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**A proposal for a core list of indicators for ICT measurement**

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**Introduction**

1. Despite the bursting of the dotcom bubble and the recent slowdown of the global economy, information and communication technologies (ICTs) have unmistakably been one of the main drivers of economic growth in the last decade, and will remain of crucial importance in the future. The expansion of ICT is not confined to a few developed countries, but is of global interest. A key issue for developing countries is that of the digital divide, the gap between those who can effectively use new information and communication tools, and those who cannot. Most developing countries are lagging in the diffusion of ICT technologies, which might imply that these countries will have greater problems in catching up with the developed countries.

2. Governments of virtually all countries in the world are trying to design effective policies to facilitate the use of ICTs in order to stimulate economic development. Statistics underpin policies, and good statistics on ICT are important to meet the information needs of the policymakers and to examine the issue of the digital divide. In addition, statistics allow for international comparisons, giving countries, developed and developing alike, the opportunity for international benchmarking.

3. Countries that are starting ICT measurement now, are where many of the OECD countries were in the middle of the 1990s. Faced with a demand from their policymakers for information on the state and development of ICT in their country, national statistical offices (NSOs) or responsible ministries want to develop indicators to measure the information society, benchmarking themselves with other countries. Because the OECD countries have gone through this phase already, countries that are setting up an indicator system now have the advantage of being able to profit from the experience of countries that have done so already.

4. This paper sets out to assist countries in devising a collection strategy for ICT statistics, and help them set priorities, by suggesting core indicators, based on the OECD learning experience. Before presenting these, first an overview is given of work undertaken by the OECD, mainly through the Working Party on Indicators for the Information Society (WPIIS), and its member countries. The core indicators that follow are largely drawn from this overview.

*OECD work on ICT indicators*

5. A prerequisite to international comparison of indicators is that the underlying statistics adhere to certain methodological standards. In the field of ICT indicators, the OECD countries have been discussing standards since 1997, mainly through the WPIIS, in which period much progress has been made. Nevertheless, the area of ICT measurement is very dynamic and is developing rapidly, and there are plenty of areas where standards are being developed, or even need to be started from scratch.

6. The following, non-exhaustive, list gives a broad panorama of work undertaken or in development.

- ?? Supply, demand and trade in ICT products
- ?? Information on enterprises active in industries belonging to the ICT sector
- ?? ICT prices and deflators
- ?? Skills, occupations and qualifications in the information society
- ?? Infrastructure for the information society
- ?? Household readiness and use of ICT
- ?? Business readiness and use of ICT
- ?? Government readiness and use of ICT
- ?? ICT related patents
- ?? ICT in education
- ?? ICT and health
- ?? ICT content products
- ?? ICT content industries

7. The WPIIS has produced many methodological documents over the years. A compilation of this material has been pulled together in the so-called “*Framework document for information society measurements and analysis*”. Currently, this document is still in preliminary draft form, a more complete draft is expected by mid 2004, and will be a topic of discussion of the 2004 WPIIS meeting. Once finalised, it will be diffused widely (possibly in 2005), and can serve as a reference for anybody interested in collecting ICT statistics.

8. Much of the information is already available and can be found in the publication “*Measuring the Information Economy 2002*”. This publication brings together over 80 indicators based on official statistics, providing a comprehensive international comparison of the performance of the OECD countries in the information economy. The essential findings are presented in bullet points, while explanations of the applied methodology are given in boxes. The publication is freely accessible online and can be downloaded from [www.oecd.org/sti/measuring-infoeconomy](http://www.oecd.org/sti/measuring-infoeconomy). Updated versions of a selection of these indicators, as well as some new

indicators will be published soon in the 2003 edition of the “*OECD Science, Technology and Industry Scoreboard*”.

### *Building the list*

9. In building an indicator list, the experience of OECD countries in collecting official ICT statistics is used to propose a small list of core ICT indicators to the non-OECD world. The target audience is basically all non-OECD countries, which raises the problem that not all countries are in the same phase of development. Some countries are lacking the basic infrastructure for effective ICT use, and the statistical system in these countries is maybe underdeveloped too, making the collection of reliable, official statistics a difficult task. For example, it is difficult to survey the business sector without a proper business register to draw a representative sample from. On the other hand, there are also non-OECD countries that are very advanced, collecting statistics that few OECD countries can match. It is therefore not possible to propose a list of indicators, without taking the level of development into account.

10. The approach followed here is to first look at a set of basic indicators that paint a picture of a country’s ICT readiness. These data are usually collected already at the national level and available in existing international databases. Analysing these data will work as a filter. The next step is to measure the intensity of ICT use. Based on OECD data collection experience, a list of indicators is suggested that describe the supply and use side of ICT. For the more advanced countries, a list of supplementary indicators has been established, that offers richer detail and broader coverage than the core list.

11. Finally, there is in general much interest in the impacts of ICT. These are diverse and (in the case of businesses) relate to productivity, profitability, competitiveness, efficiencies and the creation of wealth. They are best examined analytically, as opposed to direct measurement, and therefore no specific impact indicators are proposed.

### *Sources*

12. The ultimate goal of establishing an indicator list being data collection, it is essential to say something about data sources. In view of the diversity of indicators, there is no unique source that collects them all. On the contrary, there is a wide variety of sources that contain, in one way or another, information about ICT.

13. A non-exhaustive list of sources that can contain information on ICT is as follows:

- ?? Telecom surveys
- ?? Price and/or PPP surveys
- ?? Trade databases
- ?? General business surveys of various types
- ?? General population surveys of various types
- ?? Special ICT surveys (of households and/or businesses)
- ?? Patent databases

?? Administrative records

14. When proposing indicators, they will be linked to the sources that are most likely to collect the concerned information. To enhance international comparability, it is recommended that the data are collected by official sources, meaning the country's national statistical office, or where this is not possible the responsible government agencies. This is usually done by sample surveys or censuses, although administrative records can sometimes provide useful information too. However, as was remarked before, not all countries are at the same level of development, which holds true as well for the statistical systems. Therefore, countries at a lower level of development will not always be able to conduct sample surveys, let alone complete censuses, or possess adequate administrative records. Initially, an alternative could be to rely on other sources, such as data from market research companies, preferably from those providing internationally comparable data.

**The core list of ICT indicators**

*Readiness indicators*

15. Before trying to measure a range of ICT indicators, it makes sense to investigate first whether a country has the necessary endowments to use the new technologies. This is done by looking at the state of the infrastructure, imports and exports of ICT goods<sup>1</sup> and educational attainment of the population. These indicators should shed light on if a country has the necessary physical networks, on the level of connectivity, whether the country is a net importer or net exporter of ICT goods and if the people have sufficient education to use the new technologies.

**Infrastructure**

Indicators:	<p><i>Indicators available in the ITU database (available for many countries)</i></p> <ul style="list-style-type: none"> <li>?? Main fixed telephone lines per 100 inhabitants</li> <li>?? Total telephone subscribers per 100 inhabitants</li> <li>?? Cellular phone subscribers per 100 inhabitants</li> <li>?? Number of personal computers per 100 inhabitants</li> <li>?? Number of Internet users per 100 inhabitants</li> <li>?? Residential monthly telephone subscription cost</li> <li>?? Cellular monthly subscription cost</li> <li>?? Business telephone monthly subscription cost</li> </ul> <p><i>Indicator available through the Internet Software Consortium (ISC) (available for many countries)</i></p> <ul style="list-style-type: none"> <li>?? Number of Internet hosts</li> </ul> <p><i>Other indicators (to be collected from national sources or private sources)</i></p> <ul style="list-style-type: none"> <li>?? Internet subscribers per 100 inhabitants</li> <li>?? Web sites per 1 000 inhabitants</li> <li>?? Internet access costs</li> </ul>
Sources:	<ul style="list-style-type: none"> <li>?? National telecommunication authorities (data collected by ITU)</li> <li>?? ISP surveys</li> </ul>

1. Technically, exports of ICT goods are not a readiness indicator, but for ease and clarity they are kept together with imports.

	?? surveys of telecom carriers ?? private sources (e.g. netsizer, netcraft)
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### Trade

Variables:	?? Value of imports and exports of ICT goods ?? Value of total imports and exports
Indicators:	?? ICT sector trade balance (defined by the OECD as ICT exports minus ICT imports divided by total manufacturing trade (the average of exports and imports)) ?? Growth rate of ICT imports ?? Growth rate of ICT exports ?? ICT imports as a % of total imports ?? ICT exports as a % of total exports
Classification:	Harmonised System (HS) rev. 1 (for list of ICT goods, see annex)
Sources:	Trade databases, such as the UN's COMTRADE database

### Qualifications

Indicators:	?? Proportion of population with completed secondary education ?? Proportion of population with completed tertiary education ?? Enrolment ratios in primary, secondary and tertiary education ?? Proportion of enrolments in higher education in an ICT field of study (as a % of total number of enrolments and as a % of the corresponding age group) ?? Proportion of graduates in higher education in an ICT field of study (as a % of total number of graduates and as a % of the corresponding age group)
Classification:	ISCED 97; ICT field of study is ISCED field 48: Computing
Sources:	?? UNESCO ?? National education statistics

### *ICT supply and use indicators*

16. Once the basic conditions for using ICT are fulfilled, the intensity of ICT use can be gauged. This is done by looking at supply side indicators that assess the contribution the ICT producing sector makes to the economy, by measuring the use of ICT by households, individuals and businesses and by looking at ICT related patents. A small set of core indicators is suggested, that can hopefully be collected by an increasing set of countries. For countries that are further advanced, more indicators are proposed in a supplementary list.

### The ICT 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

	<p>business sector employment</p> <p>?? Growth of employment in the ICT sector</p> <p>?? Contribution of production value in the ICT sector to total business sector production value</p> <p>?? Growth of production value in the ICT sector</p>
Classification:	<p>ISIC Rev. 3 (see annex for list of activities); if possible data broken down by:</p> <p>?? ICT manufacturing</p> <p>?? ICT services</p> <p>?? Total manufacturing</p> <p>?? Total services</p> <p>?? Total business sector</p>
Sources:	<p>?? Business survey data (detailed enough to allow for measurement of the ICT sector, see annex for details)</p> <p>?? Administrative sources</p> <p>?? Private sources (not recommended)</p>

## Households' and individuals' readiness and use of ICT

Indicators:	<ul style="list-style-type: none"> <li>?? Proportion of households with access to a home computer (% of total)</li> <li>?? Proportion of households with access to the Internet (% of total)</li> <li>?? Proportion of individuals (aged 16+) accessing the Internet from the following locations: <ul style="list-style-type: none"> <li>- home</li> <li>- work</li> <li>- place of education</li> <li>- Internet café or similar</li> <li>- other</li> </ul> </li> <li>?? Proportion of individuals (aged 16+) using the Internet for the following activities: <ul style="list-style-type: none"> <li>- using e-mail/chat rooms</li> <li>- finding information about goods and services</li> <li>- getting information from/interacting with government</li> <li>- finding health related information</li> <li>- reading/downloading online newspapers/news magazines</li> <li>- playing/downloading games, music, software</li> <li>- using banking or other financial services</li> <li>- purchasing/ordering goods or services</li> <li>- education activities</li> <li>- other</li> </ul> </li> </ul>
Classification:	<ul style="list-style-type: none"> <li>?? Households broken down by composition of the household (couple, couple with children, one-parent family, other family, lone person, other non-family)</li> <li>?? Individuals broken down by gender</li> <li>?? Individuals broken down by age-group (16-24, 25-44, 45-64, 65-74)</li> <li>?? Individuals broken down by highest education received (primary, secondary, post-secondary (not tertiary), tertiary)</li> </ul>
Sources:	<ul style="list-style-type: none"> <li>?? General population surveys</li> <li>?? Specific ICT surveys</li> <li>?? Private sources</li> </ul>

## Businesses' readiness and use of ICT

Indicators:	<ul style="list-style-type: none"> <li>?? Proportion of businesses with PCs (% of total)</li> <li>?? Proportion of employees using PCs (% of total)</li> <li>?? Proportion of businesses with Internet access (% of total)</li> <li>?? Proportion of businesses accessing the Internet by the following modes of access: <ul style="list-style-type: none"> <li>- analogue modem</li> <li>- ISDN</li> <li>- DSL</li> <li>- mobile phone</li> <li>- WiFi</li> <li>- other</li> </ul> </li> <li>?? Proportion of employees using the Internet (% of total)</li> <li>?? Proportion of businesses with a website (% of total)</li> <li>?? Proportion of businesses receiving orders over the Internet</li> </ul>
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	(% of total) ?? Value of orders received over the Internet (% of annual revenue) ?? Proportion of businesses placing orders over the Internet (% of total)
Classification:	?? Enterprises broken down by activity/industry (at the 2-digit level of ISIC Rev. 3) ?? Enterprises broken down by size-class (size-classes: 0, 1-9, 10-49, 50-249, 250+ employees)
Sources:	?? General business surveys ?? Special ICT use and/or e-commerce surveys ?? Private sources

### Patents

Variables:	?? Number of ICT patents ?? Total number of patents
Indicators:	?? ICT patents as a % of total patents ?? ICT patents as a % of world total of ICT patents ?? Growth of ICT patents
Classification:	International Patent Classification (IPC) (see annex for list of codes referring to ICT patents)
Sources:	EPO, USPTO, JPO, other (national) patent offices using the IPC

## The supplementary list

17. For some countries, the core list will not be enough to satisfy the needs of the policymakers, which is why a supplementary list is created, which offers more indicators, with a broader scope or a more in-depth coverage than the core list. In particular, more indicators and breakdowns are offered on the households', individuals' and businesses' use of ICT, and additional indicators on the availability and use of ICT in schools.

### Households' and individuals' readiness and use of ICT

Indicators:	<p><i>Extra indicators</i></p> <ul style="list-style-type: none"> <li>?? Proportion of households not having access to the Internet for the following reasons: <ul style="list-style-type: none"> <li>- costs too high</li> <li>- lack of skills</li> <li>- lack of interest</li> <li>- language barrier</li> <li>- other</li> </ul> </li> <li>?? Proportion of households accessing the Internet by the following modes of access: <ul style="list-style-type: none"> <li>- analogue modem</li> <li>- ISDN</li> <li>- DSL</li> <li>- cable</li> <li>- mobile phone</li> <li>- WiFi</li> <li>- other</li> </ul> </li> <li>?? Proportion of individuals (aged 16+) that accessed the Internet with the following frequencies: <ul style="list-style-type: none"> <li>- at least once a day</li> <li>- at least once a week, but not every day</li> <li>- at least once a month, but not every week</li> <li>- less than once a month</li> <li>- don't know</li> </ul> </li> <li>?? Proportion of individuals (aged 16+) that used the Internet for the following purposes: <ul style="list-style-type: none"> <li>- paid work or business</li> <li>- education or study</li> <li>- voluntary or community work</li> <li>- personal or private</li> <li>- other</li> </ul> </li> <li>?? Value of purchases over the Internet by individuals (aged 16+)</li> </ul>
Classification:	<p><i>Extra breakdowns</i></p> <ul style="list-style-type: none"> <li>?? Households broken down by income level</li> <li>?? Individuals' occupations</li> </ul>
Sources:	Same as core list
Note:	See also the core list for core indicators (to be collected as well for the extra breakdowns) and core breakdowns (to be applied as well to the extra indicators)

## Businesses' readiness and use of ICT

Indicators:	<p>?? Proportion of businesses not using ICT (computers) for the following reasons:</p> <ul style="list-style-type: none"> <li>- ICT expenditure too high</li> <li>- level of ICT skills too low among the employed personnel</li> <li>- difficult to recruit qualified ICT personnel</li> <li>- existing personnel reluctant to use ICT</li> <li>- lack of perceived benefits</li> <li>- other</li> </ul> <p>?? Proportion of businesses not having access to the Internet for the following reasons:</p> <ul style="list-style-type: none"> <li>- costs too high</li> <li>- data communications too slow or unstable</li> <li>- lack of qualified personnel/know-how</li> <li>- lack of perceived benefits</li> <li>- lack of security (viruses, hackers)</li> <li>- other</li> </ul> <p>?? Proportion of businesses using the Internet for the following activities:</p> <ul style="list-style-type: none"> <li>- information search</li> <li>- monitoring the market (e.g. prices)</li> <li>- communication with public authorities</li> <li>- recruitment and search of personnel</li> <li>- activities related to purchasing goods and services</li> <li>- other</li> </ul> <p>?? Value of orders placed over the Internet (% of annual expenditure)</p>
Classification:	<p><i>Same as core list:</i></p> <p>?? Enterprises broken down by activity/industry (at the 2-digit level of ISIC Rev. 3)</p> <p>?? Enterprises broken down by size-class (size-classes: 0, 1-9, 10-49, 50-249, 250+ employees)</p>
Sources:	Same as core list

## Use of ICT in schools

Indicators:	<p>?? Proportion of 15-year old students using a computer at home/school/library at least a few times a week</p> <p>?? Proportion of 15-year old students using a computer for Internet, e-mail, chatroom, schoolwork, programming at least a few times a week</p>
Sources:	<p>?? OECD programme for international student assessment (PISA)</p> <p>?? National sources for countries not in PISA program</p>
Note	Indicators from the PISA programme are available for a number of non-OECD countries; results can be extracted from the PISA database, available at the OECD website.

## **Next steps**

18. This document was written from an OECD perspective, aiming to assist (developing) countries in devising a strategy for ICT indicator measurement. The experience of OECD countries in collecting these indicators was taken into account, when establishing the core and supplementary indicator lists. Of course, it is likely that the proposed list of indicators overlooks indicators that are crucial to policymakers in the non-OECD countries, or, the other way around, that indicators are proposed that are not relevant, or impossible to collect. For example, should a question be added about the use of the Internet versus the use of proprietary networks, or is that not relevant (anymore) for developing countries? Therefore, comments on this document are most welcomed, and can be e-mailed to the author at [martin.schaaper@oecd.org](mailto:martin.schaaper@oecd.org).

19. Broad agreement on a set of core and supplementary indicators could guide countries in prioritising ICT data collection. If a large group of countries would contribute to the development of these lists, this should eventually help international comparability. International organisations will be interested in storing data from a wide selection of countries in international databases. A concerted effort of these organisations would be ideal, but if and how this will be organised is open for discussion. Available resources will be an important constraint for many. This meeting could serve as a starting point for discussion.

## ANNEX: CLASSIFICATIONS

### *The OECD definition of the ICT sector*

20. In 1998 the OECD countries reached agreement on an industry-based definition of the ICT sector based on Revision 3 of the International Standard Industrial Classification (ISIC Rev. 3). The principles underlying the definition are the following:

21. 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;
- or*
- ?? Must use electronic processing to detect, measure and/or record physical phenomena or control a physical process.
22. For *services* industries, the products of a candidate industry:
- ?? Must be intended to enable the function of information processing and communication by electronic means.
23. The classes included in the definition are as follows:

<b>ICT manufacturing</b>	
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.
<b>ICT services</b>	
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.

*ICT goods*

24. The OECD countries have not yet agreed on a list of ICT manufactured goods. Therefore, for the moment, the OECD definition of the ICT manufacturing sector based on ISIC Rev. 3 has been used as the basis for the ICT commodities list (as used for example for the trade indicators). The following table shows the conversion of ICT manufacturing codes from ISIC Rev. 3 to the Harmonised System (HS Rev. 1).

**ISIC Rev. 3 ICT sector definition conversion regime to HS Rev. 1**

<b>ISIC Rev. 3</b>	<b>HS Rev. 1</b>	<i>less</i>	<b>DESCRIPTION</b>
<b>3000</b>			<b>Office, accounting and computing machinery</b>
	844312		Offset printing machinery : Sheet fed, office type (sheet size not exceeding 22 x 36 cm)
	8469		Typewriters and word-processing machines.
	8470		Calculating machines; accounting machines, cash registers, postage-franking machines, ticket-issuing machines and similar machines, incorporating a calculating device.
	8471		Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included.
	8472		Other office machines (for example, hectograph or stencil duplicating machines, addressing machines, automatic banknote dispensers, coin-sorting machines, coin-counting or wrapping machines, pencil-sharpening machines, perforating or stapling machines).
	8473		Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with machines of headings Nos. 84.69 to 84.72.
	9009		Photo-copying apparatus incorporating an optical system or of the contact type and thermo-copying apparatus.
<b>3130</b>			<b>Insulated wire and cable</b>
	8544		Insulated (including enamelled or anodised) wire, cable (including co-axial cable) and other insulated electric conductors, whether or not fitted with connectors; optical fibre cables, made up of individually sheathed fibres, whether or not assembled with
	-	854430	<i>Ignition wiring sets and other wiring sets of a kind used in vehicles, aircraft or ships</i>
	8532		Electrical capacitors, fixed, variable or adjustable (pre-set).
	8533		Electrical resistors (including rheostats and potentiometers), other than heating resistors.
	8534		Printed circuits.
	8540		Thermionic, cold cathode or photo-cathode valves and tubes (for example, vacuum or vapour or gas filled valves and tubes, mercury arc rectifying valves and tubes, cathode-ray tubes, television camera tubes).
	8541		Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices, including photovoltaic

		cells whether or not assembled in modules or made up into panels; light emitting diodes; mounted piezo-electric crystals.
<b>3210</b>		<b>Electronic valves and tubes and other electronic components (continued)</b>
8542		Electronic integrated circuits and microassemblies.
<b>3220</b>		<b>TV and radio transmitters and apparatus for line telephony and telegraphy</b>
8517		Electrical apparatus for line telephony or line telegraphy, including such apparatus for carrier-current line systems.
8525		Transmission apparatus for radio-telephony, radio-telegraphy, radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; television cameras.

<b>3230</b>		<b>TV and radio receivers, sound or video recording or reproducing apparatus etc.</b>
8518		Microphones and stands therefor; loud-speakers, whether or not mounted in their enclosures; headphones, earphones and combined microphone/speaker sets; audio-frequency electric amplifiers; electric sound amplifier sets.
8519		Turntables (record-decks) record-players, cassette-players and other sound reproducing apparatus, not incorporating a sound recording device.
8520		Magnetic tape recorders and other sound recording apparatus, whether or not incorporating a sound reproducing device.
8521		Video recording or reproducing apparatus.
8522		Parts and accessories of apparatus of headings Nos. 85.19 to 85.21.
8527		Reception apparatus for radio-telephony, radio-telegraphy or radio-broadcasting, whether or not combined, in the same housing, with sound recording or reproducing apparatus or a clock.
8528		Television receivers (including video monitors and video projectors), whether or not combined, in the same housing, with radio-broadcast receivers or sound or video recording or reproducing apparatus.
8529		Parts suitable for use solely or principally with the apparatus of headings Nos. 85.25 to 85.28.
<b>3312</b>		<b>Instruments and appliances for measuring, checking, testing, navigating etc.</b>
+		
<b>3313</b>		<b>Industrial process control equipment</b>
8526		Radar apparatus, radio navigational aid apparatus and radio remote control apparatus.
9012		Microscopes other than optical microscopes; diffraction apparatus.
9014		Direction finding compasses; other navigational instruments and appliances.
9015		Surveying (including photogrammetrical surveying), hydrographic, oceanographic, hydrological, meteorological or geophysical instruments and appliances, excluding compasses; rangefinders.
9016		Balances of a sensitivity of 5 cg or better, with or without weights.
9017		Drawing, marking-out or mathematical calculating instruments (for example, drafting machines, pantographs, protractors, drawing sets, slide rules, disc calculators); instruments for measuring length, for use in the hand (for example, measuring rods and tapes, micrometers, callipers), not specified or included elsewhere in this chapter.
9024		Machines and appliances for testing the hardness, strength, compressibility, elasticity or other mechanical properties of materials (for example, metals, wood, textiles, paper, plastics).
9025		Hydrometers and similar floating instruments, thermometers, pyrometers, barometers, hygrometers and psychrometers, recording or not, and any combination of these instruments.

9026	Instruments and apparatus for measuring or checking the flow, level, pressure or other variables of liquids or gases (for example, flow meters, level gauges, manometers, heat meters), excluding instruments and apparatus of heading No. 90.14, 90.15, 90.28
9027	Instruments and apparatus for physical or chemical analysis (for example, polarimeters, refractometers, spectrometers, gas or smoke analysis apparatus); instruments and apparatus for measuring or checking viscosity, porosity, expansion, surface tension or
9028	Gas, liquid or electricity supply or production meters, including calibrating meters therefor.
9029	Revolution counters, production counters, taximeters, mileometers, pedometers and the like; speed indicators and tachometers, other than those of heading No. 90.15; stroboscopes.
9030	Oscilloscopes, spectrum analysers and other instruments and apparatus for measuring or checking electrical quantities, excluding meters of heading No 9028; instruments and apparatus for measuring or detecting alpha, beta, gamma, X-ray, cosmic or other ionizing radiations.
9031	Measuring or checking instruments, appliances and machines, not specified or included elsewhere in this Chapter; profile projectors.
9032	Automatic regulating or controlling instruments and apparatus.
9033	Parts and accessories (not specified or included elsewhere in this Chapter) for machines, appliances, instruments or apparatus of Chapter 90.

### *ICT services*

25. No agreement has been reached yet and therefore no recommendations are made. However, work in progress is described below.

26. Consistent with the work on ICT manufactured goods, the guiding principle for services industries is that:

?? “the products of a candidate industry must be intended to enable the function of information processing and communication by electronic means.”

27. This can be also used to determine the scope of the list of ICT services. Although the list of services should not, in theory, be restricted to those primarily produced by ICT industries, it appears in this case that the bulk of ICT services do originate from these industries.

28. At a broad level of aggregation, then, a possible classification of ICT services would include:

?? Telecommunication and program distribution services.

?? On-line access services.

?? ICT professional expertise.

?? Hosting and information technology infrastructure provisioning services.

- ?? IT infrastructure and network management services.
- ?? IT technical support services.
- ?? Information and document transformation services.
- ?? Software.
- ?? Other ICT services.

*ICT patents*

29. The following codes from the International Patent Classification (IPC) are the ones used by OECD as referring to ICT patents.

**IPC codes describing ICT patents**

Telecommunications	G01S, G08C, G09C, H01P, H01Q, H01S3/(025, 043, 063, 067, 085, 0933, 0941, 103, 133, 18, 19, 25), H1S5, H03B, H03C, H03D, H03H, H03M, H04B, H04J, H04K, H04L, H04M, H04Q
Consumer electronics	G11B, H03F, H03G, H03J, H04H, H04N, H04R, H04S
Computers, office machinery	B07C, B41J, B41K, G02F, G03G, G05F, G06, G07, G09G, G10L, G11C, H03K, H03L
Other ICT	G01B, G01C, G01D, G01F, G01G, G01H, G01J, G01K, G01L, G01M, G01N, G01P, G01R, G01V, G01W, G02B6, G05B, G08G, G09B, H01B11, H01J(11/, 13/, 15/, 17/, 19/, 21/, 23/, 25/, 27/, 29/, 31/, 33/, 40/, 41/, 43/, 45/), H01L