysis concerns the degree in which services provided by the government are used by citizens, institutions or enterprises. The supply side analysis is based on the availability of services provided through electronic means. The third, namely back office analysis, focuses on the characteristics of ICT usage in different tasks performed by governmental institutions. The following diagram tries to summarize these three approaches to e-government measurement.

Regarding the matrix, an analysis from the demand side would require analysing the characteristics of the infrastructure, applications, investment and skills, more in relation with the other rows than with the government row. A supply side analysis would refer to a specific unit inside the government department, in charge of setting in motion and maintaining the programmes that support the services provided.



C.1. OECD

In April of the current year was presented at the meeting of the Working Party on Indicators for the Information Society (WPIIS) a draft version of the OECD report on measuring e-government (OECD, 2005a). What follows summarizes the discussions at WPIIS, the compilations of statistical data from member countries by OECD and the statistical appendix of the "E-government for better Government" report, which will be publish later this year (OECD, 2005b).

There are three basic concepts connected to e-government surveys:

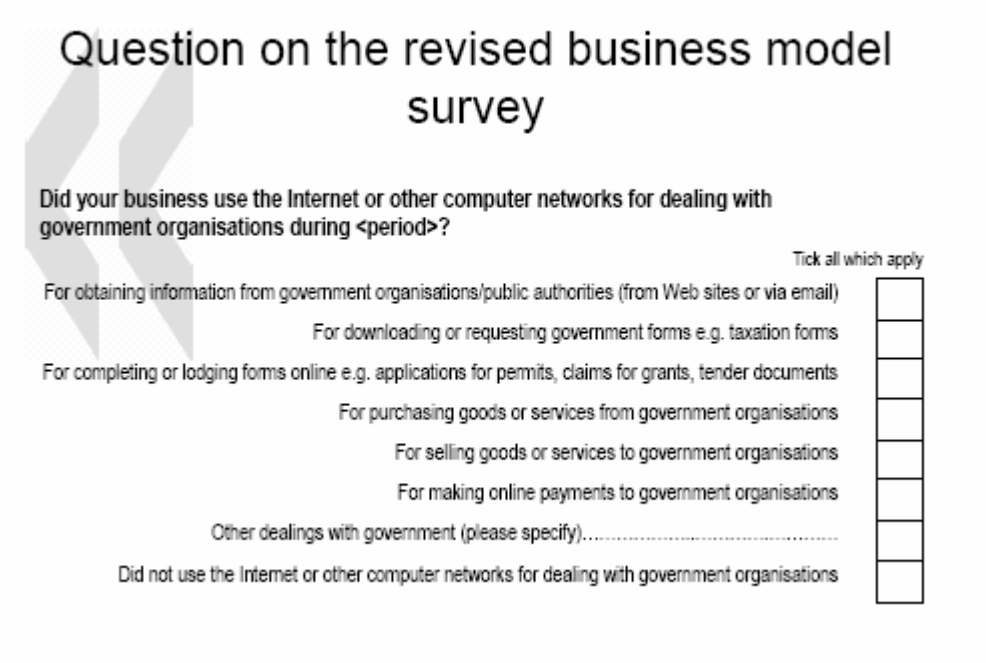
a) demand for electronic services;
b) demand for ICT from the government (government use of ICT)
c) supply of electronic services by the government

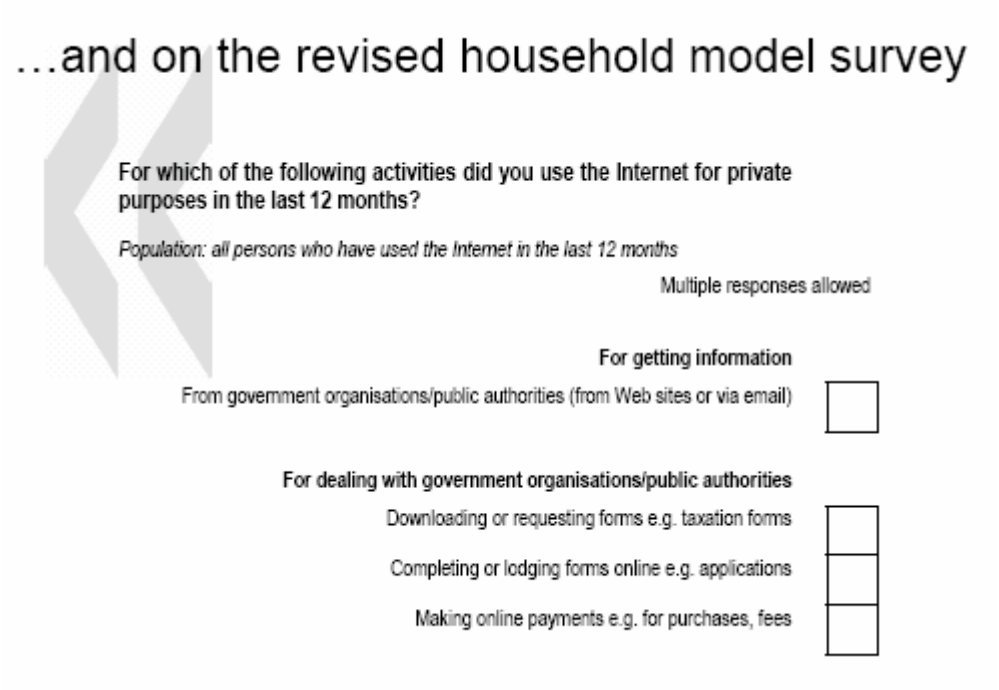
The measurement of ICT penetration in this sector and the possibility of international comparison are limited by the difficulty in defining a target population and a unit of analysis, by the heterogeneity of government departments in terms of functions and structures and by the fact that measuring activity does not take into consideration the supply and accessibility of services.

Similar to what happens in European countries, OECD member countries set out from a demand side approach. Accordingly, in 2002 WPIIS has agreed on expanding e-

government analysis on the demand side, since, despite its restrictions, it grants more international comparability that supply side approaches.

Table 1





Source: OECD (2005)

Resuming the e-government definition, this e-government measurement proposal assumes a direct relation between an increase in ICT usage by citizens and the development of a better government.

At the same time, it seems to focus more attention on estimating the measure in which the government responds to new needs by households and enterprises than in the search for best practices or the development of back office technologies.

C.2. EUROPEAN UNION/EUROSTAT

In order to overcome the structural differences between countries, the European Union has proceeded to measure e-government in two ways: from the demand side and from the supply side. During the WPIIS sessions held in Paris in April 2005 Eurostat's work (2005) on the measurement of e-government was presented. For EU member countries, and in the framework of eEurope action plan, measuring ICT penetration in government stems from two sources of information: surveys and a comparison work commissioned by the Information Society and Media Directorate-General.

On the ICT surveys directed to households and enterprises the question regarding Internet usage for interacting with authorities is partitioned. This question makes possible to know the degree of use of such services through the demand and turns out to be a useful tool for comparing between countries the degree of use of public services by households and enterprises. Table 2 shows these questions.

Nevertheless, this approach does not allow the distinction between services that are not used because they are not available and those that are not used for other reasons. In order to overcome this lack of information, there is an annual study on the availability of on-line services, that is to say, an approach to measuring TIC penetration from the supply side.

Table 2

Enterprise survey

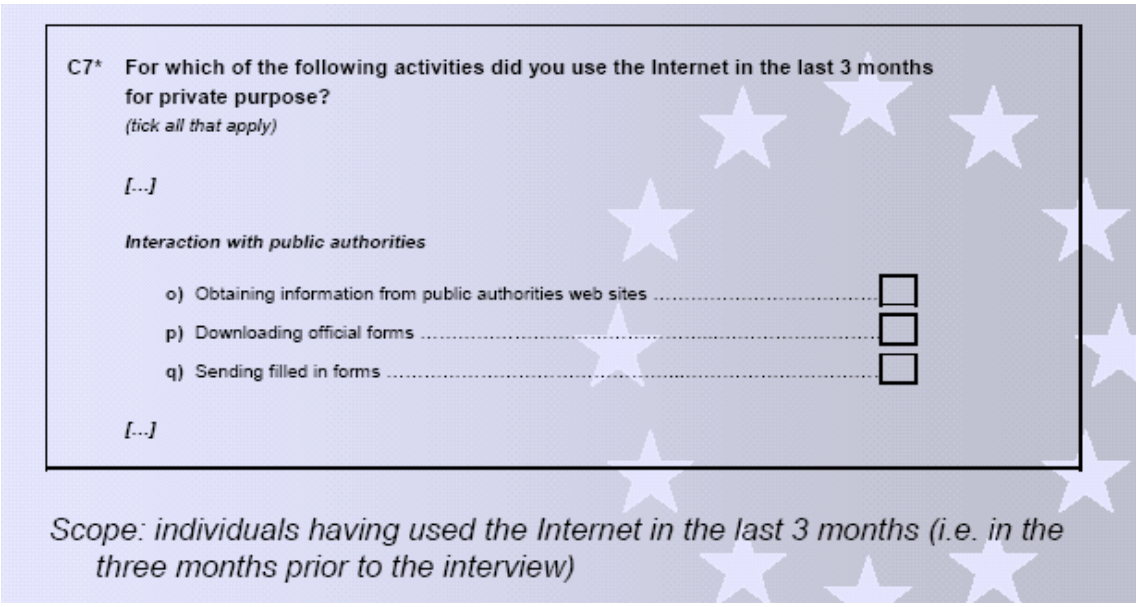
B6*. Did your enterprise interact with public authorities in the following ways, during 2004?	Yes	No
a) For obtaining information	•	•
b) For obtaining forms, e.g. tax forms	•	•
c) For returning filled in forms, e.g. provision of statistical information to public authorities	•	•
d) For full electronic case handling, e.g. return filled tax form and include electronic payment	•	•
e) Submitted a proposal in an electronic tender system (e-procurement) (Pilot question)	•	•

Scope: enterprises having access to the Internet in January 2005

Source: Eurostat 2005

Table 3

Household survey



Source: Eurostat 2005

This measurement, which was formerly made twice a year and is currently annual, derives from a study about the availability of public services on the web (Information Society and Media Directorate-General, 2005). The methodology is based on counting the amount of public services made available through the web and the degree in which taxpayers can perform these services completely on-line. 20 services, defined since the start of this measurement in 2001, are considered, of which 12 concern the use by households and 8 by enterprises (Table 4). At the same time, the development of the supply of these services is analysed through a ranking that comprises 4 stages of online availability of public services (Table 5).

Table 4

Citizens	Businesses
Income Taxes	Social Contribution for Employees
Job Search	Corporate Tax
Social Security Benefits[2]	VAT
Personal Documents[3]	Registration of a New Company
Car Registration	Submission of Data to the Statistical Office
Application for Building Permission	Custom Declaration
Declaration to the Police	Environment-related Permits
Public Libraries	Public Procurement
Birth and Marriage Certificates	
Enrolment in Higher Education	
Announcement of Moving	
Health-related Services	

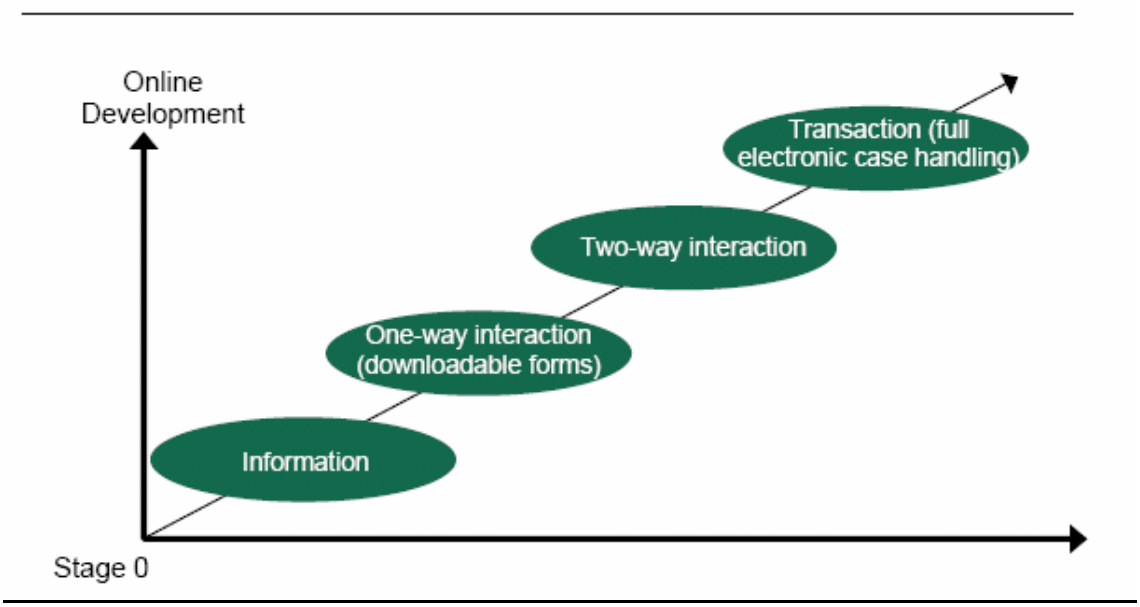
Source: Information Society and Media Directorate-General, 2005

Table 5

- **Stage 1- Information:** The information necessary to start the procedure to obtain this public service is available on-line.
- **Stage 2- One-way Interaction:** The publicly accessible website offers the possibility to obtain in a non-electronic way (by downloading forms) the paper form to start the procedure to obtain this service. An electronic form to order a non-electronic form is also considered as stage 2.
- **Stage 3- Two-way Interaction:** The publicly accessible website offers the possibility of an electronic intake with an official electronic form to start the procedure to obtain this service. This implies that there must be a form of authentication of the person (physical or juridical) requesting the services in order to reach stage 3.
- **Stage 4- Full electronic case handling:** The publicly accessible website offers the possibility to completely treat the public service via the website, including decision and delivery. No other formal procedure is necessary for the applicant via "paperwork".

Besides these 4 stages a stage 0 was introduced to capture two possible research outcomes:

- Total absence of any publicly accessible website managed by the service provider
- The public service provider has a publicly accessible website, but this one does not offer any relevant information, interaction, two-way interaction or transaction possibilities at all concerning the analysed service.



Source: Information Society and Media Directorate-General, 2005

Resuming the e-government definition by the European Commission, one realises that these indicators require at least two questions. The first is that the availability and use of on-line public services is consistent with the implementation of organizational change and the search for improvements in the skills and efficiency of public bodies.

The second assumption is based on the services used for measuring the degree of ICT penetration in the government. It is possible that these services respond to the characteristics of member countries in general terms but the weight of the services or their effects on the daily activities of the departments will not necessarily be the same in all cases.

C.3. UNITED NATIONS/CEPAL

In April this year was also carried out the Partnership on Measuring ICT for Development meeting, of which not only the United Nations and CEPAL but also ITU, OECD and UNESCO are members. In this meeting, progresses were made towards constituting a set of indicators able to allow international comparisons between developed and developing countries.

Concerning the measurement of ICT in the government sector, the recommendations that were issued are also based on the demand side approach in order to homogenise a set of indicators. Thus, in the key indicators for the household sector and enterprise

sector was proposed to breakdown Internet usage by type of activity (Table 6). The Economic Commission for Latin America and the Caribbean (CEPAL) and the Information Society Observatory for Latin America and the Caribbean (OSILAC 2004, 2005a and 2005b) issued a similar recommendation.

Though the surveys carried out by Eurostat and the OECD proposals allow a greater breakdown of activities in which the Internet is used for interacting with public departments, the proposal issued by Partnership on Measuring ICT for Development and specifically by OSILAC allows a minimum level of comparison from which we may proceed.

In sum, in a similar way to the proposal made by Eurostat and to what was accomplished by OECD member countries, those national statistical offices that follow the United Nations recommendations will be able to produce internationally comparable information.

Table 6

Key indicators on ICT access and use: households and individuals

H10	Activities performed thorough the Internet in the past 12 months
	Answers:
	• To obtain information
	  • On products and services
	  • Concerning health or health services
	  • From public bodies/public authorities via websites or e-mail
	  • Other information or general searches in websites
	• Communication
	• Buy or order products and services
	• E-banking and other financial services
	• Education and learning
	• Transactions with public services/government departments
	• Entertainment
	  • Play/download video or computer games
	  • Obtain films, music or software
	  • Read or download e-books, newspapers or magazines
	  • Other entertainment activities

Key indicators on ICT access and use: enterprises

B12	Proportion of enterprises that use the Internet by type of activity
	Answers:
	• E-mail through the Internet
	• To obtain information
	  • On products and services
	  • From public bodies/public authorities via websites or e-mail
	  • Other information searches or research activities
	• E-banking and other financial services
	• Transactions with public services/government departments
	• Supply services to customers
	• On-line distribution of products

Source: OSILAC, 2005b

Finally, it must be stated that the reference period may vary between countries. As can be seen in Table 2, the reference period for Eusostat's household survey is the previous three months and for the enterprise survey is the previous year. On OECD's last proposals no specific period is defined for enterprises, as can be seen on Table 1, though in former recommendations a specific year was mentioned – the previous, the current or the following year. For households, the previous 12 months are used as reference. On the OSILAC recommendations the reference period is the previous 12 moths, both for households and for enterprises.

D. Towards an e-government measurement strategy in Iberoamerica

The first issue that requires a consensus is the definition of e-government. From what has been stated in previous sections, two basic types of definition can be set apart:

a) Those that use the concept of e-government as a change in the paradigm of public administration characterized by a transition in the government role, from a regulation and control role to the support and empowerment of initiatives emanating from the civil society;
b) Those that use the concept of e-government to make reference to the degree of dissemination of ICT-based interactions between government and citizens and enterprises.

In the framework of a proposal of indicators for the Iberian American region, the second definition seems more appropriate. The need for creating programs and policies aimed at improving the daily functioning of this sector is crucial due to the different

development levels in this region, the specific historical problems in some cases and the need for improving public sector efficiency.

However, once the concept is defined and the justifications stated, it becomes necessary to establish the standpoint from which it will be measured. From what was said above, there are two types of approaches: those that measure e-government from the demand side and those that do it from the supply side.

The set of relevant information proposed by OECD as well as the CEPAL proposal correspond to the second type of approach, by focusing the analysis on the use of front office technologies by citizens. Nevertheless, this approach does allow the distinction between the lack of use due to causes that are connected only with the users – such as the absence of an Internet connection or the lack of minimum skills for using it – and the lack of use due to the inexistence of on-line services. This kind of deficiency may not be relevant for developed countries, since it is assumed that it has been successfully overcome. But in the cases of countries where information is crucial for the development of policies, it can be wrongly interpreted and the lack of demand may be mistaken for lack of supply and vice versa.

The European Union combines both approaches but not always remaining inside the range of front office technologies. According to the indicators under analysis, e-government measurements follow a stock logic, that is to say, they assess whether services are available or not and measure their use by households and enterprises. Though Eurostat is progressing towards the development of questionnaires that can grasp issues like obstacles, current measurements cannot encompass these questions nor the existing or absent abilities, citizen needs and efforts made towards use. Therefore, though this set of indicators allows the assessment of ICT implementation policies, its design and execution would not be functional.

In summary, it seems appropriate to progress towards a set of indicators for the Iberoamerican region that analyses the availability and use of on-line public services but at the same time provides information regarding existing hindrances. Probably the services that should be considered are not the same that are taken into account in European countries because national circumstances and strategies are different. However, it is necessary to consider that whichever set of indicators is chosen it must allow a minimum degree of comparability, in order to monitor, among other things, the divide between countries from different regions.

In conclusion, there are three issues for debate:

1) To assess the relevance and viability of the two e-government definitions;

2) If a definition closer to the second one is chosen, to analyse the relevance and viability of the list of services employed by the European Union;

3) To assess which is the most suitable method for gathering information. That is to say, a demand side approach or a supply side approach or a combination of both, which in operative terms refers to the use of administrative records or the production of information from household and enterprise surveys.

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Chapter 3: ICT access and use by households

Introduction

In the framework of the transition towards an Information Society, ICT usage allows families to have access to diverse kinds of goods and services as well as to new forms of interaction and support for their daily activities.

A. What does it mean to measure the Information Society in Households?

The analysis of the transition towards the Information Society in households is the counterpoint to the analysis of e-government and e-business. It means to measure the degree in which citizens and workers and consumers are prepared or are effectively using new information and communication technologies. Therefore, to measure the households row means to study the transition of society towards an Information Society.
It seems that there is a broad consensus in political, business, media and academic circles that the development of ICT is producing important social and economic change. Though it is still important, the consensus seems frailer regarding the analysis of the extent of this phenomenon and the magnitude of its effects.
Nevertheless, any attempt to quantify this process of change, this social phenomenon, requires a definition as accurate as possible, of which some features are debated here. Without these central elements it would not be easy to establish differences and similarities between former stages and would be impossible to quantify change and its effects. Thus, an indispensable first step is to disentail the meaning of several terms related to this issue.
Revisiting some of the main definitions seems to be the most appropriate step in order to proceed towards the definition of Information Society indicators.
Many authors and institutions have breach this subject in very little time. As such, and considering the aims of this document, we have tried to make a selection of the most important ones, chosen for the representativity of their opinions or for the originality of their contributions.

One of the most representative documents of the prevailing approach at the European Union is the Green Paper "Living and working in the Information Society", published in 1996 (CEC, 1996). According to the European Union,

> *"We are living through a historic period of technological change, brought about by the development and the widening application of information and communication technologies (ICTs). This process is both different from, and faster than, anything we have seen before. It has a huge potential for wealth creation, higher standards of living and better services. ICTs are already an integral part of our daily life, providing us with useful tools and services in our homes, at our workplaces, everywhere"* (CEC, 1996: 3)

In a more recent document, in the framework of the "eEurope: an Information Society for all" initiative, changes connected with the Information Society are described as:

> *"the most significant since the Industrial Revolution, are far-reaching and global. They are not just about technology. They will affect everyone, everywhere. Bringing communities, both rural and urban, closer together, creating wealth, sharing knowledge, they have huge potential to enrich everyone's lives. Managing this transformation represents the central economic and social challenge for the Union. It will impact profoundly on European employment, growth and productivity for the next five years and for decades afterwards*." (CEC, 2000: 2)

In the Green Paper on the Information Society in Portugal (MSI, 1997) it is stated that:

> *"The term "information society" refers to a form of social and economic development where the acquisition, storage, processing, evaluation, transmission, distribution and dissemination of information leading to the creation of knowledge and the satisfaction of the needs of individuals and companies, plays a central part in economic activity, in the creation of wealth and in the definition of the citizens' quality of life and cultural practices."* (MSI, 1997: 7)

From the document "UNESCO and Information Society for all" it can be stressed that:

> *"The dramatic acceleration in the development and use of information and communication technologies during the last few years has set in motion a worldwide process of transition from the "Industrial" to the "Information Society". The depth and non-linearity of this process seem to have much greater social, economic and cultural implications for humanity than the industrial revolution of the past. Business, education, training, research, entertainment - indeed, all aspects of life - are increasingly affected by electronic networks and multimedia technologies, which are opening up new opportunities and challenges for all."* (UNESCO, 1996: 1-2)

In 1996 OECD has published a document regarding the knowledge-based economy, where it is stated that:

> *"The term "knowledge-based economy" results from a fuller recognition of the role of knowledge and technology in economic growth. Knowledge, as embodied in human beings (as "human capital") and in technology, has always been central to economic development. But only over the last few years has its relative importance been recognized, just as that importance is growing. The OECD economies are more strongly dependent on the production, distribution and use of knowledge than ever before. Output and employment are expanding fastest in high-technology industries, such as computers, electronics and aerospace."* (OECD, 1996: 9)

In this new age, the productive process requires workers who are able to manipulate knowledge and complex inputs for producing differentiated goods and services. At the same time, an expansion of supply requires consumers that have the necessary skills to decipher and enjoy new products, much of which are intangible, with important cultural, artistic or intellectual components.

From the demand point of view, several authors emphasise that a severe change in consumer patterns and in the use of time, both work time and leisure, is occurring. New forms of interaction can also be found. ICT allow mass and interactive

communications. These changes in the connections between individuals are transforming politics, culture and entertainment.

But then these transformations call for new workers, new consumers and new citizens and, as such, education plays a fundamental role. The concern regarding new teaching methods and curricular reform has become once again a strategic issue, quite similar to what has happened in the beginning of the 20th century, when society was confronted with the challenge of finding suitable workforce for taking advantage of the technical improvements.

Among the most notorious manifestations of this process are the expansion of information and telecommunications infrastructure, the multiplication of intangible goods and the supply of new services – many of which are connected to intermediation, formation and provision of information - and the automation of tasks in administration, production and trade.

The opportunities these changes bring in terms of communication have opened new channels, which have allowed a remarkable increase in exchange fluxes that have arisen from the emergence of new connection procedures that have altered our practices, both in the field of work, culture, politics and entertainment.

Therefore, the transition towards the Information Society encompasses technological and social features, whose conjunction originates a wide range of situations and trajectories, so that we are facing both a global and heterogeneous process.

B. Why measure the households row?

As mentioned above, the available evidence increasingly supports the notion that we are facing a heterogeneous process determined by the combination of previous characteristics of different regions and populations with deliberate efforts they do to take advantage of the benefits and to reduce the negative aspects of this transformation.

It is possible to think that the development of the Information Society in developed countries will not be same as that of the developing ones. For starters, key technologies are usually created and produced outside the region and technical progress in this field progresses in a direction that not always takes into consideration the restrictions and problems that affect our region.

Then, the internal digital divide, due to its extent and depth, will certainly have a significant bearing on the trajectory followed by the Iberoamerican region. This problem is starting to be taken as one of the main challenges political and business leaders must solve.

In fact, the objectives pursued by the indicator systems design in developed countries probably do not coincide with the needs or questions that need to be addressed in the rest of the world. For instance, eEurope indicators aim to assess the progress and efficacy of European policies in this matter. Therefore, it is assumed that the basis for a European Information Society already exists and the main concerns lie in ways or mechanisms to expedite this process.

However, in Latin America the process possesses and faces other characteristics. In these countries we are still facing the challenge of setting the basis for the Information Society, therefore it seems more relevant to identify and remove the obstacles that hinder the participation in this new social space by the large majority of the population.

The issue of the internal digital divide is much more significant in developing countries due to its magnitude and extent. What it is even more important is that many of its causes are structural, so they require wide-ranging and time-extensive actions in order to be overcome. Therefore, the production and presentation of data broken down by geographical areas and social groups is an unavoidable prerequisite, since global statistics by country can only reveal the divide with the rest of the world but they hide the huge differences inside each society or territory.

Also, the reflection on the Information Society rekindles the debate about technology and development. Information Society is based on ICT evolution and dissemination. These technologies are a powerful tool for integration, but at the same time they exclude those who are unable to assimilate them. Scientific and technological advancement becomes progress but at the same time it can increase differences between those that have the abilities to use them and those that are left behind. In the case of ICT, this effect is magnified by the strong spatial reconfiguration it engenders. ICT penetration in a territory or society can be very focalised and restricted, which can quite quickly originate very divergent potentialities and opportunities in neighbouring areas or groups. This can cause a severe territorial or social incoordination, which compel permanent monitoring, in order to take corrective measures to assure an optimal development of the Information Society.

What has been said in these last paragraphs clearly shows the need for proceeding on the development of indicators for the household row that allow international comparison without giving up on the heterogeneity among countries and inside them.

C. How to measure households?

C.1. Unit of analysis household

The analysis of the transition towards an Information Society among citizens departs from the study of ICT penetration and use in homes and among individuals. As such, not only the analysis of ICT penetration but also of the kind of use it is made of them and the obstacles individuals face is intended.

Several international institutions have been developing a set of indicators and methodological procedures to produce an array of internationally comparable indicators. However, due to the existence of national and regional specificities, we intend to complement the proposal with specific indicators, suited to domestic needs.

As we shall see in the next sections, the institutions in charge of producing statistical information and indicators – OECD, Eurostat, United Nations/CEPAL – have opted for a demand side approach, that is to say, from the standpoint of ICT access and use by individuals.

Regarding this row, two information sources are more frequently used: surveys directed to households by national statistical offices and the information produced by telecommunications companies and their regulators.

In what concerns the first type of source, though the definition of household is similar in all countries, the age-break considered for the definition of individual eligibility and the unit of analysis may vary. For instance, though for OECD and Eurostat the surveys aim to gather information on all members of the household aged between 16 and 74, for other countries the unit of analysis is just the household and not each individual member.

In what concerns the second source, the information is presented in an aggregated manner and is based mainly in statistical data on infrastructure and use of front office technologies. It must be clarified that the methodology for data gathering and information presentation may vary widely between countries, since it is produced by

national institutions. However, progresses have been made towards the homogenisation of methodologies and indicators, since institutions like the International Telecommunication Union (ITU) also take part in international working teams.

Regarding the matrix, the analysis of ICT penetration in households, both from information concerning homes and individuals, requires the analysis of infrastructure, applications, skills and investments characteristics of the members of a given society and their relative position with regard to the transitions towards the Information Society.

C.2. OECD

With the purpose of analysing the degree of ICT penetration in households, OECD suggests two sets of indicators: those that refer to the infrastructure on an aggregated level and those specifically aimed at measuring ICT access and use by individuals.

The framework of analysis within which OECD puts forward these indicators corresponds to a demand side approach, that is to say, the degree in which individuals use ICT in their daily activities, including the analysis of access possibilities and obstacles.

Aware of the double need for recommending indicators that can both allow international comparability and be used as tools for monitoring and evaluating different levels of transitions towards the Information Society, OECD proposes a basic set of indicators and an extended set that allows more developed countries to proceed in the analysis of specific subjects, such as the internal and external digital divide.

Besides putting forward a list of indicators, OECD recommends the use of common concepts and methodologies, in order to guarantee international comparability. Table 1 shows the set of infrastructure indicators. These emerge from the information provided by telecommunications companies and their regulators and from other sources of information – for example, Internet service providers and private statistical information institutions. Thus, from this data it is possible to obtain aggregated information on a national level, from which the evolution of a specific country can be monitored, compared with other countries or acquire a general view from a wider region.

Table 1

Infrastructure and access core indicators

Basic core	
A-1	Fixed telephone lines per 100 inhabitants
A-2	Mobile cellular subscribers per 100 inhabitants
A-3	Computers per 100 inhabitants
A-4	Internet subscribers per 100 inhabitants
A-5	Broadband Internet subscribers per 100 inhabitants
A-6	International Internet bandwidth per inhabitant
A-7	Percentage of population covered by mobile cellular telephony
A-8	Internet access tariffs (20 hours per month), in US$, and as a percentage of per capita income
A-9	Mobile cellular tariffs (100 minutes of use per month), in US$, and as a percentage of per capita income
A-10	Percentage of localities with public Internet access centres (PIACs) by number of inhabitants (rural/urban)
Extended core	
A-11	Radio sets per 100 inhabitants
A-12	Television sets per 100 inhabitants

Source: OECD, 2005

The second set of indicators aimed at measuring ICT access and use by individuals stems from the surveys directed at households, carried out by national statistical offices. This set of indicators proposes specific ways for classifying individuals – for instance, by age groups, by levels of formal education and household constitution – answer categories and reference periods.

As was mentioned before, both a basic set of indicators and a extended set of indicators are proposed; the latter allows an in-depth analysis of certain issues, such as the frequency of use or the type of access to the Internet.

Finally, it should be mentioned that due to the acute differences between countries concerning development levels and ICT penetration degrees, OECD also proposes a reference indicator: the proportion of households with electricity (Table 2).

Table 2

Core indicators on access and use of ICTs by households and individuals

Basic core	
HH-1	Proportion of households with a radio
HH-2	Proportion of households with a TV
HH-3	Proportion of households with a fixed line telephone
HH-4	Proportion of households with a mobile cellular telephone
HH-5	Proportion of households with a computer
HH-6	Proportion of individuals that used a computer (from any location) in the last 12 months
HH-7	Proportion of households with Internet access at home
HH-8	Proportion of individuals that used the Internet (from any location) in the last 12 months
HH-9	Location of individual use of the Internet from all locations in the last 12 months Response categories: • At home • At work • Place of education • At another person's home • Free Public Internet Access Centre (specific denomination depends on national practices) • Charged Public Internet Access Centre (specific denomination depends on national practices) • Others
HH-10	Internet activities undertaken by individuals in the last 12 months Response categories: • For getting information o About goods or services o Related to health or health services o From government organisations/public authorities via websites or e-mail o Other information or general Web browsing • For communicating • Purchasing or ordering goods or services • Internet banking or other financial services • For education and learning • For dealing with government organisations/public authorities • For leisure activities o Playing/downloading video or computer games o Obtaining movies, music or software o Reading/downloading electronic books, newspapers or magazines o Other leisure activities
Extended core	
HH-11	Proportion of individuals with use of a mobile telephone
HH-12	Proportion of households with access to the Internet by type of access from home • Response categories should allow an aggregation to narrowband and broadband, where broadband will exclude slower speed technologies, such as dial-up modem, ISDN and most 2G mobile phone access, and which will usually result in a speed of at least 256 kbit/s.
HH-13	Frequency of individual access to the Internet in the last 12 months (from any location) Response categories: • at least once a day • at least once a week but not every day • at least once a month but not every week • less than once a month

Source: OECD, 2005

C.3. European Union / Eurostat

With the aim of developing some measures for promoting the development level of the Information Society in Europe, the European Union, in the framework of eEurope action plans, has tried to define a set of basic indicators for measuring ICT penetration in member countries (European Union, 2002).

Eurostat's endeavours overlap with OECD's by proposing a set of indicators that emerge from the surveys directed to households carried out by national statistical offices. However, the structure from which the set of indicators is defined is different. Table 3 shows how the indicators are grouped in 5 sections: Internet indicators, on-line public service use indicators, e-business indicators, Internet security indicators and broadband penetration indicators.

Table 3

Internet indicators	
A.	Citizens' access to and use of the Internet
B.	Enterprises' access to and use of ICTs
C.	Internet access costs
Modern online public services	
D.	e-government
E.	e-learning
F.	e-health
A dynamic e-business environment	
G.	Buying and selling on-line
H.	e-business readiness
A secure information infrastructure	
I.	Internet users' experience and usage regarding ICT-security
Broadband	
J.	Broadband penetration

Source: European Union (2002)

Inside the household row it is pertinent to approach Internet access and use indicators - part of the cost indicators – security indicators and broadband penetration. On the methodological side, Eurostat considered as statistical unit each of the individuals aged between 16 and 74 that constitute a certain household. The information proposed by the statistical offices allows an ICT penetration analysis on the whole of individuals that make up society. At the same time, due to the speed of change that affects ICT, it is proposed that these indicators should be produced yearly.

Finally, in order to sort out the differences between countries – specially after 10 new members have joined the EU – two sets of indicators are recommended, a basic set and an extended one (Table 4). Considering that not all countries are on the same level of development of the Information Society, the European Commission intends to

contribute to the development of national and regional strategies that will encourage the penetration of new technologies.

Table 4

1) Internet Indicators

A. Citizens' access to and use of the Internet[1]

Policy indicators[2]:

A.1 Percentage of households or individuals having access to the Internet at home

A.2 Percentage of individuals regularly using the Internet

Supplementary statistical indicators:

A.3 Percentage of households with access to the Internet broken down by device for accessing via digital TV, mobile device (include all forms of mobile access; handheld computer, mobile phone, identifying 3G (UMTS) separately when available).

A.4 Percentage of individuals with access to the Internet broken down by place of access (home, workplace, place of education, Internet cafe, PIAP etc) and by gender.

A.5 Percentage of individuals using the Internet for specific purposes (broken down by purposes: sending/receiving emails, finding information about goods and services, reading/downloading online newspapers, playing/downloading games and music, internet banking) in the previous 3 months.

A.6 Percentage of households connected in Objective 1 regions.

C. Internet access costs

Policy indicator:

C.1 Costs of Internet access broken down by different frequency of use: 20, 30, 40 hrs/month, unmetered rates.

2) Internet Security Indicators

I. Internet users' experience and usage regarding ICT-security

Policy indicators:

I.1 Percentage of individuals with Internet access having encountered security problems

Supplementary statistical indicators:

I.3 Percentage of individuals having taken ICT security precautions[10] within the last three months

I.5 Percentage of individuals and enterprises that have installed security devices on their PCs and updated them within the last three months

3) Broadband penetration indicators

J. Broadband penetration

Policy indicators:

J. 2 Percentage of households or individuals with broadband access

Supplementary indicators:

J.5 Percentage of households or individuals equipped with home networking connections[11]

Source: European Union (2002)

C.4. United Nations /CEPAL

In April this year was also carried out the Partnership on Measuring ICT for Development meeting, of which not only the United Nations and CEPAL but also ITU, OECD and UNESCO are members. In this meeting, progresses were made towards constituting a set of indicators able to allow international comparisons between developed and developing countries. Therefore, in terms of the proposed indicators, the United Nations in general and CEPAL for the case of Latin America – specifically through its participation at the Information Society Observatory for Latin America and the Caribbean (OSILAC) have recommended a set of indicators similar to the one proposed by OECD (OSILAC 2004, 2005a and 2005b).

However, unlike what happens in the European Union, there are no surveys specifically aimed at measuring ICT in the households. The existing data is due to the initiative of some national statistical offices that have included in their regular surveys directed to households and population census some questions on ICT. As a result, in order to make progresses in the development of a set of indicators for these countries, the need for international comparability must be combined with the usefulness of the information created as input for the design of development policies and the construction of a brief questionnaire that can be inserted in existing surveys and census.

Such is the aim of the proposal of indicators and their questions prepared by OSILAC. As mentioned above, the indicators are the same of those suggested by OECD and they have guided the construction of the questions for obtaining information shown on Table 5. On the other hand, since the existing information comes from individual initiatives of the national statistical offices, different methodologies have been used. This proposal tries to develop a common methodology for the countries in this region.

Table 5

Questions directed to households		Response options
Core question set in permanent household surveys		
H-1	Does this household have a radio?	Y/N
H-2	Does this household have a television?	Y/N
H-3	Does this household have a fixed line telephone?	Y/N
H-4	Does this household have a mobile telephone?	Y/N
H-5	Does this household have a Personal Computer?	Y/N
H-6	Have you used a personal computer (from any location) in the last 12 months?	Y/N
H-7	Does this household have an internet access at home?	Y/N
H-8	Have you used the internet (from any location) in the last 12 months?	Y/N (Filter H-9; H-10; H-13)
H-9	Where did you use the internet most frequently in the last 12 months? Multiple answers	-Household -Work place -Educational Facility -Free Public Access Center -Commercial Access center -At another person's home
H-10	For what services/activities have you used the internet in the last 12 months? Multiple answers	Obtaining information -about products and services -related to health or health services -from public services/authorities -other information Communication Buying/ordering products and services Electronic banking or other financial services Education and training Transactions with public services Entertainment activities -Playing/downloading games -Playing/downloading music and software -Reading/downloading online newspapers, news magazines and e-books -Other entertainment activities
Extended question set in permanent household surveys		
H-11	How many members of the household have access to a mobile phone?	Number
H-12	What modes of access/bandwidth does the household use for internet access?	Analog modem ISDN DSL Cable Mobile Wireless Fixed Wireless (Wi-Fi) Other
H-13	How often did you use the internet in the last 12 months (from any location)?	At least once a day At least once a week, but not every day At least once a month, but not every week Less than once a month Doesn't now
H-14	How many hours per week did you use the internet in the last 12 months	Number of hours per week Doesn't now

Source: OSILAC (2005b)

Finally it is important to point out the fact that despite the homogeneity reached with these indicators, some differences between proposals still persist. One of them is the unit of analysis because, as was mentioned in the introduction, whereas in some countries household surveys gather information from all members, in others only one person answers the questionnaire. Therefore, the answers may vary widely given the characteristics of the respondent.

A second difference is the period of reference used. Though OECD and CEPAL coincide in proposing the former 12 months as a reference period, this recommendation is not always followed by national statistical offices. This is due to domestic needs and different development levels. For instance, although for one country knowing the amount of individuals that have used the Internet in the previous year may be sufficient, for another country this may be irrelevant, being necessary to know the use in a much shorter period and to accompany this with information on frequency.

D. Towards a measuring strategy for the household row in Iberoamerica

From what has been exposed in previous sections, it may be noticed that the diverse theoretical approaches concerning the Information Society, and therefore the aim of the measuring proposals by different institutions, may be grouped in three standpoints.

One of these standpoints emphasizes the need for monitoring the so-called "digital divide". The proposed methodology aims to produce information able to describe ICT penetration in different regions of one country – internal divide – and at the same time to compare the country's situation with the remaining nations – external divide. This is reflected in the existence of indicators broken down by region or area but also those that can be internationally compared.

A second standpoint sets our from the importance of progressing towards an Information Society, characterised by new ways of interacting, communicating and participating in the world. This would require monitoring the degree of ICT penetration and use in the households as proxy of the extent in which ICT are connected with daily activities. This would be reflected in the construction of indicators concerning infrastructure and uses.

Finally, a third standpoint seems to seize elements from the two former ones, since it both recognises the importance of monitoring the digital divide and the way ICT are

assimilated in households. However, emphasis is placed in the demand for skills and investments that the transition to an Information Society represents. Therefore, the proposed indicators are grouped by: those that allow intra and international comparability; infrastructure and use indicators; and indicators concerning the link between ICT and education or ICT and learning.

In conclusion, there are three issues for debate:
1) To assess the relevance and viability of the different approaches to the transition to an Information Society among households;
2) To define which data should be chosen for constituting the indicators;
3) To develop a suitable methodology.

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Chapter 4: ICT Access and usage by enterprises

Introduction

According to the matrix, the "enterprises" row includes all organizations whose action is motivated by profit and that use a cost-benefit evaluation as criterion for their decisions.

In general terms, measuring ICT penetration and usage by enterprises entails not only measuring the way and intensity in which these technologies have penetrated the front office of these organisations but also to analyse the impact in terms of implementation efficiency of support technologies in critical activities usually called back office.

A. What is the enterprises row?

In order to measure the process of transition towards an Information Society in enterprises it is necessary to gather information concerning both ICT equipment in companies and the use they make of these new tools as well as the skills needed for taking advantage of information and knowledge fluxes (Baptista, 2005).

In the past few years, significant progresses have been made regarding the definition and application of internationally comparable statistical methodologies for measuring ICT penetration and usage in the private sector. Measuring ICT in the enterprises is particularly important since it allows identifying and analysing economic progress through ICT and it makes possible to research and to analyse issues concerning the industrial sector both between countries and within them.

In the past few years, relevant contributions have also been made concerning the conceptualisation of ICT impact in companies, in order to create a theoretical structure that is able to explain the connection between ICT introduction and productivity increase.

Therefore, from a study done on Argentinean companies, Yoguel et al (2004) have stated that, inside this general trend for ICT implementation, a wide range of situations can be identified, as a consequence of the heterogeneity of this technological change. By and large, the enterprise's endogenous abilities are a determining factor of its

possibilities for taking advantage of theses technologies. One other influential element is the company's size, due to the importance of hardware and software indivisibilities.

Therefore, the authors bring additional evidence to the debate on the connection between productivity and ICT. It seems that in this case the causal connection is opposite to the one anticipated in the first years of rapid diffusion of these technologies. The enterprises with better performances and more competitive conditions assimilated these tools in a most decisive and profound way. ICT will have helped these companies to solidify a position that was already outstanding in the entrepreneurial milieu. Conversely, the early idea that ICT might be a way for transforming a low profile company into a world-class firm seems to have been disproved by experiences and data from several studies from all over the world.

One other work that should be mentioned for its contribution to the debate on the factors that influence ICT adoption by SME is by Renata Lébre La Rovere and Lía Hasenclever (2003), concerning Brazilian companies. This research has substantiated the claim that ICT are adopted as a result of a cumulative learning process in which mastering one technology leads to the assimilation of other technologies. So, enterprises situated in sectors that use information intensively should have a greater propensity for taking advantage of ICT.

Simultaneously, the data analysis performed by these authors shows that ICT adoption by an enterprise depends of the innovative complexity of the sector in which the company operates. Fieldwork has confirmed that enterprises belonging to the software sector display a more intense and diversified pattern of ICT adoption. Also, the comparison between travel agencies and clothing enterprises suggests that the traditional character of the activity bears no influence on ICT adoption and usage but the importance of information for innovative processes and the role of ICT on organisational improvement do. In these sectors, the implementation of changes in the organisation is a fundamental prerequisite for the use of these technologies as means for broadening and strengthening learning processes in enterprises.

With the purpose of explaining ICT impact within the enterprise, Vilaseca et al (2002) propose to compare the transformation of the enterprise's activities from the viewpoint of organisation and network strategy. They have pointed out that if attention is focused on the transformation of the enterprise due to the economic application of ICT, one of the key elements in the framework of the new economy is e-business, defined as "productive activities whose key operations, such as management, finances, innovation,

production, distribution, sales and employee-consumer relations take place via the internet or another computerised network, without prejudging the degree of connection between the firm's virtual and physical dimensions".

At the same time, the authors explain that this array of changes should be examined by taking into consideration four essential aspects of the economic transformation process: a) transformation of the firm's activities (e-business); b) links between ICT and the capital market (e-capital); c) the role of work and employment flexibility according to the "network enterprise" model (e-work); and d) the specific character of innovation on the new economy (e-innovation).

In this framework, the contribution of ICT for this new enterprise model would be given in these five features:

- Scalability – network work allows the inclusion of the necessary elements for the development of whichever line of business; the geometric variable of the business strategy and the global or local dynamic of the enterprise no longer constitute a problem;
- Interactivity – the relationship between agents participating in different company activities can be defined on a preferred moment and information diffusion and the decision process can be connected on the chosen time;
- Flexibility – the enterprise's integration and the business scale are extended and diversified according to the needs of the line of business. As such, the strategy and the agent's decentralised interactions can be easily combined.
- Brand management – it is the sign of value acknowledgment by the client, in such a way that global connections are needed for innovation control and final product quality in a network-dominated setting
- Personalisation – cultural change and global diversity do not allow massive production standardization at the same time that scale savings maintain their impact. For economic agents, personalization and interaction made possible by ICT are needed for obtaining the efficient blend of volume and personalised production, in a large-scale production setting.

Departing from this conceptualisation of ICT impact, the authors perform a comparative analysis of the available information regarding a group of enterprises from Catalonia and different European countries. This comparison allowed them to conclude that ICT are changing the production function but there is still little evidence on how this is occurring. In other words, the main transformation happens within enterprises, so it is

necessary to study in depth information on how organizations and their strategies are changing.

On an international level, several OECD studies have tried to assess ICT impacts on the enterprise's organization and competitiveness. Firstly, it is observed that the main conclusions and statements on ICT impact have evolved within the space of four years. In the report on small and medium-sized enterprises published in 2000 (OECD, 2000) it was stated that SME have a tendency for progressing in stages towards electronic business. The first stage involves the use of the Internet as a tool for communicating and obtaining information and the second stage entails basic activities of buying and selling through electronic commerce.

The following report on SME that was published two years later (OECD, 2002) highlighted evidence concerning that ICT adoption increases productivity in companies of all sizes and one of the major benefits is the improvement of the enterprise's procedures regarding information production and circulation between different hierarchical levels. At the same time, it was noticed that small enterprises were increasingly aware of the potential benefits of ICT for their business operations, which was noticeable in the increasing expenditure on this type of technology. Nevertheless, in 2003, in a report that gathers statistical information from several OECD member countries in order to assess ICT impact on economic growth (OECD, 2003a), the heterogeneity between countries and enterprises concerning ICT dissemination and usage becomes clear. Thus, this report reaches the conclusion that, regarding enterprises, ICT usage contributes to improve business performance only when it is complemented with other investments and actions by the firm, such as changes in work organization and workers skills.

Two main conclusions are derived from the analysed evidence:

- First, the return of ICT investments is comparatively larger than in other investments with fixed assets and this is due to the fact that ICT investments are accompanied with other expenditures, which are not necessarily considered investments.
- Second, on the enterprise level, evidence suggests that ICT absorption and impact differs between firms, varying according to size, age and origin of capital (specially the use of network technologies), the complementarity between ICT usage and skills and organizational change that go together with their implementation.

These conclusions are also highlighted in the report of the OECD Ministerial Level Council Meeting (OECD, 2003b). The conclusion was reached that policies aimed specifically at ICT usage and dissemination are not sufficient to achieve the improvement in performance that is attributed to these technologies but that it is necessary that these policies are framed in a set of actions destined to create the appropriate conditions for growth and innovation. Possessing equipment and a network is not sufficient for generating economic benefits from ICT; other factors are needed, such as the regulatory framework, qualified human resources, the ability to carry out organizational change, etc.

Finally, in the case of small and medium-sized enterprises, the conclusions reached by the OECD Conference of Ministers Responsible For Small And Medium-Sized Enterprises (2004) acknowledge that ICT implementation is part of a process and success depends not only of the amounts invested directly in these technologies but also of the implementation of associated actions in several aspects of the enterprise and in its environment.

Accordingly, the report states that according to surveys carried out in OECD countries, ICT usage in SME tends to become gradually widespread. Some companies, especially those that have adopted e-commerce early, are already entering the next stage in ICT usage: e-business. That is to say, enterprises that have made progresses in computerizing back office activities such as data exchange, information processing, organization of orders and invoices and other more sophisticated ICT applications such as KMS (Knowledge Management System) and ERP (Enterprise Resource Planning), which allow storing, sharing and using knowledge and know how. These enterprises have faced a more sophisticated use of ICT, where B2C (Business to Consumer) and B2B (Business to Business) are part of an extensive e-business strategy, in which external relations with consumers and internal processes are integrated.

On the other hand, the report explains that most of theses companies seem to be in a stage in which setting up a web page (front office) and e-commerce adoption are at the centre of the ICT investments especially because a successful integration of internal and external processes in the framework of e-business requires organizational changes, time, information and knowledge, all of which entail larger costs and risks for the enterprise. Additionally, smaller companies have fewer incentives to integrate processes than larger ones, in which processes and resources that require harmonization and coordination are

more complex. Thus, it is possible that it takes more time and resources for SME to adopt an e-business strategy.

A similar evolution can be found in the reports produced by the European Commission. In a document produced in 2001 (Commission of the European Communities, 2001), it was stated that SME would benefit from the removal of market entry barriers as a consequence of e-business and as such, e-business was often described as the entry door for SME on global businesses and markets. At the same time, the challenge lay in progressing from ICT infrastructure investments to the use of the Internet as a new business tool. According to this reasoning, in the same year, at the e-conference of the European Commission (European Commission, 2001), it was highlighted that, firstly, e-business technologies allowed SME to access international markets at a low cost; secondly, network work would allow product development in an amount and complexity that was not possible before, becoming more efficient and competitive providers. Finally, thirdly, ICT would allow SME to become groundbreakers in highly specialized areas and in some cases to convert into development labs for larger partners.

Nevertheless, in 2003, in the European Report on e-Business (European Commission, 2003) the existence of a severe heterogeneity on ICT impact and diffusion was acknowledged. The report departed from the comparative analysis of 15 productive sectors and concluded that e-business adoption dynamics has economic and organizational consequences and that evidence suggests that it is necessary to change the focus from the use of e-business technologies to internal processes and cooperation between business partners.

From the available statistics it can be observed that companies are trying hard to take advantage of the opportunities to decrease costs, to improve procedures and routines and to expand their market, while at the same time that they are challenged to introduce new business models and to redefine their value chain. The current situation in the sectors under analysis is diverse. E-business activities and impact mirror the differences in core activities, in the nature of products and services provided, consumer orientation and the degrees of ICT adoption and usage inside industry. It can also be observed that the adopted business model influences the results of ICT implementation. E-business encompasses a wide and diverse range of internal and external processes, some of which have not been developed as was anticipated, whereas others have reach a significant advancement.

To summarize, and following the proposal by Peirano and Suárez (2005), performance improvement though ICT, once the stage of computerisation of support processes (information) and articulation between areas (communication) is completed, depends on the degree of progress in the introduction of ICT tools as a support for all kinds of organisation routines and of the degree of success in implementing organisational innovations in order to maximise the use of these tools. Therefore, the analysis of the transition towards an Information Society in enterprises requires going beyond the implementation of front office technologies and to establish key aspects linked to back office. This is due to the fact that the main impact of ICT, once the first computerisation stage is completed, is associated to its potential for improving the efficiency of critical processes in the firm and in so far as the minimum skills for their integration are there.

B. Why measure the enterprises row?

The different ways in which ICT penetration has been measured corresponds to the evolutionary nature ascribed to ICT impacts. Currently, it can be said that this kind of measurement is conceived as a way in which to proceed in the understanding of the determining factors of competitiveness and technological development of enterprises as well as of the impact on one country's economy.

Firstly, the focus of attention was placed on the ICT production sector. Nevertheless, as time has gone by, the weight of the demand for these technologies became obvious. So, different governments and private actors became high demanders for this kind of statistical information, both as input for policy production and for taking private decisions.

Departing from the diverse national strategies and the plans and programs that were implemented, the existence of information regarding ICT implementation created a new function for this information: the possibility of assessing and controlling policy development. Institutions such as OECD and Eurostat developed pioneering and extensive work with the aim of promoting, monitoring and assessing policies directed towards economic growth, that is to say, to provide information to political decision-makers in order to design and implement socio-economic development policies. Therefore, it can be said that for the case of the European Union countries, the

development of indicators serves the main purpose of assessing compliance to the policies defined in the eEurope action plans.

More recently, the United Nations in general and CEPAL in the case of Latin American countries, are also progressing in the same direction, by proposing indicators than might be used not only to analyse the situation and evolution of Latin America, but also to be comparable with developed countries. However, for developing countries, though they are not quite as advanced neither with regard to ICT adoption nor to measuring it, the production of a set of indicators allows the analysis of their penetration in enterprises and can also be used as raw material for designing public policies aimed at encouraging the use of these technologies, which in turn will foster economic growth.

C. How to measure the enterprises row?

C.1. Enterprise unit of analysis

As was said before, the enterprise is defined as a company that possess more than a certain number of workers. Though the minimum size may vary, the unit of analysis is basically the same in all countries.

Both OECD and Eurostat recommend enterprises with more than ten workers as unit of analysis. Despite this, they also state that each country may choose to analyse enterprises with less workers. Luxembourg, Slovenia and Finland are some of the countries that have opted for including in their sample universes enterprises with a smaller staff.

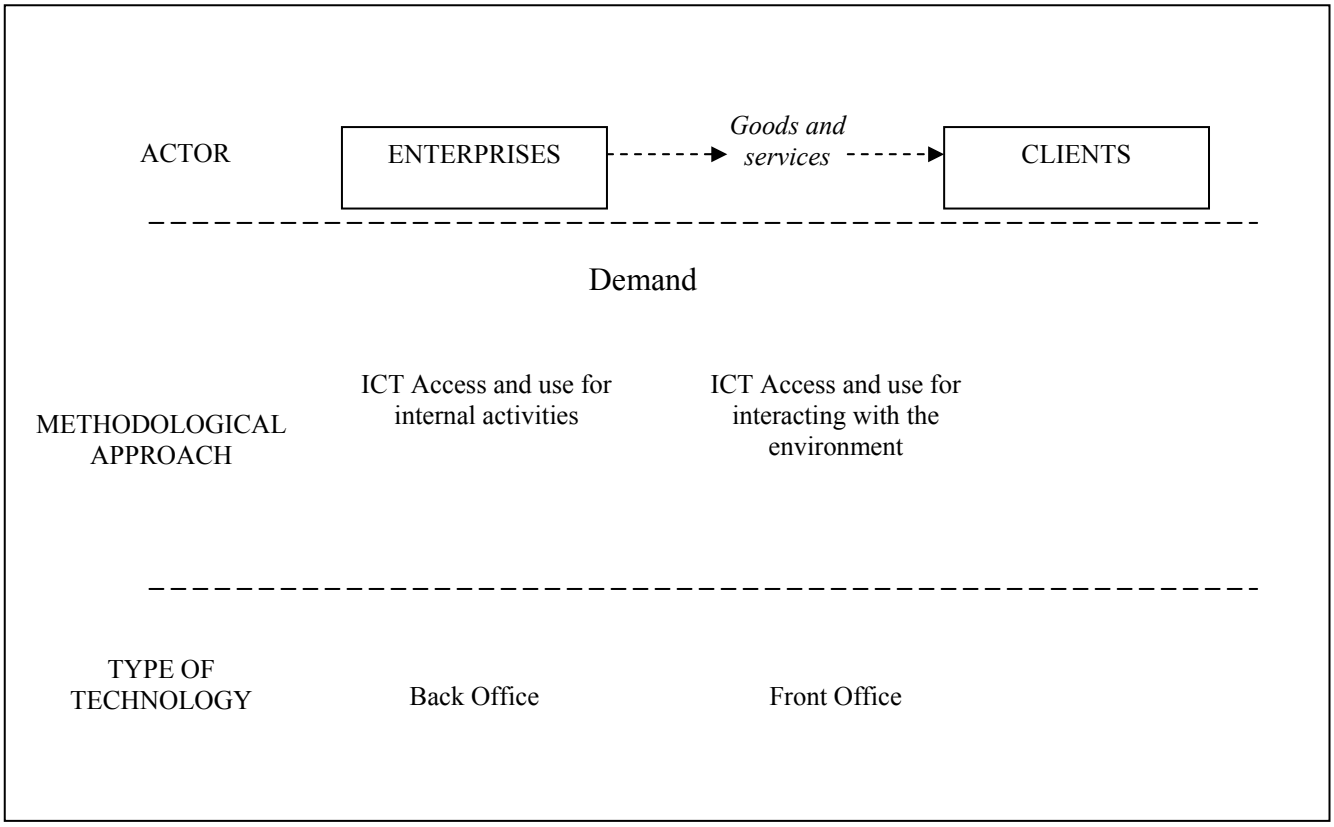
One other difference between countries regards the definition of enterprises by classification of size: in some countries it is based on the number of employees; in others the yearly turnover is considered; other countries combine these two variables. Several studies have shown that ICT do not have the same impact over large, medium-sized or small companies.

A third difference, closer perhaps to methodological issues, lies in the measuring unit used for gathering information. For instance, in some countries data corresponds to the unit “establishment” and in others to the unit “enterprise”. This, as well as being a possible obstacle for international comparability, can lead to a severe distortion in aggregated data. So, although in micro, small and some medium-sized enterprises there

may be no difference between establishment and firm, in larger enterprises the reverse happens.

Returning to the proposals put forward by OECD and Eurostat, measuring ICT in enterprises is a demand side type analysis (ICT usage), contrary to what occurs with the ICT production sector, in which a supply side analysis is made.

On the other hand, a demand side analysis can also be developed from the analysis of back office and front office technologies. The first type of analysis refers to the introduction of ICT as support for the company's activities. The second type studies how these technologies contribute to the interaction between the enterprise and its environment. So, although the analysis of back office technologies allows a greater understanding of ICT impact, its level of international comparability is lower. Conversely, the analysis of front office technologies penetration – such as the use of the Internet – allows the construction of indicators that can be compared between countries and offers a certain estimate of the degree of ICT penetration and usage.



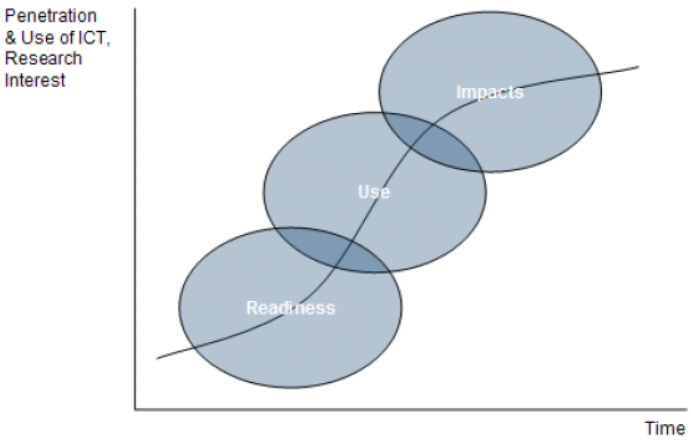
C.2. OECD

In the 90's[8], OECD, aware of the importance of developing statistical indicators that, on the one hand, allow an understanding of the changes surrounding the Information Society and, on the other hand, provide accurate information for the promotion of public policies directed towards economic growth, has started to gather experiences and to produce guidelines on the application of concepts, definitions and methods for analysing the Information Society.

Nowadays, given the complexity and transversality of Information Society, OECD uses a methodology characterised by a progressive and continuous approach to the objects of study, which has first been applied to a supply side type of analysis (ICT sector statistics[9]) and then to a demand side type of analysis (statistics on ICT usage).

Concerning ICT usage by enterprises, in order to define general basic indicators, OECD has devised a model questionnaire, jointly with Eurostat and the Voorburg Group. This questionnaire was approved in 2001 and allows to progress in the analysis of how ICT are being introduced and used by the socio-economic activity (OECD, 2001).

The construction and analysis of the indicators and the questionnaire are included in an analysis model developed by OECD that states that the purposes and need of the research are determined by the market's level of maturity. This analysis model illustrated by the S curve (Figure 1) allows tracing the diffusion of new technologies by reading three sets of indicators: readiness, intensity of use and impacts.



[8] In the beginning of 1997 the Working Group on the Indicators to the Information Society (WPIIS) was created, with the purpose of producing and recommending indicators regarding the Information Society.
[9] The ICT service will be dealt with in a specific chapter.

At the first state the aim is to assess how prepared is the society for participating in the network world, by reading indicators such as the availability of computers, Internet access, ICT skills and benefits and barriers to use.

Later, the objective is focused on analysing the intensity of use – amount, objective of use of computers, the Internet, web sites. At the same time, it is important to analyse the worth of products bought and sold through the Internet or through systems like EDI, as well as the identification of these products and their location on the network.

Finally, nowadays we are progressing in the analysis of the impacts connected to productivity, competitiveness and efficiency. These are perhaps the most complex and sector specific indicators.

From the analysis of these three elements, OECD proposes a basic set of indicators, which should be monitored yearly, and an extended group (Table 1) to be deployed in line with the evolution of the Information Society in each country. It also recommends the application of the questionnaires through national statistical offices to enterprises from specific sectors of economic activity[10], with more than ten workers (though each country can choose to define a larger universe or a lesser number of workers).

Table 1 – core indicators on access and use of ICT by business

Basic core	
	Proportion of businesses using computers
	Proportion of employees using computers
	Proportion of businesses using the Internet
	Proportion of employees using the Internet
	Proportion of businesses with a website (or web presence where the business has control over the content)
	Proportion of businesses with an intranet
	Proportion of businesses receiving orders over the Internet
	Proportion of businesses placing orders over the Internet
Extended core	
	Proportion of businesses accessing the Internet by modes of access • Response categories should allow an aggregation to narrowband and broadband, where broadband will exclude slower speed technologies, such as dial-up modem, ISDN and most 2G mobile phone access, and which will usually result in a speed of at least 256 kbtit/s.
	Proportion of businesses with a Local Area Network (LAN)
	Proportion of businesses with an extranet
	Proportion of businesses using the Internet by type of activity: • Internet e-mail • Getting information o About goods or services o From government organisations/public authorities via websites or

[10] ISIC D, F, 51, 52, H, I , J (non-scope) and K.

	e-mail o Other information searches or research activities • Performing Internet banking or accessing other financial services • Dealing with government organisations/ public authorities • Providing customer services • Delivering products online

Source: OECD (2005), "Measuring the Information Society", conclusions of the WSIS Thematic Meeting, Geneva, 7-9 February

C.3. European Union / Eurostat

With the purpose of developing some measures to encourage the development of the Information Society and to transform this region's economy into one of the most dynamic and competitive of the world, the European Union, in the framework of the action plans eEurope 2002 and 2005 has sought to, in a first stage, identify the statistical information – indicators and sources - available in the member states. In a second stage it has promoted, through Eurostat, the introduction of harmonised surveys concerning ICT usage by enterprises[11].

Like OECD, the EU also focuses its analysis on the demand side approaches - for example, ICT usage in enterprises – and proposes a set of basic indicators that should be monitored yearly (Table 2). It also recommends that the survey should be made up of several modules - ICT usage, Internet access and usage, electronic commerce, ICT expenditure – and be applied to enterprises with more than ten workers and from specific sectors of activity[12].

Table 2 – Benchmarking Indicators eEurope 2005

Enterprises` access to and use of ICTs	
Policy indicators	Percentage of persons employed using computer connected to the Internet, in their normal work routine.
Supplementary statistical indicators	Percentage of enterprises having access to the Internet
	Percentage of enterprises having a website/homepage
	Percentage of enterprises using intranet/extranet
	Percentage of enterprises with persons employed working part of their time away from enterprise premises and accessing the enterprise's IT systems from there.
A Dynamic e-Business Environment - Buying and selling on-line	

[11] Eurostat model for a community survey on ICT usage and e-commerce in enterprises.
[12] NACE D, F, G, H, I, K (partially) and 992.2.

Policy indicators	Percentage of enterprises' total turnover from e-commerce
Supplementary statistical indicators	Percentage of individuals having ordered/bought goods or services for private use over the Internet in the last 3 months.
	Percentage of enterprises having received orders on-line
	Percentage of enterprises having received on-line payments for Internet sales
	Percentage of enterprises having purchased on-line
e-business readiness	
Policy indicators	e-business index
Supplementary statistical indicators	Percentage of enterprises that use Internet
	Percentage of enterprises that have a web site/ home page
	Percentage of enterprises that use at least two security facilities at the time of the survey
	Percentage of total number of persons employed using computer in their normal work routine (at least once a week)
	Percentage of enterprises having broadband connection to the Internet
	Percentage of enterprises with a LAN and using an Intranet or Extranet
	Percentage of enterprises that have purchase products/ services via the Internet, EDI or any other computer mediated network where these are > 1% of total purchases
Supplementary statistical indicators	Percentage of enterprises that have received orders via the Internet, EDI or any other computer mediated network where these are > 1% of total turnover
	Percentage of enterprises whose IT systems for managing orders or purchases are linked automatically with other internal IT systems
	Percentage of enterprises whose IT systems are linked automatically to IT systems of suppliers or customers outside their enterprise group
	Percentage of enterprises with Internet access using the Internet for banking and financial services
	Percentage of enterprises that have sold products to other enterprises via presence on specialised Internet market palces
Secure information infrastructure	
Policy indicators	Percentage of enterprises with Internet access having encountered security problems
Supplementary statistical indicators	Percentage of enterprises having taken ICT precautions within the last three months
	Percentage of enterprises that have installed security devices on their PCs and update them within the last three months

Source: European Union, 2002

C. 4. United Nations / CEPAL

Due to the particular conditions of Latin American counties and to the complex and budgetary issues involved in measuring the Information Society, CEPAL, alongside

other institutions[13] proposes the application of a minimum set of indicators concerning ICT usage in enterprises, which warrants the participation of all countries and international comparability and at the same time allows capturing regional particularities (Olaya et al, 2005).

In this sense, OSILAC (Observatory for the Information Society in Latin America and the Caribbean) has tried to respond to the growing need for harmonisation and international comparability by developing the compilation and centralisation of data and methodologies, seeking to analyse the quantity and quality of the information available on ICT at the same time. The normalisation and harmonisation of business indicators is part of this task.

CEPAL has sought the participation of national statistical offices in this endeavour in order to obtain suitable information that will help understand the behaviour and the dynamics of the ICT implementation and usage process by enterprises.

The set of proposed indicators will be shown next, departing from the existing information and from the need to homogenise this region's data with the available information on UE and OECD member countries.

Table 3 – Indicators of ICT access and usage by enterprises

Basic core set of key indicators	
B-1	Proportion of businesses using computers
B-2	Proportion of employees using computers
B-3	Proportion of businesses using the Internet
B-4	Proportion of employees using the Internet
B-5	Proportion of businesses with a website (or web presence where the business has control over the content)
B-6	Proportion of businesses with an intranet
B-7	Proportion of businesses receiving orders/selling over the Internet
B-8	Proportion of businesses placing orders/buying over the Internet
Extended core set of key indicators	
B-9	Proportion of businesses accessing the Internet by modes of access ▪ Response categories should allow an aggregation to narrowband and broadband, where broadband will exclude slower speed technologies, such as dial-up modem, ISDN and most 2G mobile phone access, and which will usually result in a speed of at least 256 kbtit/s.
B-10	Proportion of businesses with a Local Area Network (LAN)
B-11	Proportion of businesses with an extranet
B-12	Proportion of businesses using the Internet by type of activity: • Internet e-mail • Getting information o About good or services

[13] A working group – Partnership on Measuring ICT for development – that includes ITU, OECD, UNCTAD, UNESCO and CEPAL.

	○ From government organisations/public authorities via websites or e-mail ○ Other information searches or research activities • Performing Internet banking or accessing other financial services • Dealing with government organisations/ public authorities • Providing customer services • Delivering products online

D. Towards a measuring strategy of the enterprises row for Iberoamerica

When we try to open the black box and see what transformations occur inside an enterprise with the arrival of ICT, we soon look at the organisation as a group of administrative, productive and commercial processes. Choosing this approach is quite useful for detecting the kind of contribution ICT will make, since these technologies allow speeding up, making less expensive or strengthen the activities carried out by the organisation.

Definitely, assessing the dissemination of the digital paradigm among enterprises through a point of view confined to the degree of extension of the installed equipment leads to severe distortions in the analysis. In fact, this occurs because we do not take into consideration the dimensions concerning the skills of human resources and of the systems. These aspects are crucial for determining the level of use or appropriation of these technologies and they are extremely important elements to explain the differences in performance between companies, including those that have similar levels of equipment. This does not mean to say that it is irrelevant to measure infrastructure. On the contrary, it serves to show that it is necessary to complement this kind of indicators with other regarding skills.

When a certain level of complexity is reached, if ICT implementation does not proceed towards supporting a new kind of routine, the impact of these technologies on performance tends to become null or even negative.

From the point of view of total costs, these reflect a direct connection between an increase in complexity and investment requirements. At the same time, due to the characteristics of the new technologies, the transition from one level of complexity to the next reveals discontinuities in the cost curve. This is due to the fact that the expenses

in which an enterprise incurs by adopting ICT belong to three different headings: infrastructure costs, training costs and system development costs.

The acknowledgement of these three components allows the formulation of the following proposal: the dynamics of the process under analysis is explained by the prominence of each of these costs in each stage. We use the term prominence because the curves of these costs are S-shaped and the sections with a greater slant are displaced in time and are associated with a different stage of the ICT implementation path.

Therefore, the next step consists of determining which indicators are more relevant for describing and assessing the ICT adoption process inside enterprises. To begin with, it would be necessary to create three groups of indicators able to report the evolution of each of the dimensions (infrastructure, human resources, system development). On the other hand, it would also be important to consider the different types of effort in order to progress in the characterisation of the implementation stage each enterprise is on.

At the moment, the most common indicators only concern the infrastructure. If they are applied to enterprises that have already overcome the first stage, these indicators do not reflect accurately the differences caused by the heterogeneity of abilities, showing resemblances where there are differences. This inconsistency has been demonstrated elsewhere (INDEC, 2003; Peirano and Suarez, 2004).

In conclusion, there are three issues for debate:

1) To assess the relevance and viability of the proposed indicators: infrastructure, human resources, system development and efforts;

2) To define which data should be chosen for constituting the indicators;

3) To develop a suitable methodology.

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Chapter 5: ICT Sector: economic and social indicators

Introduction

According to the matrix, the telecommunications sector is the one that provides basic equipment and services for establishing networks that make possible the connections between different actors and the circulation of information and knowledge. At the same time, the computer industry and high value added services sector supplies the necessary tools for processing, managing and storing information and knowledge.

In this context, and given the existing advancements pertaining the measurement of this particular industry sector, it could be said that is feasible to envisage the quantitative approach to these activities from a selection of sector indicators that are already currently produced and to complement them with a set of indicators suited to this region's characteristics. On the other hand, it also seems necessary to accompany the selection with a reinterpretation of the information emerging from "traditional" indicators, taking into consideration the whole of the processes that are occurring.

A. What is the ICT sector?

The scenario of productive and occupational change in western societies has become an issue persistently studied and debated by the academic, business, political and media fields in the past few decades. The transition from an industrial society – typical of the development course of the western world in the past three centuries – to a service society and the associated processes of productive, occupational and organisational change have constituted the first focus for academic attention, present in Daniel Bell (1973), Jonathan Gershuny and Ian Miles (1983).

The growing weight of the services sector in the product induced also a fundamental transformation in the productive dimension of contemporary societies. That signalled the twilight of the action of energy and technology over matter directed towards the expanded and continuous productions of equipment goods as the dominant production method. The production and distribution of knowledge and information formatted into intangible goods for mass consumption became a fundamental dimension of product

formation and growth in post-war societies. The production and distribution of knowledge and the development of the information economy constituted a study object defined and statistically sustained by Fritz Machlup (1962) and Marc Porat (1977), through data extracted from secondary statistic sources, namely the United States national accounts.

In order to analyse the ICT sector, it should first be made explicit the definition regularly used of Information and Communication Technologies (ICT). According to Katz and Hilbert (2003)[14]

> *"ICT are defined as technical systems that accept, manipulate and process information and facilitate communication between at least two parties. ICT are therefore more than informatics and computers, since they do not operate as isolated systems, but are an integral part of a network. They are also more than broadcasting technologies, since ICT systems not only disseminate information, but also facilitate interactive communication. In the current process of "ICT-convergence" (namely the merger of Information Technologies, Communication Technologies and informatics solutions) three technological paths in a single system, which is often simplistically referred to as "ICT" (or "network of networks"), tend to come together."*

This strategy of isolating a conceptually defined and statistically objectified sector is also the work methodology usually followed by OECD, specially when it is confronted with a new problem that still does not have statistical tools for observation and empirical proofing. The first steps in monitoring the development of the Information Society in the world context and in OECD member states were taken thus. The perception that the emergence and diffusion of the new information technologies among the different sectors of economic activity produces impacts on employment, qualifications, competitiveness and economic development, as well as the perception that these impacts form the structural basis of a new framework of economic relations that configure a new type of society, has lead to the inclusion of this issue in this organisation's agenda.

[14] KATZ, J. and HILBERT, M. (2003): "Los caminos hacia una sociedad de la información en América Latina y el Caribe" Comisión Económica para América Latina y el Caribe (CEPAL), Santiago de Chile, July 2003.

It is in this background that in 1997 an ad hoc working group emerges, focusing on the production of statistical indicators for the Information Society, which, devoided of direct observation instruments for developing this issue, opted for the usual work procedure concerning definitions, methodologies for gathering information and assessing the quality of the sources (official statistics and information produced by private agencies).

It is the midst of these early steps – contemporary of the extraordinary development of the computer components and software industry, the development of on line electronic contents and electronic commerce and business procedures – that the need arises for defining and evaluating the importance of this group of economic activities for product formation and growth.

The first step that made possible the production of indicators for measuring the ICT sector, thereby providing a statistical framework for international comparisons, was taken in 1998, when OECD members agreed on the definition of the ICT sector. This definition is based on the *International Standard Classification of Activities* (ISIC Rev.3) that states that the ICT sector is:

> "*a combination of manufacturing and services industries that capture, transmit and display data and information electronically*"[15].

Its based on this definition, also adopted by Eurostat (2005[16]), that a more detailed classification of the activities comprised in the ICT sector was developed, which will be described in the following sections.

B. Why measure the ICT sector?

The ICT sector stands out not only because it is the ICT production and distribution sector but also because it is their more intensive user (of hardware, software, electronic products and content). Therefore, with the aim of understanding and identifying the traits and features of post-industrial societies, OECD has produced important

[15] OCDE (2002), Measuring the Information Economy, URL, p.81

[16] EUROPEAN COMMISSION (2005): "THE ICT ACTIVITY INDEX", Brussels, 12 May 2005, DG Enterprise and Industry/MAM, AEL D(2005).

advancements in the definition and application of methodologies that allow measuring the weight and impact of the ICT sector.

It should be mentioned that at the same time that the relevant economic activities were being identified and this sector was being defined, it was speculated (and still is) that the pace of convergence towards the Information Society depended of the pace of growth of this specific sector and of the increase of its weight on the whole of the economy. The core contention was the transition from a society that produces and consumes mainly equipment goods (cars, fridges, washing machines) to one that produces and consumes mainly information products, with the correlated importance of this change on the general economic and employment framework.

Bearing this objective in mind, OECD has started to produce information departing from the existing statistical sources, namely structural indicators of enterprises, applying the ICT sector definition and the correlated set of sectors of economic activity associated to a group of variables, with a view to capture this sector's contribution for product formation and its partition regarding the whole of the economic activity.

For the European Union, according to the report above mentioned (European Union, 2005), the importance of this sector in the economy, as well as its potential impact in employment and productivity, renders it necessary to monitor its evolution in terms both of magnitude and direction. At the same time, and similar to the rest of Information Society indicators, the measurement of this sector contributes to assess and monitor the evolution of the initiatives framed by the eEurope action plan.

In the case of Latin American countries, different situations can be encountered but all of them highlight the need for statistical information. In some countries, where a greater development of this sector compared to other industrial activities can be observed, this kind of data would allow monitoring it and the production of encouragement policies. In other countries this sector is still poorly developed – low in complexity – so the availability of reliable information could help in the design and implementation of tools for its expansion. In both situations, information is need, not only to quantify the contribution of the ICT industry but also to assess its level of complexity.

C. How to measure the ICT sector?

C.1. "ICT sector" unit of analysis

As was mentioned before, from the moment that ICT started to be considered as one of the main economic growth-inducing and employment-generation mediums, many countries have shown quite a substantial interest in obtaining internationally comparable data, which would allow understanding the weight and impact of the new technologies.

The first efforts focused on analysing the production and distribution of ICT goods and services, that is to say, a supply side approach which aimed to measure the size and growth of the ICT sector.

However, and despite the countless data compilations carried out by several countries, the inexistence of a generally agreed-upon definition of the sector that could be applied in different countries did not permit the desired comparability.

Still according to OECD, a more complete and detailed definition of the ICT sector, that allowed a greater accuracy in the quantification of this sector, should be based primarily on ICT goods and services and later on the economic activities surrounding these products. However, the need for obtaining an early set of indicators at short notice lead to the fact that the economic activities were defined first and only then the list of goods and services was added, that is to say, a definition of ICT commodity. Nevertheless, it was agreed that the ICT sector definition would be subject to reconsideration after the ICT goods and services classification[17] was finalised and after the ISIC revision in 2007 (ISIC Rev 4).

The list of ICT sector activities was developed based on the following set of principles:

> "*For manufacturing industries, the products of a candidate industry:*
>
> - *Must be intended to fulfil the function of information processing and communication including transmission and display;*

[17] In December 2003 the ICT products classification was approved after endless works were developed and presented, not only by OECD but also by Eurostat and Canada, between 1998 and 2002. The criteria that guided the ICT sector definition are the same that lead to the following definition of ICT products: "ICT goods must either be intended to fulfil the function of information processing and communication by electronic means, including transmission and display, or use electronic processing to detect, measure and/or record physical phenomena, or to control a physical process". ROBERTS, Sheridan (2004), OECD work on measuring the Information Society, OECD, p.3

- *Must use electronic processing to detect, measure and/or record physical phenomena or control a physical process.*

For service industries, the products of a candidate industry:

- *Must be intent to enable the function of information processing and communication by electronic means*.[18]"

Based on this set of principles and on ISIC Rev 3, OECD selects a list of economic activities that belong to the current definition of the ICT sector:

Table 1 - International Standard Classification of Activities (ISIC Rev.3) categories forming the Information and Communication Technologies sector

ICT manufacturing	
3000	Office, accounting and computing machinery;
3130	Insulated wire and cable;
3210	Electronic valves and tubes and other electronic components;
3220	Television and radio transmitters and apparatus for line telephony and line telegraphy;
3230	Television and radio receivers, sound or video recording or reproducing apparatus, and associated goods;
3312	Instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process equipment;
3313	Industrial process equipment.
ICT services	
5150	Wholesaling of machinery, equipment and supplies (if possible only the wholesaling of ICT goods should be included, which are classes: 5151 Wholesale of computers, computer peripheral equipment and software 5152 Wholesale of electronic and telecommunications parts and equipment);
7123	Renting of office machinery and equipment (including computers);
6420	Telecommunications;
72	Computer and related activities.

Source: Schaaper, M. (2003) "A Proposal for a Core List of Indicators for ICT Measurement", *OECD*

Some doubts have arisen about the inclusion of the software production activities in the scope of the ICT sector definition. Category 72 of the ISIC classification (computer and related activities) includes classes 72.10 to 72.60. Software consultancy and supply (of all sorts of customized software production) is integrated in the category 72.20, as stated by its definition:

> *"This class includes activities in connection with analysis, design and programming of systems ready to use. This usually involves the analysis of the users' needs and problems, consultancy on the most economic solution and producing the necessary software to realize this solution. Also included is the*

[18] Schaaper, M. (2003) "A Proposal for a Core List of Indicators for ICT Measurement", *OECD*, p.11

simple writing of programs following directives of the user. Specifically, these activities involve development, production, supply and documentation of order-made software based on orders from specific users and easy-order and ready-made (non-customized) software. Exclusions: Reproduction of non-customized software is classified in class 2230 (Reproduction of recorded media). Similar activities carried out as an integrated part of the reselling of software are classified in class 5239 (Other retail sale in specialized stores). Software consultancy provided in conjunction with hardware consultancy is classified in class 7210." ISIC Rev3
http://unstats.un.org/unsd/cr/registry/regcs.asp?Cl=2&Lg=1&Co=7220

Through the development of concordance tables with other systems of industrial classification, the measurement systems of the ICT sector were adopted by a large number of the OECD countries. This correspondence occurred, for instance, between the *North American Industry Classification System* (NAICS) and the Classification of Economic Activities in the European Community (NACE Rev. 1). As a result of these endeavours, a greater data comparability of this economic sector between countries was achieved.

C.2. OECD

Measuring the ICT sector

As was mentioned before, the ICT sector is defined as the combination of manufacturing and services industries that gather, process and diffuse data and information through electronic means. This definition pinpoints the main concerns of OECD, who has sought, from the beginning, to measure and analyse the production and distribution of ICT products and services, consigning the analysis of the demand and diffusion to a secondary position.

In fact, and resuming the theoretical matrix put forward by OECD, the ICT sector analysis can be done in two ways: through the supply side (production and distribution of ICT products) or through the demand side, that is to say, the demand for and use of

ICT products. However, until then, the measurement of the ICT sector has consisted mainly in supply side analysis, the most common in OECD countries.

The definition agreed upon by OECD member countries and accepted by Eurostat allowed the development of a set of indicators for measuring the ICT sector (Tables 2 and 3), that make possible to identify and to analyse the weight of this sector, its growth and its contribution to the economic activity, not only of a chosen country by also on a supranational level.

OECD has established a set of variables that should be used in order to achieve international comparability: turnover, added value, employment, wages, number of enterprises or establishments, international trade and, to a lesser degree, R&D expenditure.

Since the features already identified in this sector (high rates of technological progress and growth) produce considerable impacts on economic activity, it must be pointed out that the main concern that has been guiding ICT sector measurements is the analysis of these impacts, which can de made in several ways: directly, through its contribution for productivity increase or employment; indirectly, for example as source of technological change that affects other parts of the economy.

Table 2 – ICT sector Indicators

ICT sector basic core	
ICT-1	Proportion of total workforce involved in the ICT sector
ICT-2	Value added in the ICT sector (as a percentage of total value added)
ICT-3	ICT goods imports as percentage of total imports
ICT-4	ICT goods exports as percentage of total exports

Table 3 – ICT sector Indicators

Indicators:	• Contribution of value added in the ICT sector to total business sector value added • Growth of value added in the ICT sector • Contribution of employment in the ICT sector to total business sector employment • Growth of employment in the ICT sector • Contribution of production value in the ICT sector to total business sector production value • Growth of production value in the ICT sector

ICT sector revision

The ICT sector definition, promoted by the *Working Party on the Indicators for the Information Society* and approved by all OECD member countries, has undergone an

extensive process of tests and revisions, performed both by the Secretariat of this working group and by several national delegations that participate in it.

The first revision process occurred in the 2002 meeting. It was agreed that the definition should not be altered but it should take into account the break down of the 5150 category (Wholesale of machinery, equipment and supplies) introduced by the 2002 ISIC revision process (Rev. 3.1). This change required the transformation of the 5150 category included in the ICT sector definition, with a view to include two new classes: 5151 - Wholesale of computers, computer peripheral equipment and software; and 5152 - Wholesale of electronic and telecommunications parts and equipment (see OECD, DSTI, ICCP, IIS, 2005: 24).

In 1998 it was also agreed that the definition of the ICT sector would be reconsidered from the contributions brought by the conclusion of the work on ICT goods classification. The ICT goods classification reached an agreement in 2003 and the ICT services classification was subjected to an initial agreement by WPIIS, the inclusion of which in the United Nations Central Classification of Products should occur in the 2007 revision.

The ISIC general revision, set for 2007, which will give rise to the ISIC Rev 4, should give a greater boost for the revision of this definition. The public consultation of the revision proposal includes important changes in *ICT manufacture, repair and maintenance activities* and also in *Database creation and maintenance and online distribution of electronic content activities*. Some of these modifications provide significant opportunities, such as the proposal of isolated categories for manufacture of electronic equipment, repair of computer equipment and retail trade of ICT goods.

The WPIIS Secretariat has examined the revision proposal and, in agreement with concerned member States, has submitted to the United Nations Technical Subgroup the following proposal regarding relevant groups in the ICT domain:

- that class 6323 (*Renting of office machinery and equipment (including computers))* be split into two classes – *Renting of computers and peripheral equipment* and *Renting of other office machinery and equipment* consistent with the treatment of computer and peripheral equipment manufacturing, and computer and peripheral equipment repair and maintenance.
- creation of separate ICT classes section 445 *Retail sale of high-tech equipment and related goods in specialized stores*. This change would allow including retailing of ICT products in the sector, in which case, based on the OECD ICT

goods classification, all the proposed 445 classes except for 4454 Retail sale of music and video recordings should be retained.

This submission by WPIIS also suggested:

- the revision of proposed telecommunication categories;
- in relation to ISPs, their move from Telecommunications to Information Technology could lead to time series complications.

In respect of splitting classes, the submission requested that:

- Split 2650 *Manufacture of measuring, testing, navigating, and control equipment* to exclude watches, clocks and other timing devices.
- Split category 2730 *Manufacture of wiring devices* as it includes a mix of ICT goods, such as coaxial cable and optical fibre cables, and non-ICT goods.
- Split category 3313 *Repair and maintenance of electronic and optical equipment* to exclude optical equipment. The electronic equipment component of this class is largely within the ICT sector, while optical equipment is excluded.

One last development of the ICT sector definition revision process and associated classifications (activities, products and services) includes the identification of ICT goods produced by enterprises and institutions that are not included in the activities grouped around the sector and the ICT patenting activity.

C.3. European Union / Eurostat

In order to measure the ICT industry in the European Union, Eurostat has adopted the same classification that OECD has proposed in 1998 and the following revisions, therefore opting for a supply side approach. As a result, the measurement of this sector is based in the quantification regarding the rest of industrial activities and its impact in different macroeconomic indicators.

At the same time, “as the sector is broad and diffuse it contains several different economic indicators, which can provide conflicting signals about the magnitude and direction of activity”, it was considered necessary to specify a particular set of

indicators (European Union, 2005[19]) and simultaneously to monitor, in a conventional way, the variables associated with performance and innovation in this sector.

This set of indicators, entitled "ICT activity index", comprises of four variables: exports, production, turnover and hours worked. The two first variables allow measuring changes in the demand for ICT goods and the two last ones regard changes in supply. These variables are weighed together in a composite index, which analysed jointly with the evolution and participation of each variable provides a picture of sector, allowing to analyse which variables are leading and which are lagging behind.

C.4 CEPAL

With the specific purpose of measuring the development of the ICT sector, Latin American and Caribbean countries use fundamentally the same set of recommendations, classifications, variables and indicators stated at the report produced by the Partnership on Measuring Information and Communication Technologies for Development, a working group formed by institutions such as ITU, OECD, UNCTAD, UNESCO and CEPAL.

The main purpose lies in taking advantage of the work already developed by OECD regarding the sector definition (see page…) and, by using it, assessing the weight of the ICT sector in terms of turnover, added value, and employment in Latin American and Caribbean economies. We are dealing with, fundamentally, setting aside statistical information regarding these variables from the whole of economic activities included in the ICT sector. In order to carry out this task successfully, it is crucial to possess databases originating from enterprises surveys and administrative data collection, with sufficient detail in terms of ISIC 3.1 sections and subsections.

The fundamental indicators that have been identified are based on the assessment of the contribution of the ICT sector in terms of value added, employment and turnover regarding the whole business sector in the context of Latin American economies. One other group of indicators concerns the estimation of the annual growth rate of added value, employment and turnover in the enterprises of the ICT sector.

[19] EUROPEAN COMMISSION (2005): " THE ICT ACTIVITY INDEX", Brussels, 12 May 2005, DG Enterprise and Industry/MAM, AEL D(2005).

One other objective, if at all possible in view of the available statistical information, is the determination of the values for each of the above mentioned variables according to its break down by manufacture and services categories integrated in the ICT sector, by the general manufacture and services categories of the economic activities classification and by business activity on the whole of the economy.

This set of indicators will allow the development of monitoring and systematic comparison tools to assess the development of the ICT sector in Latin American and Caribbean countries, as well as extended international benchmarking activities.

Table 4

ICT supply and use indicators: the information and communication technology sector	
Variables	• Production value • Value added • Employment
Indicators	• Contribution of value added in the ICT sector to total business sector value added • Growth of value added in the ICT sector • Contribution of employment in the ICT sector to total business sector employment • Growth of employment in the ICT sector • Contribution of production value in the ICT sector to total business sector production value • Growth of production value in the ICT sector
Classification	ISIC, Rev. 3; if possible data broken down by: – ICT manufacturing – ICT services – Total manufacturing – Total services – Total business sector
Sources	• Business survey data (detailed enough to allow for measurement of the ICT sector, see annex for details) • Administrative sources • Private sources (not recommended)

D. Towards a measuring strategy of the ICT sector in Iberoamerica

Throughout the last paragraphs it is possible to observe that there is a significant level of progress in the standardization of the classification of the different actors that make up the ICT sector. This leads to a fairly homogenous definition and a minimum set of indicators than can be internationally compared, whose construction does not require too much effort in terms of resources and skills.

Nevertheless, it seems that not enough space was allocated to the production of software. According to Lopez et al (2001[20]), "the Software and Computer Services Sector is far from having reached a stage of technological maturity, since its markets are still in a process of permanent redefinition that constantly opens new business opportunities. In other words, in certain areas the entry barriers are still considerably low". Therefore, since it is an activity that is relatively little capital-intensive but highly skilled labour-intensive, that can be easily relocated and that offers wide sub-contracting opportunities, there is possibility that developing countries can participate in these markets. However, and also according to Lopez et al (2003[21]), "this chance can not happen spontaneously, but requires public and private initiatives specifically orientated towards this goal".

Therefore, measuring this type of product becomes strategic, since it is a basic input both for the design, implementation and assessment of public policies and for decision making in the private sphere. On the other hand, measuring this activity would also contribute to the analysis of the complexity and the measure in which own technological developments are generated. As such, we should proceed towards a classification of this type of production in a manner as detailed as possible, in order to assure both international comparability and a useful tool for Iberoamerican countries.

This requires that the measuring strategy for Iberioamerica departs from existing definitions and classifications but also progress towards the constitution of a minimum set of indicators which will allow measuring the ICT sector not only in terms of economic impact but also with regard to its complexity, the distinction between hardware and software and the level of connection between technology supply and demand. So, this type of information should report on the quantity and quality of labour implicated in the production and provision of high added value services, the kind of hardware/software produced and the extent in which the sector meets a demand that is able to stimulate an advancement in complexity or, in other terms, the obstacles it faces and the actual development possibilities.

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[20] Chudnosky D, López, A. y Melitsko, S. (2001): " El sector de software y servicios informáticos (SSI) en la Argentina: situación actual y perspectivas de desarrollo" Centro de Investigaciones para la transformación, Documento de Trabajo Nº 27, Julio de 2001

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Definitely, we believe it necessary to warn that the ICT sector classification proposals in their current version seem to have a manufacturing and commercial services leaning that is insufficient for encompassing the activities connected to software production, which is a specialised and high value added service, in an adequate manner.

This type of activity is predominant in the Iberoamerican area, specially in Latin America and Caribbean countries, whereas the production of software that can be sold as a closed and standardised package plays a very marginal role, quite similar to the manufacture of equipments and parts – hardware.

Therefore, we think its is vital to recommend that the proposed classifications should be complemented by including additional headings or categories in order to produce indicators that cover the issues mentioned above. It is clear though that this should not compromise in any way the compatibility work between the regional statistical system and international practices.

Therefore, there are three issues for debate:

1) To assess the relevance and viability of the existing classification as well as the absent indicators and classifications;

2) To define which data should be chosen for constituting the indicators;

3) To develop a suitable methodology.

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