



**REVISIONS AND ADDITIONS TO THE CORE LIST OF
ICT INDICATORS**

**Comments should be submitted to
emeasurement@unctad.org
by 31 July 2008**

Contents

Contents	2
Acknowledgements	4
Chapter 1. Introduction	5
<i>The core list of ICT indicators</i>	6
<i>Revisions to the core indicators</i>	7
Chapter 2. ICT Infrastructure and access	8
<i>Introduction</i>	8
<i>Proposed revisions to the core indicators and associated standards</i>	8
Chapter 3. Access to, and use of, ICT by households and individuals	14
<i>Introduction</i>	14
<i>Comparability of core indicator data</i>	14
<i>Proposed revisions to the core indicators and associated standards</i>	14
Units.....	24
Scope and classificatory variables	25
Derivation and reporting of the core ICT indicators	27
Chapter 4. Use of ICT by businesses	29
<i>Introduction</i>	29
<i>Comparability of core indicator data</i>	29
<i>Proposed revisions to the core indicators and associated standards</i>	29
Mobile phone use by businesses	37
Units.....	38
Scope and classificatory variables	39
Derivation and reporting of the core ICT indicators	40
Chapter 5. The ICT (producing) sector	42
<i>Introduction</i>	42
<i>Comparability of core indicator data</i>	42
<i>Proposed revisions to the core indicators and associated standards</i>	45
Units and scope for ICT sector surveys	47
Chapter 6. International trade in ICT goods	48
<i>Introduction</i>	48
<i>Proposed revisions to the core indicators and associated standards</i>	48

Chapter 7. Indicators on ICT in education	50
<i>Introduction.....</i>	<i>50</i>
<i>Selection process and principles.....</i>	<i>50</i>
<i>The proposed core indicators on ICT in education</i>	<i>52</i>
Classificatory variables.....	61
<i>Conclusion.....</i>	<i>62</i>
Chapter 8. Summary and recommendations.....	63
Bibliography	64

Acknowledgements

This paper was prepared by Sheridan Roberts, consultant to UNCTAD, with significant input from Claude Akpabie, UNESCO Institute for Statistics (especially Chapter 7) and Vanessa Gray, International Telecommunication Union (especially Chapter 2).

Staff from member organizations of the Partnership on Measuring ICT for Development and the United Nations Statistics Division (UNSD) provided valuable information and suggestions, in particular: Susan Teltscher from UNCTAD, Martin Schaaper and Colin Webb from the OECD, Albrecht Wirthmann from Eurostat and Ralf Becker from the UNSD.

Chapter 1. Introduction

1. Following the first phase of the World Summit on the Information Society, in 2003, members of the Partnership on Measuring ICT for Development¹ worked with statistical agencies and policymakers to develop an agreed ‘core list’ of indicators for measuring ICT. The list was released at the end of 2005 (*Partnership*, 2005a) and endorsed in 2007 by the United Nations Statistical Commission at its 38th session. The *Commission* encouraged countries to use the core list in their data collection programmes (UNSC, 2007).
2. This paper presents proposals for revisions to the current core list of ICT indicators and a proposal to include a set of indicators on ICT in education. It follows discussion of both proposals at the 2008 Global Event on Measuring the Information Society, held in Geneva from 27-29 May 2008. Note that the revisions and additions do not include model questions. These will be prepared once the revisions are finalized.
3. Comments are sought on the proposals contained in this paper; these should be sent to emeasurement@unctad.org by the end of July 2008.
4. The proposals arise from several sources including:
 - Revisions made to indicators included in the International Telecommunication Union’s Telecommunication Indicators Handbook (ITU, 2007a), following the fifth and sixth World Telecommunication/ICT Indicators meetings (held in 2006 and 2007). These cover many of the changes made to the ICT infrastructure and access indicators, and also changes to the definitions of technologies used for the household and business access and use indicators.
 - Experience gained from preparation of the *The Global Information Society: a Statistical View* (Partnership on Measuring ICT for Development, 2008). The publication assessed progress in measuring the information society using the core indicators. It explored the main data limitations associated with the indicators² and concluded that work is needed on several fronts. Revisions to the core ICT indicators and associated statistical standards have been proposed to address some of these limitations.
 - Experience gained in compiling core indicators data for the forthcoming ITU publication, *Use of Information and Communication Technology by the World’s Children and Youth: A Statistical Compilation* (ITU, 2008a).

¹ The *Partnership* was launched in June 2004. The *Partnership* project document can be found here: <http://www.itu.int/ITU-D/ict/partnership/material/Partnership%20Project%20Document%2023%20June.pdf>.

² These are lack of availability of statistical data (particularly for the developing world) and poor international comparability for some of the core indicator data. See *Partnership* (2008) for a detailed discussion of these limitations.

- Feedback on the policy and practical relevance of the core indicators from various sources, for instance, feedback on the United Nations Conference on Trade and Development *Manual for the Production of Statistics on the Information Economy* (UNCTAD, 2007).³
- Changes to other international standards and closer compliance with those standards (particularly those of the United Nations Statistics Division (UNSD) and the International Labour Organization (ILO)).

5. Reasons for proposed amendments are documented in this report, especially with reference to the above inputs.

6. The 2008 *Global Event* discussed a number of other possible ICT indicators, including ICT impacts (economic and social), e-government, barriers to ICT use, ICT expenditure and investment, trade in ICT services, and IT security and trust. Indicators in these areas may be added to the core list in the future, following more development work and/or advances in other areas of statistics (such as the finalization of an internationally agreed classification of ICT services).

The core list of ICT indicators

7. Development of a core list of ICT indicators was an early objective of the *Partnership*. A number of regional meetings on ICT measurement were held after the Geneva phase of WSIS and included discussion of regional ICT indicators of interest to policymakers.⁴ The *Partnership* consolidated a global core list and circulated it to all national statistical offices for further comment. A final list was discussed, and agreed on, at the WSIS Thematic Meeting on Measuring the Information Society, held in Geneva in February 2005.

8. The list, published as *Core ICT Indicators (Partnership, 2005a)* was officially launched at the second phase of WSIS, held in Tunis in November 2005, during the Parallel Event on Measuring the Information Society. The list now serves as the basis for the *Partnership's* work on measuring ICT.

9. There are 41 core ICT indicators in four groups as follows:

- ICT infrastructure and access, A1 to A12;
- Access to, and use of, ICT by households and individuals, HH1 to HH13;⁵
- Use of ICT by businesses, B1 to B12; and
- The ICT sector and trade in ICT goods, ICT1 to ICT4.

³ An Expert Group meeting was held the day before the Global Event on Measuring the Information Society to discuss revisions to the *Manual*. A questionnaire had previously been sent to a number of statistical offices and their responses have been taken into account in this document.

⁴ For more information on these meetings, see *Partnership* (2008).

⁵ A 'reference indicator', HHRI, on the proportion of households with electricity is also part of this set.

10. The main purpose of the core list is to help countries that collect (or are planning to collect) ICT statistics to produce high quality and internationally comparable data. In order to achieve this, the indicators have associated statistical standards including:

- Definitions of terms (e.g. *computer, the Internet*);
- Model questions;
- Calculation of indicators (e.g. use of appropriate denominators for proportions);
- Collection scope (e.g. by business size or industry, age of individuals); and
- Classificatory variables (e.g. business size; age ranges for individual ICT use core indicators).

11. Each indicator is currently nominated as either ‘basic core’ or ‘extended core’, where the latter were considered more suitable for countries with relatively advanced ICT statistical systems (*Partnership, 2005a*). However, this paper proposes to remove this distinction, as it is no longer considered to be useful.

Revisions to the core indicators

12. The development of core ICT indicators was always intended to be a continuing process and some minor revisions to the business ICT use indicators have already been proposed by UNCTAD⁶ and ITU.⁷ Those revisions are included with the others presented in this paper.

13. Other changes to the core indicators are considered in this paper, based on collection experiences, changing policy interests and other statistical developments, notably revisions to the 1993 System of National Accounts (SNA), the introduction of ISIC⁸ Rev. 4 and the CPC⁹ Ver. 2/HS2007.

14. An important consideration, when contemplating changes to the core indicator concepts and definitions, is how best to retain the time series value of existing data. It is considered that most of the changes presented in this paper will have little impact on ongoing time series. The ICT sector and trade indicators, ICT1 to ICT4 are an exception to this because changes to the definitions of the ICT sector and ICT goods will occur with the implementation by countries of ISIC Revision 4 and the HS2007¹⁰. This is further explained in chapters 5 and 6.

⁶ In *Manual for the Production of Statistics on the Information Economy* (UNCTAD, 2007).

⁷ Following updates to ITU’s *Telecommunication Indicators Handbook* (2007a).

⁸ International Standard Industrial Classification of All Economic Activities (UNSD).

⁹ Central Product Classification (UNSD).

¹⁰ Harmonized System (World Customs Organization) used for trade statistics.

Chapter 2. ICT Infrastructure and access

Introduction

15. The ICT infrastructure and access core indicators are collected by the International Telecommunication Union (ITU), along with a number of other telecommunication indicators. The data, some of which go back as far as 1960, are published in the *World Telecommunication/ICT Indicators Database* (ITU, 2007b) and are defined in ITU's *Telecommunication Indicators Handbook* (ITU, 2007a).

16. In order to assist the standardization of statistics in this field, the definitions are reviewed regularly,¹¹ particularly to reflect technological changes and the addition of new services. Changes to the definitions are reflected in the current proposal to revise several of the ICT infrastructure and access core indicators. Other changes that have occurred since 2005, for instance, in patterns of use of ICT, have also influenced the proposed revisions.

Proposed revisions to the core indicators and associated standards

17. The revisions to the core indicators on ICT infrastructure and access have been proposed by ITU. The proposed changes are with reference to the definitions and notes in *Core ICT Indicators (Partnership, 2005a)* and are shown in bold in Table 1 below.

Table 1. Proposed changes to core indicators on ICT infrastructure and access

Core indicator		Definitions and notes	Proposed changes
Basic core indicators			This distinction is no longer relevant, with the proposed deletion of the only two extended core indicators.
A1	Fixed telephone lines per 100 inhabitants	<i>Fixed telephone lines per 100 inhabitants</i> is calculated by dividing the number of fixed telephone lines by the population and then multiplying by 100. <i>Fixed telephone lines</i> refer to telephone lines connecting a subscriber's terminal equipment to the public switched telephone network (PSTN) and which have a dedicated port on a telephone exchange.	No change

¹¹ Via World Telecommunication/ICT Indicators meetings; the last two took place in October 2006 and December 2007.

Core indicator		Definitions and notes	Proposed changes
A2	Mobile cellular telephone subscribers per 100 inhabitants	<p><i>Mobile cellular telephone subscribers per 100 inhabitants</i> is obtained by dividing the number of mobile cellular subscribers by the population and then multiplying by 100.</p> <p><i>Mobile cellular telephone subscribers</i> refer to users of portable telephones subscribing to a public mobile telephone service using cellular technology, which provides access to the PSTN. This includes analogue and digital cellular systems, including IMT-2000 (Third Generation, 3G). Users of both post-paid subscriptions and pre-paid accounts are included.</p>	Slight changes (shown in bold) have been made to the title and to the definition of <i>mobile cellular telephone subscribers</i> , based on updates to ITU (2007a).
A3	Computers per 100 inhabitants	<p>Computers per 100 inhabitants is obtained by dividing the estimated number of computers installed in a country by the population and then multiplying by 100.</p> <p>Computers measures the number of computers installed in a country. The statistic includes PCs, laptops, notebooks etc, but excludes terminals connected to mainframe and mini-computers that are primarily intended for shared use, and devices such as smart-phones and personal digital assistants (PDAs) that have only some, but not all, of the components of a PC (e.g. they may lack a full-sized keyboard, a large screen, an Internet connection, drives etc.).</p>	Proposed for deletion; the similar household indicator HH5 is considered to be of better quality. Note that A3 has also been deleted from the Millennium Development Goals list of indicators.
A3	Fixed Internet subscribers per 100 inhabitants	<p><i>Fixed Internet subscribers per 100 inhabitants</i> is obtained by dividing the number of fixed Internet subscribers by the population and then multiplying by 100.</p> <p>Internet subscribers refer to users of the Internet subscribing to paid access to the public Internet (a TCP/IP connection).</p> <p>Fixed Internet subscribers refer to the total number of Internet subscribers with fixed access, which includes dial-up and total fixed broadband subscribers: cable modem, DSL Internet subscribers, other fixed broadband and leased line Internet subscribers.</p>	<p>Changes have been made to limit this indicator to fixed Internet subscribers.</p> <p>The indicator has been renumbered.</p> <p>ITU has included the term 'fixed' for clarification, as it now also collects separate data on mobile Internet subscribers.</p>
A4	Fixed broadband Internet subscribers per 100 inhabitants	<p><i>Fixed broadband Internet subscribers per 100 inhabitants</i> is obtained by dividing the number of fixed broadband Internet subscribers by the population and then multiplying by 100.</p> <p><i>Broadband Internet subscribers</i> refer to users of the Internet subscribing to paid high-speed access to the public Internet (a TCP/IP connection). High speed access is defined as being at least 256 kbit/s, in one or both directions. Subscribers with access to data communications (including the Internet) via mobile cellular networks are excluded.</p>	<p>Changes have been made to limit this indicator to fixed broadband Internet subscribers.</p> <p>The indicator has been renumbered.</p> <p>This indicator complements A5.</p>

Core indicator		Definitions and notes	Proposed changes
A5	Mobile broadband subscribers per 100 inhabitants	<p>Mobile broadband subscribers per 100 inhabitants is obtained by dividing the number of mobile broadband subscribers by the population and then multiplying by 100.</p> <p>Mobile broadband subscribers refer to subscribers to mobile cellular networks with access to data communications (e.g. the Internet) at broadband speeds (here defined as greater than or equal to 256 kbit/s in one or both directions) such as WCDMA, HSDPA, CDMA2000 1xEV-DO, CDMA 200 1xEV-DV etc. These services are typically referred to as 3G or 3.5G and include:</p> <ul style="list-style-type: none"> -Wideband CDMA (W-CDMA), an IMT-2000 3G mobile network technology, based on CDMA that presently delivers packet-switched data transmission speeds up to 384 kbit/s and up to 2 Mbit/s when fully implemented. It is known as <i>Universal Mobile Telecommunications System (UMTS)</i> in Europe. -High-speed Downlink Packet Access (HSDPA), an upgrade to W-CDMA to allow downlink data transmission at speeds of typically 8-10 Mbit/s. It is complemented by High-Speed Uplink Packet Access (HSUPA), which offers uplink speeds of around 5 Mbit/s. -CDMA2000 1xEV-DO (Evolution, Data Optimised), an IMT-2000 3G mobile network technology, based on CDMA that delivers packet-switched data transmission speeds of up to 4.9 Mbit/s. 	New indicator, which complements A4.
A6	International Internet bandwidth per inhabitant (bits/second/inhabitant)	<p><i>International Internet bandwidth per inhabitant</i> is obtained by dividing the amount of bandwidth (in bits/second) by the population.</p> <p><i>International Internet bandwidth</i> refers to the capacity which backbone operators provision provide to carry Internet traffic. It is measured in bits per second.</p>	Minor changes to clarify the unit of measurement.
A7	Percentage of population covered by mobile cellular telephony	<p><i>Percentage of population covered by mobile cellular telephony</i> refers to the percentage of a country's inhabitants that live within areas served by a mobile cellular signal, irrespective of whether or not they choose to use it. Note that this measures the theoretical ability to use mobile cellular services if one has a cellular telephone and a subscription.</p>	No change

Core indicator	Definitions and notes	Proposed changes
<p>A8 Broadband Internet access tariffs (20 hours per month), in US\$, and as a percentage of monthly per capita income</p>	<p>Broadband Internet access tariffs are the lowest sampled cost in US\$ per 100 kbit/s per month and are calculated from two different broadband prices, low and high speed monthly ISP charges. Low speed monthly charge refers to a typical 'entry-level' broadband lower-speed connection (download speeds of 256 – 1,024 kbit/s). High speed monthly charge refers to a faster and typically more expensive offer. Monthly charges do not include installation fees nor modem rentals. The lowest sampled cost in US\$ per 100 kbit/s is the most cost-effective offer for a country based on the criterion, the 'lowest cost per 100 kbit/s'. The cost per 100 kbit/s is calculated by dividing the monthly subscription charge in US\$ by the theoretical download speed, and then multiplying by 100.</p> <p><i>As a percentage of monthly per capita income</i> refers to the lowest sampled cost in US\$ per 100 kbit/s divided by the average monthly gross national income <i>per capita</i> (World Bank, Atlas method, current US\$) and expressed as a percentage.</p> <p>The Internet access tariff includes the tariff components of monthly line rental, line usage charge and Internet access charge, plus any tax that may be levied (as this is a service used by both residential and business consumers). The tariff chosen for a particular country would be the package for 20 hours per month that is the cheapest, that is widely available (or, in the case of regional service providers, is available in the capital city) and is available to the general public without restriction (e.g. excluding in-company or limited time offers, and excluding offers that are bundled with some other service). The price comparison is expressed in US\$. The indicator should be compared, as far as possible, for the same date between countries.</p> <p>As a percentage of per capita income involves dividing the broadband Internet access tariff by the average monthly gross national income per capita of the country.</p>	<p>Amended to refer to broadband Internet access tariffs. The changes reflect increasing use of broadband, its importance to the information society and increasing difficulty collecting data on dial-up tariffs.</p>

Core indicator		Definitions and notes	Proposed changes
A9	<p>Mobile cellular tariffs (OECD monthly low-user basket) (100 minutes of use per month), in US\$, and as a percentage of monthly per capita income</p>	<p>The Mobile cellular tariff includes the tariff components of monthly service rental (if relevant), 50 minutes of local peak time calling and 50 minutes of local off-peak calling, plus tax. Differences in the distance of calls, which may be applicable in some countries, are not taken into account, nor are international calls or SMS messages. The possible one-time charge for connection is not taken into account, except where this is bundled into the costs of a pre-paid account. Countries should calculate the tariff either on a post-paid or a pre-paid service, whichever one is more popularly used. If more than 50% of the mobile cellular subscribers use pre-paid, then the tariff should also be based on the pre-paid service, and vice versa. The price comparison is expressed in US\$. The indicator should be compared, as far as possible, for the same date between countries.</p> <p>The OECD monthly low-user basket¹² includes the cost of monthly mobile usage for 25 outgoing calls (on-net, off-net and to a fixed line) in predetermined ratios plus 30 SMS messages.</p> <p>As a percentage of monthly per capita income involves dividing the price of the monthly low user basket by the average monthly gross national income <i>per capita</i> of the country.</p>	<p>The changes adopt OECD's indicator for the low-user mobile tariff basket.</p>
A10	<p>Percentage of localities with public Internet access centres (PIACs) by number of inhabitants</p>	<p><i>Percentage of localities with public Internet access centres (PIACs)</i> is computed by dividing the number of localities with at least one PIAC by the total number of the country's localities and then multiplying by 100.</p> <p>A <i>public Internet access centre (PIAC)</i> is a site, location, or centre of instruction at which Internet access is made available to the public, on a full-time or part-time basis. PIACs This may include telecentres, digital community centres, Internet cafés, libraries, education centres and other similar establishments, whenever they offer Internet access to the general public. All such centres should have at least one public computer for Internet access. <i>Localities</i> refer to a country's villages, towns and cities.</p> <p>Note that this indicator is used to measure the WSIS target "<i>to connect villages with ICTs and establish community access points</i>" by 2015.</p>	<p>Minor change to the definition of PIAC to explicitly include telecentres.</p>

¹² For definition, see: <http://oberon.sourceoecd.org/v1=15177325/cl=12/nw=1/rpsv/sti2007/ge11-1.htm>.

Core indicator		Definitions and notes	Proposed changes
Extended core indicators			
A11	Radio sets per 100 inhabitants	<p>Radio sets per 100 inhabitants is obtained by dividing the number of radio sets in use by the population and then multiplying by 100.</p> <p>A radio set is a device capable of receiving broadcast radio signals, using popular frequencies, such as FM, AM, LW and SW. A radio set may be a stand-alone device, or it may be integrated into another device, such as a Walkman, a car, or an alarm clock.</p>	Proposed for deletion; the similar household indicator HH1 is considered to be of better quality.
A12	Television sets per 100 inhabitants	<p>Television sets per 100 inhabitants is obtained by dividing the number of sets in use by the population and then multiplying by 100.</p> <p>A television set is a device capable of receiving broadcast television signals, using popular access means such as over-the-air, cable and satellite. A television set may be a stand-alone device, or it may be integrated into another device, such as a computer or a mobile phone.</p>	Proposed for deletion; the similar household indicator HH2 is considered to be of better quality.

Chapter 3. Access to, and use of, ICT by households and individuals

Introduction

18. Statistics on household/individual ICT access and use are typically collected by National Statistical Offices (NSOs) through household surveys.¹³ Most developed economies have been collecting these statistics for a number of years, using model questionnaires recommended by the Organisation for Economic Co-operation and Development (OECD) and Eurostat. Other economies are starting to collect these indicators using the core indicators recommendations (*Partnership*, 2005a) and/or those of the OECD (2007) and Eurostat (2006 and 2007).

19. While the statistical standards for household/individual ICT access and use were originally developed by the OECD and Eurostat, the *Partnership* has played an important role in extending these standards to developing economies, via the core list of ICT indicators.

20. The core indicators on access to, and use of, ICT by households and individuals are shown in Table 2.

Comparability of core indicator data

21. There are a number of issues of data comparability for these indicators, including variable age scope (for individuals) and variations in questions asked (for instance, different response categories for locations of Internet use, Internet activities undertaken and means of Internet access). See *Partnership* (2008) for a more detailed discussion of comparability issues.

Proposed revisions to the core indicators and associated standards

22. Recommendations for revising the core indicators and associated statistical standards (on units, scope, classificatory variables, definitions of terms, construction and aggregation of indicators) address some of the comparability issues outlined above and detailed in *Partnership* (2008). The recommended changes also align the indicators with current international standards and improve their policy relevance.

23. Proposed revisions to the core indicators are described below and detailed in Table 2. Changes are with reference to *Core ICT Indicators* (*Partnership*, 2005a) and are shown in bold in the table. They include:

¹³ These may be surveys that are dedicated to measuring ICT access and use, or surveys such as labour force or 'omnibus' ('general purpose') surveys where ICT is one of several topics.

1. The distinction between basic and extended core indicators has been removed. Except for HH12, the extended core indicators are not significantly less available than other indicators; HH11 and HH12 are also highly relevant for policy purposes.
2. A number of minor updates reflecting changes in definitions for ICTs based on updates to ITU's definitions of technologies have been incorporated (*Telecommunication Indicators Handbook*, ITU, 2007a); these affect definitions of radio, mobile phone, community Internet access facilities and means of Internet access (narrowband/broadband).
3. Other definitional changes and expansions have been incorporated (e.g. to Internet purchasing, government organizations); some new definitions have been added (e.g. Internet banking, place of education). Most of these are based on international standards and practices of the United Nations Statistics Division, OECD or Eurostat.
4. Some indicator titles have been amended for consistency (with model questions, revised definitions or other indicators).
5. Some emphases have been added to clarify the definitions and address data comparability issues (for instance, access to the Internet is not only via a computer; multiple responses should be specified in survey questions that collect data for indicators HH9, HH10 and HH12).
6. Some broad level and 'other' categories have been removed. They are either not widely available or do not result in consistent data. Note that this does not preclude 'other' categories being included on questionnaires, or in model questions.
7. Two new categories on mobile access have been added to the location indicator (HH9) to improve the relevance and logic of 'location of use' questions and to enable collection of data on Internet access by mobile phone; a concept of 'location' (as being associated with the technology being used to access the Internet, unless it is mobile access) has been added.
8. The Internet activity category 'downloading movies, music or software' has been split into two categories (downloading software is now a separate category). This better matches Eurostat output and reflects the differences in these activities.
9. The two infrequent use categories have been combined to form a new frequency of use category, 'less than once a week'.
10. The 'household' unit concept is discussed using examples from UNSD and other organizations.

11. A slight change has been made to the lower age scope for the individual ICT use indicators, to specifically include individuals aged 15 years. Recommended age ranges for children and older people currently outside the minimum age scope have been recommended.
12. New advice has been provided on how to present and derive the core indicators, including aggregation of response categories.

Table 2. Proposed changes to the core indicators for access to, and use of, ICT by households and individuals

Core indicator		Definitions and notes	Proposed changes
Basic core indicators			Suggest remove the distinction between basic and extended core indicators. It is not useful anymore, especially given the relevance of the extended core indicators (especially HH11 and HH12).
HH1	Proportion of households with a radio	The <i>proportion of households with a radio</i> is calculated by dividing the number of in-scope households with a radio by the total number of in-scope households. A <i>radio</i> is a device capable of receiving broadcast radio signals, using popular frequencies, such as FM, AM, LW and SW. A radio set may be a stand-alone device, or it may be integrated into another device, such as a 'Walkman', a car or an alarm clock.	Slight changes (shown in bold) have been made to the definition of <i>radio</i> , based on updates to ITU (2007a).
HH2	Proportion of households with a TV	The <i>proportion of households with a TV</i> is calculated by dividing the number of in-scope households with a TV by the total number of in-scope households. A <i>TV</i> (television) is a device capable of receiving broadcast television signals, using popular access means such as over-the-air, cable and satellite. A television set may be a stand-alone device, or it may be integrated into another device, such as a computer or a mobile phone.	No change
HH3	Proportion of households with a fixed line telephone	The <i>proportion of households with a fixed line telephone</i> is calculated by dividing the number of in-scope households with a fixed line telephone by the total number of in-scope households. A <i>fixed telephone line</i> refers to a telephone line connecting a customer's terminal equipment (e.g. telephone set, facsimile machine) to the public switched telephone network (PSTN) and which has a dedicated port on a telephone exchange.	No change

Core indicator		Definitions and notes	Proposed changes
HH4	Proportion of households with a mobile cellular telephone	<p>The <i>proportion of households with a mobile cellular telephone</i> is calculated by dividing the number of in-scope households with a mobile telephone by the total number of in-scope households.</p> <p>A <i>mobile cellular telephone</i> refers to a portable telephone subscribing to a public mobile telephone service using cellular technology, which provides access to the PSTN. This includes analogue and digital cellular systems, as well as IMT-2000 (3G). Users of both post-paid subscriptions and pre-paid accounts are included.</p>	Slight changes have been made to the definition of <i>mobile cellular telephone</i> , based on updates to ITU (2007a).
HH5	Proportion of households with a computer	<p>The <i>proportion of households with a computer</i> is calculated by dividing the number of in-scope households with a computer by the total number of in-scope households.</p> <p>A <i>computer</i> includes: a desktop, portable or handheld computer (e.g. a personal digital assistant). It does not include equipment with some embedded computing abilities such as mobile phones or TV sets.</p>	No change
HH6	Proportion of individuals who used a computer (from any location) in the last 12 months	<p>The <i>proportion of individuals who used a computer</i> is calculated by dividing the total number of in-scope individuals who used a computer from any location in the last 12 months by the total number of in-scope individuals.</p>	No change
HH7	Proportion of households with Internet access at home	<p>The <i>proportion of households with Internet access at home</i> is calculated by dividing the number of in-scope households with Internet access by the total number of in-scope households.</p> <p>The <i>Internet</i> is a world-wide public computer network. It provides access to a number of communication services including the World Wide Web and carries email, news, entertainment and data files. Access is not assumed to be only via a computer – it may also be by mobile phone, games machine, digital TV etc.</p>	No change
HH8	Proportion of individuals who used the Internet (from any location) in the last 12 months	<p>The <i>proportion of individuals who used the Internet etc</i> is calculated by dividing the total number of in-scope individuals who used the Internet (from any location) in the last 12 months by the total number of in-scope individuals.</p> <p>Access to the Internet is not assumed to be only via a computer – it may also be by mobile phone, games machine, digital TV etc.</p>	Change to emphasize that Internet access is not only via a computer.

Core indicator		Definitions and notes	Proposed changes
HH9	Location of individual use of the Internet in the last 12 months	<p>The proportion of individuals who used the Internet at each location can be calculated as either: the proportion of in-scope individuals or the proportion of Internet users, using the Internet at each location.</p> <p>For international comparability, this indicator is most simply presented as the proportion of in-scope individuals using the Internet at each location, for instance, the proportion of individuals using the Internet at home, at work etc. An alternative presentation is the proportion of Internet users using the Internet from each location.</p> <p>Access to the Internet is not assumed to be only via a computer – it may also be by mobile phone, games machine, digital TV etc.</p> <p>Individuals should be asked about all locations of Internet use (that is, the survey question used by countries should specify multiple responses¹⁴). Note that, except for mobile access, the locations are associated with the technology used e.g. a PC installed at work or at an Internet café.</p>	<p>Clarification of calculation method. See also section on derivation and reporting of indicators below.</p> <p>Slight changes to categories as shown below.</p> <p>The advice with respect to reporting of multiple locations has been strengthened.</p> <p>Change to emphasize that access is not only via a computer (some countries currently have limitations on equipment used).</p>
	Home		No change
	Work	Where a person's workplace is located at his/her home, then he/she would answer yes to the home category only.	No change
	Place of education	For students. Teachers and others who work at a place of education, would report 'work' as the place of Internet use. Where a place of education is also made available as a location for general community Internet use, such use should be reported in the <i>Community Internet access facility</i> category.	Clarification of 'place of education'.
	Another person's home	Generally the home of a friend, relative or neighbour.	Clarification of 'another person's home'.
	Community Internet access facility	Includes access at community facilities such as public libraries, publicly provided Internet kiosks, non-commercial telecentres, digital community centres, post offices , other government agencies (such as schools); access is typically free or low cost and is available to the general public.	Slight changes have been made to the definition of <i>community Internet access facilities</i> , based on updates to ITU (2007a), UNCTAD input and Eurostat questionnaire categories (Eurostat, 2007).
	Commercial Internet access facility	Includes publicly available access at Internet or cyber cafés, hotels, airports etc; even though the venue is commercial, the cost is not necessarily at full market price.	No change

¹⁴ Some countries may ask about location of use as a series of yes/no questions, each referring to one location of use.

Core indicator		Definitions and notes	Proposed changes
	Mobile access via a mobile cellular telephone	Access to the Internet at any location via a mobile cellular telephone (including handheld devices with mobile phone functionality).	Suggest replace 'Other places' with this and the subsequent category. At least one country currently includes mobile phone access from any location in the 'Other places' category. This category is likely to be particularly relevant for developing economies. This category and the next are based on OECD and Eurostat model questionnaires (see OECD, 2007; Eurostat, 2007).
	Mobile access via <i>other</i> mobile access devices	Access to the Internet at any location via other mobile access devices, e.g. a laptop computer or handheld device which uses wireless access (at a WiFi 'hotspot') or a laptop computer connected to a mobile phone network.	See comments above.
	Other places		Suggest delete this as a core indicator category. Data are very variable. Note that countries would normally include an 'other' category in their national survey.
HH10	Internet activities undertaken by individuals in the last 12 months (from any location)	<p>The proportion of individuals who undertook each activity can be calculated as either: the proportion of in-scope individuals or the proportion of <u>Internet users</u> who undertook each activity.</p> <p>For international comparability, output is most simply presented as the proportion of in-scope individuals undertaking each activity, for instance, the proportion of individuals using the Internet to get information about goods or services. An alternative presentation is the proportion of <u>Internet users</u> undertaking each activity.</p> <p>Note that these activities are restricted to private purposes and therefore exclude activities such as purchasing over the Internet undertaken as part of a person's job.</p> <p>Individuals should be asked about all Internet activities (that is, the question used by countries should specify multiple responses). can respond in respect of more than one activity and Activities are not mutually exclusive.</p> <p>Access to the Internet is not assumed to be only via a computer – it may also be by mobile phone, games machine, digital TV etc.</p>	<p>Clarification of calculation method. See also section on derivation and reporting of indicators below.</p> <p>Changes to categories as shown below.</p> <p>The text "(from any location)" has been added to the indicator title for emphasis.</p> <p>Change to emphasize that access is not only via a computer (some countries currently have limitations on equipment used).</p> <p>The advice with respect to reporting of multiple activities has been strengthened.</p>

Core indicator	Definitions and notes	Proposed changes
Getting information:-		Suggest delete this as a broad category. Results do not appear to be robust.
Getting information about goods or services		Slight change to indicate that the indicator refers to 'getting information'.
Getting information related to health or health services	Health information covers injury, disease, nutrition and improving health generally.	Slight change to indicate that the indicator refers to 'getting information'.
Getting information from general government organizations/public authorities via websites or email	Government organizations/public authorities are preferably defined per the SNA93 (http://unstats.un.org/unsd/sna1993/glossform.asp?gitem=219). General government organizations should be consistent with the SNA93 (2008 revision) concept of general government. According to the SNA "... the principal functions of government are to assume responsibility for the provision of goods and services to the community or to individual households and to finance their provision out of taxation or other incomes; to redistribute income and wealth by means of transfers; and to engage in non-market production." (General) government organizations include central, state and local government units. They include government organizations at local, regional and national level.	Slight change to indicate that the indicator refers to 'getting information'. Change title of indicator to more precisely reflect the institutional unit, general government. Expanded and amended definitions of government organizations (per SNA93, 2008 revision).
Other information or general web browsing		Suggest delete this as a core indicator category – data are variable and not available for most countries. However, countries would normally include at least one 'other' category in their national survey.
Communicating	Includes sending or receiving email, using chat rooms/sites, message/bulletin boards, instant messaging and telephoning via Internet.	Slightly expanded definition.
Purchasing or ordering goods or services	Purchasing or ordering goods or services refers to purchase orders placed via the Internet whether or not payment was made on line. Orders that were cancelled or not completed are excluded. Includes purchasing and downloading of digitized products, such as music, from the Internet.	Expanded definition (per OECD, 2007).
Internet banking	Includes electronic transactions with a bank for payment, transfers, etc. or for looking up account information. Excludes electronic transactions via the Internet for other types of financial services such as share purchases, financial services and insurance.	Added definition (based on Eurostat, 2007).

Core indicator	Definitions and notes	Proposed changes
Education or learning activities	This refers to formal learning activities such as study associated with school or tertiary education courses as well as distance education involving on-line activities. (A more narrow interpretation is likely to be less meaningful as it could include a range of activities such as using the Internet to search for information.)	No change
Dealing with government organizations/public authorities	<p>Interacting with government organizations includes downloading/requesting forms, completing/lodging forms on line, making on-line payments and purchasing from government organizations. It excludes getting information from government organizations.</p> <p>Government organizations/public authorities are preferably defined per the SNA93 (http://unstats.un.org/unsd/sna1993/glossform.asp?gitemid=219). General government organizations should be consistent with the SNA93 (2008 revision) concept of general government. According to the SNA "... the principal functions of government are to assume responsibility for the provision of goods and services to the community or to individual households and to finance their provision out of taxation or other incomes; to redistribute income and wealth by means of transfers; and to engage in non-market production." (General) government organizations include central, state and local government units. They include government organizations at local, regional and national level.</p>	<p>Change title of indicator to more precisely reflect the institutional unit, general government.</p> <p>Change title and definition of activity to match that used for the corresponding business indicator (in B12) and Eurostat (2007).</p> <p>Expanded and amended definitions of government organizations (per SNA93, 2008 revision).</p>
Leisure activities:		Suggest delete this category, not available as an aggregate for a majority of countries.
Playing or downloading video games or computer games	Includes file sharing games and playing games on line.	Slight change to indicator description.
Downloading movies, music or software Downloading or watching movies, TV, radio, images or music	Includes file sharing and using web radio or web television.	Suggest split this category as the activities are essentially different. Expanded the description of the indicator to better cover its intended scope.
Downloading movies, music or software Downloading software	Includes downloading of patches and upgrades, either paid or free of charge.	New category (matches Eurostat category; Eurostat, 2007), slight definition change.

Core indicator		Definitions and notes	Proposed changes
	Reading/downloading electronic books, newspapers or magazines Reading or downloading on-line newspapers or magazines, electronic books.	Includes accessing news websites, either paid or free of charge. Includes subscriptions to on-line news services.	Slight wording change. Definition change based on Eurostat (2007).
	Other leisure activities	Includes gambling.	Suggest delete this as a core indicator category. It does not produce consistent data However, countries would normally include at least one 'other' category in their national survey.
Extended core indicators			Suggest remove the distinction between basic and extended core indicators. It is not useful anymore, especially given the relevance of the extended core indicators (especially HH11 and HH12).
HH11	Proportion of individuals with use of a mobile cellular telephone	The <i>proportion of individuals with use of a mobile cellular telephone</i> is calculated by dividing the total number of in-scope individuals with use of a mobile cellular telephone by the total number of in-scope individuals. <i>A mobile cellular telephone</i> refers to a portable telephone subscribing to a public mobile telephone service using cellular technology, which provides access to the PSTN. This includes analogue and digital cellular systems, as well as IMT-2000 (3G). Users of both post-paid subscriptions and pre-paid accounts are included. <i>Use of a mobile cellular telephone</i> does not mean that the telephone is owned or paid for by the person but should be reasonably available through work, a friend or family member, etc. It excludes occasional use, for instance, borrowing a mobile phone to make a call.	The indicator title and definitions have been amended to include "cellular" per HH4. Slight changes have been made to the definition of <i>mobile cellular telephone</i> , based on updates to ITU (2007a).

Core indicator	Definitions and notes	Proposed changes
HH12	<p>Proportion of households with access to the Internet by type of access (narrowband, broadband)</p> <p>This indicator should be calculated as the proportion of in-scope households with Internet access that use each type of access service, for instance, the proportion of households with Internet access that use a broadband service as their means of access.</p> <p>For international comparability, output is most simply presented as the proportion of in-scope households using each type of access service, for instance, the proportion of households accessing the Internet by DSL. Additionally, output should be available for the aggregations, the proportion of households with broadband/narrowband access to the Internet. Alternatively, output can be presented as a proportion of households with Internet access.</p> <p>It is expected that countries will collect data at a finer level than 'narrowband' and 'broadband'. The categories chosen by countries should allow aggregation to total narrowband and total broadband, as defined below.</p> <p>As households can use more than one type of access service, multiple responses are possible.</p>	<p>Change in title to highlight narrowband and broadband.</p> <p>Clarification of calculation method. See also section on derivation and reporting of indicators below.</p> <p>Categories are now explicitly narrowband and broadband as shown below.</p> <p>The note on aggregation to narrowband and broadband has been expanded.</p>
	<p>Narrowband</p> <p><i>Narrowband</i> includes analogue modem (dial-up via standard phone line), ISDN (Integrated Services Digital Network), DSL at speeds below 256kbit/s, and mobile phone and other forms of access with an advertised download speed of less than 256 kbit/s.</p> <p>Note that narrowband mobile phone access services include CDMA 1x (Release 0), GPRS, WAP and <i>i-mode</i>.</p>	<p>Note that, for guidance, the revised model question for this indicator will include a more detailed set of narrowband and broadband access technologies (revised to reflect technology updates).</p>
	<p>Broadband</p> <p><i>Broadband</i> includes Internet access services with an advertised download speed of at least 256 kbit/s, in one or both directions. Technologies include DSL (Digital Subscriber Line) at speeds of at least 256kbit/s, cable modem, high speed leased lines, fibre-to-the-home, powerline, satellite, fixed wireless, WiMAX and some mobile phone access services (3G and 3.5G).</p> <p>Broadband mobile phone access services include <i>Wideband CDMA</i> (W-CDMA), known as <i>Universal Mobile Telecommunications System</i> (UMTS) in Europe; High-speed Downlink Packet Access (HSDPA), complemented by High-Speed Uplink Packet Access (HSUPA); CDMA2000 1xEV-DO and CDMA 200 1xEV-DV.</p>	

Core indicator		Definitions and notes	Proposed changes
HH13	Frequency of individual access to use of the Internet in the last 12 months (from any location)	<p>The frequency of individual use of the Internet can be calculated as: either the proportion of in-scope individuals or the proportion of Internet users, accessing the Internet with each frequency.</p> <p>For international comparability, output is most simply presented as the proportion of in-scope individuals using the Internet with each frequency, for instance, the proportion of individuals using the Internet at least once a day. An alternative presentation is the proportion of Internet users using the Internet with each frequency.</p> <p>It is recommended that countries collect this information in respect of a typical period; therefore, respondents should ignore weekends (if they only access the Internet from work) and breaks from their usual routine, such as holidays.</p> <p>Access to the Internet is not assumed to be only via a computer – it may also be by mobile phone, games machine, digital TV etc.</p>	<p>Slight change to indicator title to better match the concept required (which is 'use' rather than 'access').</p> <p>Clarification of calculation method. See also section on derivation and reporting of indicators below.</p> <p>Change to emphasize that access is not only via a computer (some countries have limitations on equipment used).</p> <p>Changes to categories as shown below.</p>
	At least once a day	Once a working day for respondents who only (or most frequently) use the Internet from work.	No change
	At least once a week but not every day		No change
	Less than once a week		Suggested new category, replacing the two below.
	At least once a month but not every week		Suggest combine these two categories. All countries that report this information (irrespective of level of development) report low levels of less than monthly use.
	Less than once a month		
Reference indicator			
HHR1	Proportion of households with electricity	Electricity is not an ICT commodity, but is an important prerequisite for using many ICTs. It is therefore included in the core list as a reference indicator.	No change

Units

24. No change is proposed to the recommended statistical units, which are households and individuals. However, the concept of household has been explored and clarified.

25. There are several definitions of households used for the purposes of defining units for household surveys. The following definition is based on the "housekeeping concept" described in the UNSD's *Principles and Recommendations for Population and Housing Censuses Revision 2* (UNSD, 2008a) and is as follows:

“The concept of household is based on the arrangements made by persons, individually or in groups, for providing themselves with food and other essentials for living. A household may be either (a) a one-person household ... or (b) a multi-person household, that is to say, a group of two or more persons living together who make common provision for food and other essentials for living. The persons in the group may pool their resources and may have a common budget; they may be related or unrelated persons or constitute a combination of persons both related and unrelated.

This “concept of household ... is known as the “housekeeping concept”. It does not assume that the number of households and housing units are or should be equal.”¹⁵

26. For the purposes of the system of national accounts (SNA), the institutional unit ‘household’ is defined as follows:

“Households are defined as a group of persons who share the same living accommodation, who pool some, or all, of their income and wealth and who consume certain types of goods and services collectively, mainly housing and food.” (UNSD, 2008b)

27. Other concepts are also used by international agencies and NSOs; these are discussed in ITU (2008b). The common features of all these concepts is that a household consists of one or more people, who may or may not be related to each other, who share accommodation and who make common provision for food.

Scope and classificatory variables

28. A slight change is proposed to the minimum recommended age scope for individuals. The current scope is those individuals aged 16-74. As many countries have an age range starting at 15 years old (and because this is the UN standard), this now becomes the preferred age cut-off. Countries are encouraged to expand this scope to fulfill national policy requirements; in particular, developing economies may wish to collect information in respect of children under 15 years, given the importance of this age group to the development of an information society.¹⁶ Three age ranges for children have also been included in the recommendations, as has a range for those over 74 years old.

29. It is expected that most surveys will restrict their individual scope to those living in private dwellings (therefore excluding individuals in institutions such as prisons, nursing homes and special dwellings such as hotels).

30. The household minimum recommended scope also changes slightly to now exclude households consisting only of members over 74, or under 15 (previously 16). Other scope

¹⁵ UNSD (2008a) also discusses the “household-dwelling” concept of a household whereby a household is associated with a single housing unit.

¹⁶ The potential contributions of children and other young people to development of the information society is discussed in ITU (2008a).

limitations will follow from those applying to individuals, for instance, restricting household surveys to those households in private dwellings.

31. For the household access indicators (HH1, HH2, HH3, HH4, HH5 and HH7) sub-indicators may be constructed using the household classificatory variables, *household composition* and *household size*. For the individual use indicators (HH6, HH8, HH9, HH10, HH11, HH12 and HH13), sub-indicators may be constructed using the individual classificatory variables, age, gender, highest education level, employment status and occupation. These are defined in *Partnership* (2005a) and presented below along with proposed changes. Views are sought on a possible new classificatory variable, *disability status*.

Table 3. Proposed changes to classificatory variables

Classificatory variables (new and revised)	Proposed changes and comments
Household composition (two-way classification: households with/without children under 15/16/18)	Many countries define children, for the purposes of these categories, as those aged less than 15. This age is preferred, although 16 or 18 are acceptable substitutes where these are the ages used in country collections.
Household size (number of members, including those outside the minimum age scope of 15-74)	The minimum age scope referred to has been amended to 15-74 (from 16-74).
Age: to show the differences between age groupings, the following ranges (in years) are proposed (with changes in bold): 1 to 4, 5 to 9, 10 to 14, 15-16 to 24; 25 to 34; 35 to 44; 45 to 54; 55 to 64; 65 to 74, 75 or over . These ranges are consistent with (though not as fine as) the age ranges adopted by UNSD (2008a).	The revised ranges are shown and include a change to the range 16-24 (to 15-24) and the addition of optional ranges for younger and older people. Age ranges for children under 15/16 have been added and are consistent with UNSD recommendations. Where data are collected for children (and this is encouraged), the additional age ranges shown (1 to 4, 5-9 and/or 10-14) should be used. Countries should tabulate data on the basis of these size classes, where possible.
Gender: male/female	No change
Highest education level received – four-way classification as follows: 1. Primary education or lower (no formal education, pre-primary (ISCED 0) or primary education (ISCED 1)); 2. Lower secondary education (ISCED 2); 3. Upper secondary or post-secondary non-tertiary (ISCED 3,4); 4. Tertiary (ISCED 5,6).	Wording change to category 1. to clarify that it includes pre-primary education.
Employment status – four-way classification as follows: 1. <i>Paid employee</i> ; 2. <i>Self-employed</i> ; 3. <i>Unemployed</i> ; 4. <i>Not in the labour force</i> .	No change
Occupation (using ISCO88 major groups where possible)	Changes will occur on adoption by countries of ISCO-08. However at the major group level, these are fairly minor.
Disability status	This could be a useful additional classificatory variable and countries' views on including it with the core indicator standards would be of interest.

Derivation and reporting of the core ICT indicators

How to provide core indicator data to international agencies

32. The 2005 publication *Core ICT Indicators*, recommended that, for international reporting purposes, countries provide proportions using the total population as the denominator. While this is the obvious denominator for the simple indicators (such as proportion of individuals who used the Internet), it is one of two options for the more complex indicators (such as individuals using the Internet for communication). The alternative, in the second case, is the proportion of Internet users using the Internet for communication.

33. Following the data collection practices of ITU and UNCTAD, it is now suggested **that countries report numbers of households and individuals rather than proportions or percentages**. Population estimates for the total population, and for each sub-population (as indicated by the classificatory variables), also need to be provided so that proportions can be derived. Both sets of numbers should represent the whole population and not the sample. An example, showing part of a reporting proforma, is provided in Table 4 below.

Table 4. Example of data reporting: partial table

		Male	Female	Total
Estimated population (total in-scope population, not sample number)				
HH6	Number of individuals who used a computer (from any location) in the last 12 months			
HH8	Number of individuals who used the Internet (from any location) in the last 12 months			
HH9	Number of individuals who used the Internet at home in the last 12 months			
HH9	Number of individuals who used the Internet at work in the last 12 months			
HH9	Number of individuals who used the Internet at their place of education in the last 12 months			
HH9	Number of individuals who used the Internet at another person's home in the last 12 months			

Aggregation of response categories

34. New advice is included here on how to aggregate data on response categories (or 'response items'). Some countries may construct indicators for the 'complex' core indicators HH9, HH10, HH12 and HH13 based on more detailed response categories. For example, in the 'location of use' question in a country survey, the response category 'community Internet access facilities' could be comprised of the sub-categories, public libraries, digital community centres and other government agencies.

35. It is important to take care when aggregating response categories in order to construct the categories specified in the core indicators. In the example above, the proportion of Internet users accessing the Internet at community Internet access facilities is calculated by deriving the number of users who access the Internet at one or more of the locations, public libraries, digital community centres or other government agencies. Clearly, this aggregation has to be done at the unit record level rather than from aggregated data and gives a different answer than if the percentages or numbers accessing the Internet at each of the component locations are summed (this is because those individuals who use the Internet at more than one of these locations will be counted more than once).

Chapter 4. Use of ICT by businesses

Introduction

36. Statistics on business use of ICT are usually collected by NSOs using a stand-alone business ICT survey or through a module of ICT questions in another business survey. Most OECD and European Union countries have been collecting business ICT use statistics for a number of years and most have stand-alone surveys that are conducted annually. Other economies are starting to collect business ICT use indicators, using the core indicators methodological recommendations (*Partnership*, 2005a) and/or those of the OECD (2007) and Eurostat (2006 and 2007).

37. While the statistical standards for business ICT use statistics were originally developed by the OECD and Eurostat, the *Partnership* has played an important role in extending these standards to developing economies, via the core list of ICT indicators.

38. The core indicators on use of ICT by businesses are shown in Table 5.

Comparability of core indicator data

39. As with the household indicators, there are several specific comparability issues with respect to the core business ICT use indicators. They include variable industry and business size scope, variations in questions asked (for instance, business Internet activities and response categories for means of Internet access) and lack of current and time series data. See *Partnership* (2008) for a more detailed discussion of comparability issues.

Proposed revisions to the core indicators and associated standards

40. Recommendations for revising the core indicators and associated statistical standards address some of the comparability issues outlined above. They also align the indicators with current international standards and update them for policy relevance.

41. Proposed revisions to the core indicators are described below and detailed in Table 5. Changes are with reference to *Core ICT Indicators* (*Partnership*, 2005a) and are shown in bold in the table. They include:

1. The distinction between basic and extended core indicators has been removed; the extended core indicators are not significantly less available than other indicators; B9 and B12 are also highly relevant for policy purposes.
2. Some updates to means of Internet access (B9) reflect updates to ITU's definitions of technologies (*Telecommunication Indicators Handbook*; ITU, 2007a).

3. Other definitional changes and expansions have been incorporated (e.g. to the Internet, intranet, extranet and government organizations); some new definitions have been added (e.g. for Internet banking and other financial services).
4. Some indicator titles have been amended for consistency (with model questions, revised definitions or other indicators).
5. Some emphases have been added to clarify the definitions and address data comparability issues (for instance, access to the Internet is not only via a computer; multiple responses should be sought for indicators B9 and B12).
6. The definitions and concepts of employment affecting B2 and B4 have been clarified.
7. The Internet activity category 'sending or receiving email' has been broadened to 'communicating' and a definition added.
8. New Internet activity categories have been added to include use of the Internet for recruitment and for staff training (these are based on the OECD model questionnaire, see OECD, 2007).
9. The category, 'other information searches or research activities', has been removed. Data are not widely available and it is likely that they are not very comparable. Note that this does not preclude 'other' categories being included in country questionnaires.
10. The definition of the unit 'enterprise' has been explicitly defined based on current UNSD standards.
11. New advice on how to present and derive the core indicators, including aggregation of response categories, has been included.

Table 5. Proposed changes to the core indicators on use of ICT by businesses

Core indicator		Definitions and notes	Proposed changes
Basic core indicators			Suggest remove the distinction between basic and extended core indicators. It is not useful anymore.
B1	Proportion of businesses using computers	<p>The <i>proportion of businesses using computers</i> is calculated by dividing the number of in-scope businesses using computers during the 12-month reference period by the total number of in-scope businesses.</p> <p>A <i>computer</i> includes: a desktop, portable or handheld computer (e.g. a personal digital assistant), minicomputer and mainframe. A computer does not include equipment with some embedded computing abilities, such as mobile phones or TV sets, nor does it include computer-controlled machinery or electronic tills.</p>	No change
B2	Proportion of persons employed employees routinely using computers ¹⁷	<p>The <i>proportion of persons employed employees routinely using computers</i> is calculated by dividing the number of persons employed employees routinely using computers (in all in-scope businesses) by the total number of persons employed employees (in all in-scope businesses).</p> <p>Persons employed employees refer to all persons working for the business, not only those working in clerical jobs. They include short-term and casual employees, contributing family workers and self-employed persons. working proprietors and partners, as well as employees.</p>	<p>Slight change to indicator title to add 'routinely' based on the model question.</p> <p>Changed 'employees' to 'persons employed' to more accurately reflect the scope of the question (which includes self-employed as well as employees).</p> <p>Clarification of definition of employees based on UNCTAD (2007) and feedback on UNCTAD manual and to align with UNSD and ILO standards.</p>
B3	Proportion of businesses using the Internet	<p>The <i>proportion of businesses using the Internet</i> is calculated by dividing the number of in-scope businesses using the Internet by the total number of in-scope businesses.</p> <p>The <i>Internet</i> refers to Internet protocol (IP) based networks: WWW (the World Wide Web), intranet, extranet over the Internet, EDI over the Internet, Internet accessed by mobile phones and Internet email.</p> <p>Access to the Internet is not assumed to be only via a computer – it may also be by mobile phone, games machine, digital TV etc.</p>	<p>Changes to clarify that Internet access is not necessarily by computer only. Matches household core indicators.</p> <p>Changed definition of Internet to match OECD and for consistency (the definitions of intranet and extranet are based on use of Internet protocols).</p>

¹⁷ Note that this indicator is not equivalent to the employment weighted indicator 'proportion of persons employed working in businesses with a computer'.

Core indicator		Definitions and notes	Proposed changes
B4	Proportion of persons employed employees routinely using the Internet ¹⁸	The <i>proportion of persons employed employees routinely using the Internet</i> is calculated by dividing the number of persons employed employees routinely using the Internet (in all in-scope businesses) by the total number of persons employed employees (in all in-scope businesses).	Changes per B2.
B5	Proportion of businesses with a web presence	The <i>proportion of businesses with a web presence</i> is calculated by dividing the number of in-scope businesses with a web presence by the total number of in-scope businesses. A <i>web presence</i> includes a website, home page or presence on another entity's website (including a related business). It excludes inclusion in an on-line directory and any other web pages where the business does not have substantial control over the content of the page.	No change
B6	Proportion of businesses with an intranet	The <i>proportion of businesses with an intranet</i> is calculated by dividing the number of in-scope businesses with an intranet by the total number of in-scope businesses. An <i>intranet</i> refers to an internal communications network using Internet protocols and allowing communication within an organization (and to other authorized persons). It is typically set up behind a firewall to control access.	Slight change to definition of <i>intranet</i> based on UNCTAD (2007), with the addition of other authorized persons.
B7	Proportion of businesses receiving orders over the Internet	For international comparability, the <i>proportion of businesses receiving orders over the Internet</i> is most simply calculated by dividing the number of in-scope businesses receiving orders over the Internet by the total number of in-scope businesses. Alternatively, output can be presented as the proportion of in-scope businesses using the Internet. <i>Orders received</i> include orders received via the Internet whether or not payment was made on line. They include orders received via websites, specialized Internet marketplaces, extranets, EDI over the Internet, Internet-enabled mobile phones and email. They also include orders received on behalf of other organizations – and orders received by other organizations on behalf of the business. <i>Orders received</i> exclude orders that were cancelled or not completed.	No change

¹⁸ Note that this indicator is not equivalent to the employment weighted indicator 'proportion of persons employed working in businesses with Internet access'.

Core indicator		Definitions and notes	Proposed changes
B8	Proportion of businesses placing orders over the Internet	<p>For international comparability, the <i>proportion of businesses placing orders over the Internet</i> is most simply calculated by dividing the number of in-scope businesses placing orders over the Internet by the total number of in-scope businesses. Alternatively, output can be presented as the proportion of in-scope businesses using the Internet.</p> <p><i>Orders placed</i> include orders placed via the Internet whether or not payment was made on line. They include orders placed via websites, specialized Internet marketplaces, extranets, EDI over the Internet, Internet-enabled mobile phones and email.</p> <p><i>Orders placed</i> exclude orders that were cancelled or not completed.</p>	No change
Extended core indicators			Suggest remove the distinction between basic and extended core indicators. It is not useful anymore.
B9	Proportion of businesses using the Internet by type of access (narrowband, broadband)	<p>This indicator should be calculated as the proportion of in-scope Internet-using businesses that use each type of access service, for instance, the proportion of Internet-using businesses that use a broadband service as their means of access.</p> <p>For international comparability, output is most simply presented as the proportion of in-scope businesses using each type of access service, for instance, the proportion of businesses accessing the Internet by DSL. Additionally, output should be available for the aggregations, the proportion of businesses with broadband and narrowband access to the Internet. Alternatively, output can be presented as a proportion of businesses using the Internet.</p> <p>It is expected that countries will collect data at a finer level than 'narrowband' and 'broadband'. The categories chosen by countries should allow aggregation to total narrowband and total broadband, as defined below.</p> <p>As businesses can use more than one type of access service, multiple responses are possible.</p>	<p>Change in title to highlight narrowband and broadband.</p> <p>Clarification of calculation method. See also section on derivation and reporting of indicators below.</p> <p>Categories are now explicitly narrowband and broadband as shown below.</p> <p>The note on aggregation to narrowband and broadband has been expanded.</p>
	Narrowband	<p>Narrowband includes analogue modem (dial-up via standard phone line), ISDN (Integrated Services Digital Network), DSL at speeds below 256kbit/s, and mobile phone and other forms of access with an advertised download speed of less than 256 kbit/s.</p> <p>Note that narrowband mobile phone access services include CDMA 1x (Release 0), GPRS, WAP and i-mode.</p>	Note that, for guidance, the revised model question for this indicator will include a more detailed set of narrowband and broadband access technologies (revised to reflect technology updates).

Core indicator		Definitions and notes	Proposed changes
	Broadband	<p>Broadband includes Internet access services with an advertised download speed of at least 256 kbit/s, in one or both directions. Technologies include DSL (Digital Subscriber Line) at speeds of at least 256kbit/s, cable modem, high speed leased lines, fibre-to-the-home, powerline, satellite, fixed wireless, WiMAX and some mobile phone access services (3G and 3.5G).</p> <p>Broadband mobile phone access services include Wideband CDMA (W-CDMA), known as Universal Mobile Telecommunications System (UMTS) in Europe; High-speed Downlink Packet Access (HSDPA), complemented by High-Speed Uplink Packet Access (HSUPA); CDMA2000 1xEV-DO and CDMA 200 1xEV-DV.</p>	
B10	Proportion of businesses with a local area network (LAN)	<p>The <i>proportion of businesses with a LAN</i> is calculated by dividing the number of in-scope businesses with a LAN by the total number of in-scope businesses.</p> <p>A <i>local area network (LAN)</i> refers to a network connecting computers within a localized area such as a single building, department or site; it may be wireless.</p>	No change
B11	Proportion of businesses with an extranet	<p>The <i>proportion of businesses with an extranet</i> is calculated by dividing the number of in-scope businesses with an extranet by the total number of in-scope businesses.</p> <p>An extranet is a closed network that uses Internet protocols to securely share a business' information with suppliers, vendors, customers or other businesses partners. It can take the form of a secure extension of an Intranet that allows external users to access some parts of the business' Intranet. It can also be a private part of the business' website, where business partners can navigate after being authenticated in a login page.</p>	Definition of <i>extranet</i> expanded based on UNCTAD (2007).

Core indicator		Definitions and notes	Proposed changes
B12	Proportion of businesses using the Internet by type of activity	<p>The proportion of businesses that undertook each activity can be calculated as: either the proportion of in-scope businesses or the proportion of Internet-using businesses that undertook each activity.</p> <p>For international comparability, output is most simply presented as the proportion of in-scope individuals undertaking each activity, for instance, the proportion of individuals using the Internet to get information about goods or services. An alternative presentation is the proportion of Internet users undertaking each activity.</p> <p>For international comparability, output is most simply presented as the proportion of in-scope businesses undertaking each activity, for instance, the proportion of businesses using the Internet for sending or receiving emails. An alternative presentation is the proportion of business Internet users undertaking each activity.</p> <p>Note that the <i>Internet</i> refers to Internet protocol (IP) based networks: WWW (the World Wide Web), intranet, extranet, EDI over the Internet, Internet accessed by mobile phones and Internet email.</p> <p>Businesses should be asked about all Internet activities (that is, the question used by countries should specify multiple responses). Activities are not necessarily mutually exclusive.</p>	<p>Clarification of calculation method. See also section on derivation and reporting of indicators below.</p> <p>Suggested changes to categories are shown below.</p> <p>Advice has been added with respect to reporting of multiple activities.</p> <p>The meaning of 'Internet' has been reiterated so that it is clear that it includes IP based networks including intranets and extranets.</p>
	Communicating Sending or receiving email	Includes sending or receiving email, using message/bulletin boards, instant messaging, VoIP (Internet telephony), video conferencing.	Changed the title of the category to match household indicator, HH10. Added a definition based on that used for the household indicator (but including some technologies that are more likely to apply to businesses). Included VoIP explicitly and added video conferencing.
	Getting information		Suggest delete this as a broad category, consistent with HH.
	Getting information about goods or services		No change

Core indicator	Definitions and notes	Proposed changes
Getting information from general government organizations/public authorities via websites or email	<p>Government organizations/public authorities are preferably defined per the SNA93 (http://unstats.un.org/unsd/sna1993/glossform.asp?getitem=219). General government organizations should be consistent with the SNA93 (2008 revision) concept of general government. According to the SNA "... the principal functions of government are to assume responsibility for the provision of goods and services to the community or to individual households and to finance their provision out of taxation or other incomes; to redistribute income and wealth by means of transfers; and to engage in non-market production." (General) government organizations include central, state and local government units. They include government organizations at local, regional and national level.</p>	<p>Change title of indicator to more precisely reflect the institutional unit, general government.</p> <p>Expanded and amended definitions of government organizations (per SNA93, 2008 revision).</p>
Performing Internet banking or accessing other financial services	<p>Includes electronic transactions with a bank for payment, transfers, etc. or for looking up account information. Includes electronic transactions via the Internet for other types of financial services such as share purchases, financial services and insurance.</p>	<p>Slight title change.</p> <p>Added definition (based on Eurostat (2007)).</p>
Dealing Interacting with general government organizations/public authorities	<p>Interacting with government organizations includes downloading/requesting forms, completing/lodging forms on line, making on-line payments and purchasing from, or selling to, government organizations. It excludes getting information from government organizations.</p> <p>Government organizations/public authorities are preferably defined per the SNA93 (http://unstats.un.org/unsd/sna1993/glossform.asp?getitem=219). General government organizations should be consistent with the SNA93 (2008 revision) concept of general government). According to the SNA "... the principal functions of government are to assume responsibility for the provision of goods and services to the community or to individual households and to finance their provision out of taxation or other incomes; to redistribute income and wealth by means of transfers; and to engage in non-market production." (General) government organizations include central, state and local government units. They include government organizations at local, regional and national level.</p>	<p>Change title of indicator to more precisely reflect the institutional unit, general government. Slight change to exclude 'getting information' (based on UNCTAD, 2007).</p> <p>Expanded and amended definitions of government organizations (per SNA93, 2008 revision).</p>
Providing customer services	<p>Customer services include providing on-line or emailed product catalogues or price lists, product specification or configuration on line, after sales support, and order tracking on line.</p>	<p>No change</p>

Core indicator		Definitions and notes	Proposed changes
	Delivering products on line	Delivering products on line refers to products delivered over the Internet in digitized form, e.g. reports, software, music, videos, computer games; and on-line services, such as computer-related services, information services, travel bookings or financial services.	No change
	Internal or external recruitment	Including having details of vacant positions on an intranet or website.	Proposed new category based on comments received on the UNCTAD Manual and on a category in the OECD model questionnaire (OECD, 2007).
	Staff training	Includes e-learning applications available on an intranet or from the WWW.	Proposed new category based on comments received on the UNCTAD Manual and on a category in the OECD model questionnaire (OECD, 2007).
	Other information searches or research activities		Suggest delete this category. Data are not widely available and are likely to be less comparable than other indicators.

Mobile phone use by businesses

42. Discussions held with stakeholders on the core indicators on ICT use in business have frequently pointed to the need to collect the indicator “Proportion of businesses with a mobile phone”. Such an indicator could be particularly useful for measuring ICT use by micro- and small businesses in developing economies. However, in developed economies and among medium and large businesses, the indicator is unlikely to be useful and has therefore been excluded from this paper. Nevertheless, countries are encouraged to include such a question if they think it would provide useful information for policy makers. The indicator is reproduced for this purpose below.

Proportion of businesses with a mobile cellular telephone	<p>The <i>proportion of businesses with a mobile cellular telephone</i> is calculated by dividing the total number of in-scope businesses with a mobile cellular telephone by the total number of in-scope businesses.</p> <p>A <i>mobile cellular telephone</i> refers to a portable telephone subscribing to a public mobile telephone service using cellular technology, which provides access to the PSTN. This includes analogue and digital cellular systems, as well as IMT-2000 (3G). Users of both post-paid subscriptions and pre-paid accounts are included.</p>	This indicator is based on the household indicator HH4.
---	---	---

Units

43. No change is proposed to the recommended statistical unit, which is the 'enterprise'. However, the concept of an enterprise has been aligned with the System of National Accounts. SNA93 (2008 revision, UNSD, 2008b) describes an enterprise as follows: "An enterprise is the view of an institutional unit as a producer of goods and services. The term enterprise may refer to a corporation, a quasi-corporation, an NPI or an unincorporated enterprise." The UNSD publication *Draft International Recommendations for Industrial Statistics* (UNSD, 2008c) expands on the enterprise concept as follows:

"An institutional unit in its capacity as a producer of goods and services is known as an enterprise. An enterprise is an economic transactor with autonomy in respect of financial and investment decision-making, as well as authority and responsibility for allocating resources for the production of goods and services. It may be engaged in one or more economic activities at one or more locations. An enterprise may be a sole legal unit.

The enterprise is the smallest legal unit that is an organisational unit producing goods or services, which benefits from a certain degree of autonomy in decision-making, especially for the allocation of its current resources. An enterprise may, therefore, be a corporation (or quasi-corporation), a non-profit institution, or an unincorporated enterprise. Corporate enterprises and non-profit institutions are complete institutional units. On the other hand, the term "unincorporated enterprise" refers to an institutional unit - a household or government unit - only in its capacity as a producer of goods and services."

44. It should be noted that an enterprise is quite a broad institutional concept, including public (trading) corporations and unincorporated units that produce goods and services. The *Partnership* recommends that countries include public (trading) corporations within the scope of business ICT use surveys. If they wish to produce data for micro-enterprises (those with fewer than 10 persons employed), they should consider including

unincorporated producers of goods and services (which includes those from the informal sector).¹⁹

45. It is acknowledged that some countries may need to use establishment²⁰ surveys to collect data on business use of ICT. Where this is the case, it should be made clear in survey metadata as proportions data may not be comparable where different types of units are used (see *Partnership*, 2005a for a discussion of this point).

Scope and classificatory variables

46. No changes are proposed to the survey scope in respect of type of organization, that is, it remains those businesses (enterprises), from the private and public sectors that are operating in the country. General government organizations are excluded.

47. With respect to the industry (activity) scope applying to these indicators, there is no change in the recommended minimal scope as defined under ISIC Rev. 3.1. It remains: sections D, F, G, H, I and K (Manufacturing, Construction, Wholesale and retail trade etc, Hotels and restaurants, Transport, storage and communications, and Real estate, renting and business activities.²¹ With the introduction of ISIC Rev. 4, the recommended minimal scope will change. It will most likely become sections C, F, G, H, I, J, L, M and N, although more discussion on this point would be useful.²²

48. With respect to the size scope and size classification, a change has been made to replace 'employees' with 'persons employed'. According to the ILO (1993), persons employed include employees, employers,²³ own account workers,²⁴ members of producers' cooperatives and contributing family workers. A person employed may be paid or unpaid (for instance, a contributing family worker may be paid in kind rather than cash). An employee may be employed on a short-term, casual or seasonal basis.

¹⁹ According to UNSD (2008b), the informal sector as defined by the International Conference of Labour Statisticians "consists of a sub-set of household unincorporated enterprises with *at least some production for sale or barter* and they operate within the production boundary of the SNA. These units typically operate at a low level of organisation, with little or no division between labour and capital as factors of production and on a small scale. Labour relations, where they exist, are based mostly on casual employment, kinship or personal and social relations rather than contractual arrangements with formal guarantees. The informal sector thus defined excludes household enterprises producing exclusively for own final use."

²⁰ SNA93 (2008 revision) defines establishments as follows: "homogeneous units, which the System defines as establishments. An establishment is an enterprise, or part of an enterprise, that is situated in a single location and in which only a single productive activity is carried out or in which the principal productive activity accounts for most of the value added."

²¹ Note that this is a rather narrow scope, which should be achievable by most countries that collect business ICT use data. Many countries include other economic activities.

²² This is not a perfect correspondence with the minimal in-scope industries per ISIC Rev. 3.1. A better correspondence would require definition of the scope in terms of lower level categories (2 and 3 digit level). See draft of ISIC Rev. 4: <http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=27>. Feedback on country plans for the scope of future business ICT use surveys based on ISIC Rev. 4 (or national equivalents) would be useful.

²³ Employers are those working on their own account or with one or more partners, who hold the type of job defined as a 'self-employment job' and, in this capacity engage one or more employee(s).

²⁴ These are workers who, working on their own account or with one or more partners, hold the type of job defined as a 'self-employment job'.

49. The (minimum) recommended size scope becomes enterprises with 10 or more persons employed. Countries are encouraged to survey businesses with fewer than 10 persons employed (including unincorporated businesses). This can provide very useful information on the technological status of very small businesses.

50. Sub-indicators may be constructed for the business use indicators using the classificatory variables, size (in terms of persons employed) and industry. These are defined in *Partnership* (2005a) and presented below along with proposed changes.

Table 6. Changes to classificatory variables

Classificatory variables (revised)	Proposed changes and comments
<p>The existing industry output classification is based on ISIC Rev. 3.1 and is: manufacturing (ISIC D), construction (ISIC F), wholesale and retail trade etc (including repair of motor vehicles, motorcycles and personal and household goods) (ISIC G), hotels and restaurants (ISIC H), transport, storage and communications (ISIC I), and real estate, renting and business activities (ISIC K).</p> <p>With the introduction of ISIC Rev. 4, the proposed industry output classification is likely to become sections C, F, G, H, I, J, L, M and N.</p>	<p>No change under ISIC Rev. 3.1. However, many economies collect data for more industries than this (for instance, including ISIC J, Finance) and at a greater level of detail. The recommended categories should therefore be achievable by most countries that collect business ICT use data.</p> <p>Note that the introduction of ISIC Rev. 4 will change 1-digit industries and their descriptions.</p>
<p>The revised size classification is defined in terms of persons employed and is: 1–9, 10–19, 20–49, 50–249 and 250 or more persons employed.</p>	<p>The concept of employees has been replaced by 'persons employed'. A range of 1-9 persons employed has been added to the size classification because use of ICT by businesses with fewer than 10 persons employed is of great policy interest for many countries (while the minimum recommended scope remains those businesses with 10 or more persons employed, countries are encouraged to expand the scope to include very small businesses and to tabulate data on that basis). The previous size class 10-49 has been split to 10-19 and 20-49. This provides more information on small businesses and conforms to UNSD size recommendations (UNSD, 2008c).</p>

Derivation and reporting of the core ICT indicators

How to provide core indicator data to international agencies

51. The principles outlined in this section are the same as those for the household indicators. *Core ICT Indicators* recommended that, for international reporting purposes, countries provide proportions using the total population as the denominator. While this is the obvious denominator for the simple indicators (such as proportion of businesses using computers), it is one of two options for the more complex indicators (such as the proportion of businesses using the Internet for providing customer services). The alternative, in the second case, is the proportion of Internet-using businesses that use the Internet for providing customer services.

52. Following the practices of ITU and UNCTAD, it is now suggested **that countries report numbers of businesses rather than proportions or percentages**. Population estimates for the total population, and for each sub-population (as indicated by the classificatory variables), also need to be provided so that proportions can be derived. Both sets of numbers should represent the whole population and not the sample. See Table 4 for an example.

Aggregation of response categories

53. The same advice offered for the complex household indicators applies to the business use indicators B9 and B12, that is, it is important to take care when aggregating response items in order to construct the categories specified in the core indicators. Proportions are calculated by deriving the number of businesses who (for B9) access the Internet in one or more ways (or, for B12, undertake one or more activities). Aggregation is done at the unit record level rather than from aggregated data.

Chapter 5. The ICT (producing) sector

Introduction

54. The core ICT indicators for the ICT sector are ICT1 and ICT2. They are shown in Table 8 below. Statistics on the ICT sector are usually compiled from the output of sectoral surveys that collect employment, income and expense data for national accounts and other purposes. While some countries specifically survey the ICT sector, most use available industry statistics. Particular *ICT* characteristics of these statistics include the definition of the ICT sector (see boxes 1 and 2 below) and definitions of the variables used in the core indicators.

55. OECD and Eurostat compile ICT sector data based on the collections of their member countries. UNCTAD collects ICT sector core indicator data from its member countries. The United Nations Industrial Development Organization (UNIDO) compiles manufacturing industry statistics (including those relevant to the ICT manufacturing industries) for a number of countries.²⁵

56. The ICT sector definition for the core ICT indicators in current use dates from 2002 and is based on ISIC Revision 3.1 (UNSD, 2002). It is shown in Box 1.

57. A more recent version, based on ISIC Rev. 4 (UNSD, 2008d) was released by the OECD in 2007 and is shown in Box 2. More information on the 2007 version may be found in Annex 1b of OECD's *Guide to Measuring the Information Society* (2007).

58. Note that the 2007 definition of the ICT sector simplifies the ICT definition by narrowing it (see the note in Box 1). It is also likely to be better aligned with national equivalent industry classifications, thus reducing one source of non-comparability. ISIC Rev. 4 also deals with ICT industries better than Rev. 3.1 and has fewer 4 digit categories. In the 2007 definition of the ICT sector, there are 2 divisions (2 digit), 8 groups (3 digit) and 2 classes (4 digit); the 2002 definition comprises 3 divisions, 2 groups and 5 classes.

Comparability of core indicator data

59. ICT sector indicators (ICT1 and ICT2) are usually collected via general industry surveys used as inputs for national accounts (and often other requirements). They are therefore not generally ICT-specific. Unfortunately, the definition of the ICT sector requires data collection at the detailed (4-digit) industry level and this level of detail is not required for national accounts purposes. The result is that many countries are not able

²⁵ UNIDO's *INDSTAT4* (2007) database contains time series data for 113 countries. Data from non-OECD countries are collected from NSOs by UNIDO (and data from OECD member countries are collected by OECD and provided to UNIDO). All data are supplemented by estimates generated by UNIDO (UNIDO, 2007).

to provide ICT sector data and those that do frequently cannot provide data according to the international standard definition of the ICT sector.

60. While data comparability problems are most marked for the definition of the ICT sector used by different countries, they also affect the definition of the business sector (the denominator in the calculation of the ratios). Differences in the scope of the business sector include whether the financial sector is included or excluded (it is included by most but not all European countries). Other differences no doubt exist but are not generally well described by countries.

61. Other comparability issues include:

- Currency. Much of the data are relatively dated, with quite a large number of economies only having data available for 2003 or earlier and only a small number having data for 2006.
- Conceptual differences, for example, valuation of value added (Table 7) and the definition of the workforce. As the core indicators are ratios, it is hoped that such differences would not have a significant effect on data comparability.
- It is likely that a relatively poor correspondence between ISIC Rev. 3.1 and national equivalent classifications in respect of the ICT sector is also a cause of non-comparability for some countries.

Box 1. The 2002 OECD ICT sector definition (based on ISIC Rev. 3.1)

ICT Manufacturing

- 3000 Manufacture of office, accounting and computing machinery
- 3130 Manufacture of insulated wire and cable*
- 3210 Manufacture of electronic valves and tubes and other electronic components
- 3220 Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
- 3230 Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods
- 3312 Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment*
- 3313 Manufacture of industrial process control equipment*

ICT Services

- 5151 Wholesale of computers, computer peripheral equipment and software
- 5152 Wholesale of electronic and telecommunications parts and equipment
- 6420 Telecommunications
- 7123 Renting of office machinery and equipment (including computers)
- 72 Computer and related activities

* Note that the activity of these classes is excluded from the OECD's 2007 definition of the ICT sector.

Source: *Guide to Measuring the Information Society* (OECD, 2007).

Box 2. The 2007 OECD ICT sector definition (based on ISIC Rev. 4)

ICT manufacturing industries

- 2610 Manufacture of electronic components and boards
- 2620 Manufacture of computers and peripheral equipment
- 2630 Manufacture of communication equipment
- 2640 Manufacture of consumer electronics
- 2680 Manufacture of magnetic and optical media

ICT trade industries

- 4651 Wholesale of computers, computer peripheral equipment and software
- 4652 Wholesale of electronic and telecommunications equipment and parts

ICT services industries

- 5820 Software publishing
- 61 Telecommunications
- 62 Computer programming, consultancy and related activities
- 631 Data processing, hosting and related activities; Web portals
- 951 Repair of computers and communication equipment

Source: Guide to Measuring the Information Society (OECD, 2007).

62. The concept, ‘value added’, is used in the indicator, ICT2, and is defined by the SNA 1993 as “the value of output less the value of intermediate consumption; it is a measure of the contribution to GDP made by an individual producer, industry or sector; gross value added is the source from which the primary incomes of the SNA are generated and is therefore carried forward into the primary distribution of income account.” (UNSD website). Note that the concept defined here and used in ICT2 is ‘gross value added’; ‘net value added’ is gross value added less the consumption of fixed capital. Value added can be calculated in various ways as shown in Table 7. Most countries appear to use value added at factor costs.

Table 7. Valuation of value added (used in ICT2)

Value added at factor costs	(1). These consist mostly of current taxes (and subsidies) on the labour or capital employed, such as payroll taxes or current taxes on vehicles and buildings.
+ other taxes, less subsidies, on production (1)	
= Value added at basic prices	
+ taxes less subsidies, on products (2) (not including imports and VAT)	(2). These consist of taxes (and subsidies) payable per unit of some good or service produced, such as turnover taxes and excise duties.
= Value added at producers' prices	
+ taxes, less subsidies, on imports	(3). Market prices are those that purchasers pay for the goods and services they acquire or use, excluding deductible VAT. The term is usually used in the context of aggregates such as GDP, whereas purchaser prices refer to the individual transactions.
+ Trade and transport costs	
+ Non-deductible VAT (value added tax)	
= Value added at market prices (3)	

Source: *Core ICT Indicators, Partnership* (2005a), based on concepts outlined in both the 1968 and 1993 versions of the System of National Accounts (SNA68 and SNA93).

Proposed revisions to the core indicators and associated standards

63. Ideally, the *Partnership* would review the definitions of the ICT sector and/or the total business sector used by countries and suggest more comparable and useable definitions. However, the areas where countries diverge from the definitions specified for the core indicators are diverse, thus reducing the options available for standardization.

64. A better solution is probably to encourage countries to conform to the incoming 2007 ICT sector definition, based on ISIC Rev. 4, once their statistical agencies have implemented that classification (or their national equivalent). The implementation of ISIC Rev. 4 presents an opportunity for countries to re-design their industrial statistics programs and, in the process, change measurement practices for the ICT sector.

65. Proposed revisions to the core indicators are described in Table 8. They reflect changes in the definition of the ICT sector, based on ISIC Rev. 4, plus emphases on some aspects of the existing concepts and definitions. Given the lack of information available on country practices covering concepts and definitions of the ICT and business sectors, it is recommended that agencies that collect ICT sector data, collect more metadata on the indicators and provide it to international organizations that collect ICT sector data.

66. The core indicators and proposed changes are shown below.

Table 8. Proposed changes to the core indicators for the ICT (producing) sector

Core indicator		Definitions and notes	Proposed changes
ICT1	Proportion of total business sector workforce involved in the ICT sector (usually expressed as a percentage)	<p><i>ICT workforce</i> (or ICT employment) consists of those persons employed in businesses that are classified as belonging to the ICT sector. <i>Total business workforce</i> represents all persons engaged in domestic production in the business sector. In a national accounts framework, employment can be measured in terms of headcounts, jobs, full-time equivalents (FTE) or hours worked.</p> <p>For countries using ISIC Rev. 3/Rev 3.1 (or national equivalents), the ICT sector is defined per the OECD's 2002 definition. This can be found in Box 1 and is discussed in detail in OECD (2007).</p> <p>For countries using ISIC Rev. 4 (or national equivalents), the ICT sector is defined per the OECD's 2007 definition. This can be found in Box 2 and is discussed in detail in OECD (2007).</p> <p>The total business sector is defined on an activity (industry) basis per ISIC Rev. 3.1 as divisions 10–67 and 71–74. It therefore excludes: agriculture, hunting, forestry and fishing; real estate activities (because a significant proportion of the value added of the latter consists of imputed rent of owner-occupied dwellings); and, community, social and personal services (which consists mainly of non-market activities such as public administration, education and health services).</p> <p>For countries using ISIC Rev. 4, the total business sector is not so easily defined. It will most likely include the equivalent divisions 05 to 36, 41-66, 69-82 and 95. Discussions are ongoing on whether it should include some industries that were not included in the Rev. 3.1 definition of the total business sector (divisions 37-39, 90-93 and 96).²⁶</p>	<p>Changes to reflect the introduction of ISIC Revision 4 and a revised (2007) definition of the ICT sector.</p> <p>More emphasis on the definitions of the ICT and total business sectors.</p> <p>Note that ISIC Rev. 4 deals with ICT industries better than Rev. 3.1 and has fewer 4 digit categories. The 2007 definition is also narrower than the 2002 definition (see boxes 1 and 2).</p> <p>Countries that are using ISIC Rev. 4 or national equivalents should use the 2007 definition of the ICT sector shown in Box 2.</p>

²⁶ See draft ISIC Rev. 4: <http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=27>.

Core indicator	Definitions and notes	Proposed changes
ICT2	<p>ICT sector share of gross value added in the ICT sector (expressed as a percentage of total business sector gross value added).</p> <p>Gross value added for a particular industry represents its contribution to national GDP. It is sometimes referred to as GDP by industry and is not directly measured (but is estimated in a national accounts framework). In general, it is calculated as the difference between production (gross output) and intermediate inputs (the energy, materials and services required to produce final output). See also Table 7.</p> <p>Definitions of the ICT and total business sector are per ICT1.</p>	<p>Wording changes to indicator title as shown.</p> <p>Clarification that value added is calculated on a gross basis, changes are shown in bold.</p> <p>ICT sector changes as above.</p>

Units and scope for ICT sector surveys

67. Statistical units and survey scope will generally be determined by requirements other than those for ICT sector data. There appears to be a diversity of units and size scope used in surveys that measure the ICT sector. For example, the metadata for the UNIDO database indicates that the scope and units for manufacturing industry statistics (including ICT manufacturing) are variable, including both enterprises and establishments, many with a size cutoff of 5 or 10 employees. Most countries that undertake Eurostat structural business statistics surveys use the enterprise as the statistical unit.²⁷

68. In terms of institutional sector classifications, ideally, ICT sector surveys would include private and public corporations. Countries should also consider including unincorporated units that are enterprise/establishment producing units in ICT sector surveys. This would enable measurement of the ICT production activities of the informal sector (in principle) and other (generally) small businesses.

²⁷ Enterprise units have the advantage that certain measures may only be available at enterprise level (e.g. R&D expenditure). Establishments have the advantage of enabling a finer breakdown, are less likely to have multiple activities and have better links to output by product data.

Chapter 6. International trade in ICT goods

Introduction

69. The core ICT indicators for international trade in ICT goods are ICT3 and ICT4. They are shown in Table 9. The core indicators on trade in ICT goods use administrative trade data collected by individual countries for customs purposes. The data are ultimately brought together by the United Nations Statistics Division (UNSD) in the United Nations Commodity Trade Statistics Database (*UN COMTRADE*) (UNSD, 2008e). Particular *ICT* characteristics of these indicators include the definition of ICT goods, and sources and concepts relating to international trade statistics.

70. The definition of ICT goods associated with the core indicators on trade (ICT3 and ICT4) is that agreed by OECD member countries in 2003. It is based on the Harmonized System (HS) classifications of 2002 and 1996, and can be found at Annex 6 of UNCTAD (2007).

Proposed revisions to the core indicators and associated standards

71. There are no changes proposed to the core indicators and standards at this stage. However, it should be noted that the OECD is currently developing an ICT products²⁸ classification based on the UNSD's Central Product Classification Version 2. The ICT goods component of this classification will also be available as a Harmonized System (HS2007) correspondence for application to trade statistics. The revised ICT product classification is due to be released in 2009 and will, via its correspondence with HS2007, change the ICT goods classification on which the core indicators are based. The core indicators and associated standards are shown below.

²⁸ The term 'products' covers both goods and services.

Table 9. Proposed changes to the core indicators for trade in ICT goods

Indicator		Definitions	Proposed changes
ICT3	ICT goods imports as a percentage of total imports	<p><i>ICT goods</i> are defined per the OECD's 2003 ICT goods classification, based on the 1996 and 2002 Harmonized System classification. It can be found in UNCTAD (2007).</p> <p>Other concepts are per the <i>UN COMTRADE</i> database e.g. re-exports and re-imports are not netted out, and data are presented in US dollars (converted by the UN from country currencies).</p>	<p>ICT goods definition changes, in HS2007 terms, will be available in 2009, following revisions to OECD's ICT products definition (which is based on the CPC Ver. 2 but will be converted to a HS2007 basis). The new definition of ICT goods will be narrower than the current version.</p> <p>Agencies compiling trade data may need to use an adapted version of the current definition to provide compatible time series data.</p>
ICT4	ICT goods exports as a percentage of total exports		

Chapter 7. Indicators on ICT in education

Introduction²⁹

72. This chapter describes a proposed set of indicators on ICT in education. These indicators are new to the list of core ICT indicators, although they have been in development by the UNESCO³⁰ Institute for Statistics (UIS) for several years. They have been subject to extensive testing and consultation processes, both of which are briefly described in this chapter.

73. Under the right conditions, ICT can have a significant impact on the expansion of learning opportunities to wider populations. Technologies can improve the teaching/learning process by reforming conventional delivery systems, enhancing quality of learning achievements, facilitating state-of-art skills formation, sustaining lifelong learning, and improving institutional management.

74. ICTs are perceived as supporting tools to the conventional educational service delivery model and not as substitutes for it. ICTs include older technologies that are still affordable and widely available in the majority of countries (for example, radio and television) and newer technologies (such as computers and the Internet) which may be expensive to introduce, especially in rural areas of developing economies.

Selection process and principles

75. UIS is leading the *Partnership* Task Group on Education, the main role of which has been to develop and collect a core set of internationally comparable indicators on the role of ICT in education. At WSIS 2005 in Tunis, the UIS proposed a core set of nine indicators for measuring ICT in education. These are presented in Table 10.

²⁹ Most of the material for this chapter has been taken from the UIS background paper “Proposal for internationally comparable core indicators on ICTs in education” provided for the 2008 Global Event on Measuring the Information Society, Geneva, 27-29 May 2008. See <http://www.uis.unesco.org/template/pdf/csl/ICT/bckgrdcore.pdf>. Minor modifications have been made to the indicators for consistency with other core ICT indicators. These include re-numbering and terminology changes.

³⁰ United Nations Educational, Scientific and Cultural Organization.

Table 10. Proposed core indicators for measuring ICT in education

ED1	Proportion of schools with a radio used for educational purposes (by ISCED level 0 to 4)
ED2	Proportion of schools with a TV used for educational purposes (by ISCED level 0 to 4)
ED3	Proportion of schools with a telephone communication facility, by type (by ISCED level 1 to 3)
ED4	Student-to-computer ratio (by ISCED level 0 to 4)
ED5	Proportion of schools with Internet access, by type (by ISCED level 1 to 3)
ED6	Proportion of students who have access to the Internet at school (by ISCED level 0 to 4)
ED7	Proportion of students enrolled by gender at the tertiary level in ICT-related fields (for ISCED levels 5 and 6)
ED8	Proportion of ICT-qualified teachers in primary and secondary schools
Reference indicator	
EDR1	Proportion of schools with electricity (by ISCED level 1 to 3) ³¹

76. These indicators were based on the results of a number of surveys and studies conducted between 1997 and 2005.³² The indicators presented at WSIS in 2005 were considered to encompass the minimum number of indicators needed to cover the breadth of ICT implementation, while keeping their collection feasible and relevant to a majority of countries. In particular, UIS wished to avoid imposing a high statistical burden on least developed economies.

77. The selection of the core ICT indicators was influenced by the outcomes of the stock-taking exercise³³ that was carried out in 2004 by UN Regional Commissions³⁴ in order to identify readily available information society indicators. In 2006-07, the UIS carried out a similar stock-taking exercise through its annual global education survey. The core indicators selection process also took into consideration regional priorities as expressed through more specific sets of ICT indicators for monitoring information society goals at regional levels. Originally, UNECA³⁵ and UNESCWA³⁶ were the only regional organisations that had worked on such regional sets of indicators but recently UNECLAC³⁷ has undertaken similar work.

78. As part of a validation process, the core indicators proposed by the UIS have been presented and discussed at a series of regional meetings organized in collaboration with UN Regional Commissions.³⁸ Country representatives and experts at these regional meetings supported the collection of a limited set of indicators that allow international comparison of countries' progress in the use of ICT in expanding learning opportunities and meeting international education goals. The most common comment expressed was the need for improved standardization of definitions and methodologies to support national data collection and capacity building initiatives.

³¹ Since electricity is not specifically an ICT commodity, but an important prerequisite for using many ICTs, it is not included in the core list, but included as a reference indicator. International studies reviewed by UIS revealed that the lack of electricity is such a significant barrier in many developing economies that monitoring trends of its provision is as relevant as monitoring the supply and use of ICT.

³² These are detailed in Table 2 of UIS (2008) on which this chapter is based.

³³ *Measuring ICT: The Global Status of ICT Indicators (Partnership, 2005b)*, <http://measuring-ict.unctad.org>.

³⁴ UNECA, UNECLAC, UNESCAP, UNESCWA and UNCTAD (on behalf of UNECE).

³⁵ United Nations Economic Commission for Africa.

³⁶ United Nations Economic and Social Commission for Western Asia.

³⁷ United Nations Economic Commission for Latin America and the Caribbean.

³⁸ Panama and El Salvador (UNECLAC), Bangkok (UNESCAP), Cairo (UNESCWA) and Addis Ababa (UNECA). UNESCAP is the United Nations Economic and Social Commission for Asia and the Pacific.

79. The key principles for determining the indicators are detailed in UIS (2008). In brief, they are:

- The maximum probability of a response from all countries regardless of their capacity constraints and level of development;
- Minimization of the data collection burden on countries, given the current paucity of data on ICT in national statistical systems;
- Avoidance of duplication of data collection on education within countries;
- Sustainability of international data collection modalities of ICT in education data;
- Consistency of the core indicators with the state of knowledge regarding impact issues; and
- The promotion of a policy-relevant set of indicators at global level.

80. Information on the availability of the proposed education indicators can be found in UIS (2008).

The proposed core indicators on ICT in education

81. Table 11 below shows details of the proposed core indicators, including definitions, purpose, data requirement, methodological and other relevant information.

Table 11. Core indicators on ICT in education: details

ED1 Proportion of schools with a radio used for educational purposes (by ISCED³⁹ level 0 to 4)	
<p>Definition:</p> <p>Schools offering radio-based education as a percentage of the total number of schools in the country for each ISCED level (0-4).</p>	<p>Purpose:</p> <p>To measure the overall presence of radio-based education in schools.</p>
<p>Data requirement:</p> <ul style="list-style-type: none"> • Total number of both public and private schools providing radio-based education at ISCED levels 0 to 4. • Total number of both public and private schools at ISCED levels 0 to 4. 	<p>Method of collection:</p> <p>Administrative data collection through annual school census (based on school registers).</p>
	<p>Data source(s):</p> <p>Statistical units of ministries of education or, alternatively, national statistical offices.</p>
<p>Interpretation:</p> <p>A high percentage or value for this indicator shows that radio-based technologies are a widespread mode of instruction within schools in a given country. Such situation reflects only a high accessibility or availability of this mode of delivery in schools but not the actual intensity of use.</p> <p>By comparing this indicator to the proportion of other modes of delivery using ICT facilities, one can figure which are the most predominant or least accessible ICTs used for teaching and learning purposes within or across countries.</p>	<p>Methodological and definition issues or operational limitations:</p> <ul style="list-style-type: none"> • Radio-based education includes both radio broadcast education and interactive radio instruction (IRI) – <i>see the Glossary</i>. • A radio is considered to be a stand-alone device (in working condition) capable of receiving broadcast radio signals, using popular frequencies (such as FM, AM, LW and SW). Unless they are intentionally used for educational purposes, radio sets integrated into other devices (such as a walkman, in motor vehicles, an alarm clock, audio cassette or CD players/recorders, portable radios like transistor radios) must be excluded from the data provided.

³⁹ ISCED is the International Standard Classification of Education, 1997, for which UNESCO is responsible. Please see the section *Classificatory variables* later in this chapter for a description of ISCED levels. Detailed information can be found in UIS (2008) <http://www.uis.unesco.org/template/pdf/cscl/ICT/bckgrdcore.pdf>.

ED2 Proportion of schools with a TV used for educational purposes (by ISCED level 0 to 4)	
<p>Definition:</p> <p>Schools offering television-based education as a percentage of the total number of schools in the country for each ISCED level (0-4).</p>	<p>Purpose:</p> <p>To measure the overall presence of television-based education in schools. It measures only accessibility of this mode of delivery in schools but not the actual intensity of use.</p>
<p>Data requirement:</p> <ul style="list-style-type: none"> • Total number of both public and private schools providing television-based education at ISCED levels 0 to 4. • Total number of both public and private schools at ISCED levels 0 to 4. 	<p>Method of collection:</p> <p>Administrative data collection through annual school census (based on school registers).</p>
	<p>Data source(s):</p> <p>Statistical units of ministries of education or, alternatively, national statistical offices.</p>
<p>Interpretation:</p> <p>A high percentage or value for this indicator shows that television-based technologies are a widespread mode of instruction within schools in a given country.</p> <p>In comparison to the value of other modes of ICT-based educational service delivery, its value indicates which are the most accessible or the least accessible or predominant use of ICT for teaching and learning within or across countries.</p>	<p>Methodological and definition issues or operational limitations:</p> <ul style="list-style-type: none"> • A TV (television set) is considered to be a stand-alone device (in working condition) capable of receiving broadcast television signals using popular access means (such as over-the-air, cable and satellite). TV broadcast receivers integrated into other devices (such as a computer, PDA, Smartphone or mobile phone) are considered only if their intended use is for educational purposes. Video recorders/ players used for off-the-air educational content delivery must be counted as part of a TV set, since without the TV screen video content cannot be displayed.

<p>ED3 Proportion of schools with a telephone communication facility, by type⁴⁰ (by ISCED level 1 to 3)</p> <ul style="list-style-type: none"> • fixed line telephone • mobile cellular telephone • other telephone communication facility • any telephone communication facility 	
<p>Definition:</p> <p>Schools with telephone communication facilities as a percentage of the total number of schools in the country for each ISCED level (1-3). Note that the facility should be directly associated with the school and available for educational purposes. For instance, a mobile phone which is owned by an individual working at the school would not constitute a school <i>telephone communication facility</i>.</p>	<p>Purpose:</p> <p>To measure the availability of minimum pre-requisite conditions for Internet accessibility in schools.</p>
<p>Data requirement:</p> <ul style="list-style-type: none"> • Total number of both public and private schools with telephone communication facilities at ISCED levels 1 to 3. • Total number of both public and private schools at ISCED levels 1 to 3. 	<p>Method of collection:</p> <p>Administrative data collection through annual school census (based on school registers).</p>
	<p>Data source(s):</p> <p>Statistical units of ministries of education or, alternatively, national statistical offices.</p>
<p>Interpretation:</p> <p>A low percentage or value for this indicator reveals that challenges remain for policymakers to have Internet connectivity available at schools.</p>	<p>Methodological and definition issues or operational limitations:</p> <p>Use a classification variable to distinguish telephone access that does or not warrant public usage. However, some privately-owned devices may serve as a liaison channel with the outside world.</p> <p>Telephone access which is primarily limited to administrative use (and not for instructional purposes) should be considered separately.</p>

⁴⁰ The widespread availability of data split by type of telephone communication facility is yet to be determined.

ED4 Student-to-computer ratio (by ISCED level 0 to 4)	
<p>Definition:</p> <p>Average number of students per computer in schools that offer computer-assisted instruction (CAI) by each ISCED level (0-4).</p>	<p>Purpose:</p> <p>To measure the possibilities available for the use of computers in schools to promote or expand computer-assisted instruction.</p>
<p>Data requirement:</p> <ul style="list-style-type: none"> • Total number of students enrolled in grades where computer-assisted instruction is officially offered in schools of a given country by each ISCED level (0-4). • Total number of computers for students' use only in schools providing computer-assisted instruction (CAI) by each ISCED level (0-4). 	<p>Method of collection:</p> <p>Administrative data collection through annual school census (based on school registers).</p>
	<p>Data source(s):</p> <p>Statistical units of ministries of education or, alternatively, national statistical offices.</p>
<p>Interpretation:</p> <p>In the absence of nationally defined norms, a ratio of 1 student to 1 computer reveals a perfect adequacy of provision of computer-assisted instruction (CAI) to all students officially entitled to benefit from it in schools. Where national benchmarks exist, a student/computer ratio higher than the officially set norm means that more efforts are required from policymakers to equip schools in order to ensure equitable opportunity for all entitled students across the country.</p> <p>However, this ratio must be seen in the context of the overall proportion of schools that offer CAI in each country. Also, it is important to recognize where data reflect a broad-based nation-wide implementation as opposed to a number of small pilot projects.</p>	<p>Methodological and definition issues or operational limitations:</p> <ul style="list-style-type: none"> • Further methodological work will be required to test more robust measures than a simple average (i.e. median, percentiles) in order to improve cross-country comparisons. • This ratio is an indicator of potential access to computers for educational purposes. It is neither a measure of actual use of computers in schools nor of time spent by students for computer-assisted instructions.

ED5 Proportion of schools with Internet access, by type⁴¹ (by ISCED level 1 to 3): <ul style="list-style-type: none"> • Narrowband Internet access • Broadband Internet access • any Internet access 	
Definition: Schools with access to the Internet as a percentage of the total number of schools in the country for each ISCED level (1-3).	Purpose: To measure the overall presence of the Internet in schools.
Data requirement: <ul style="list-style-type: none"> • Total number of both public and private schools providing Internet access at ISCED levels 1 to 3. • Total number of both public and private schools at ISCED levels 1 to 3. 	Method of collection: Administrative data collection through annual school census (based on school registers).
	Data source(s): Statistical units of ministries of education or, alternatively, national statistical offices.
Interpretation: A high percentage or value for this indicator shows the extent to which Internet accessibility is prevalent within schools in a given country.	Methodological and definition issues or operational limitations: This indicator measures only the availability of Internet access in schools but not the intensity of use and time spent on it by students for learning purposes.

⁴¹ Narrowband refers to an Internet access service with an advertised download speed of less than 256 kbit/s. Broadband refers to an Internet access service with an advertised download speed of at least 256 kbit/s, in one or both directions. The widespread availability of data split by type of Internet access is yet to be determined.

ED6 Proportion of students who have access to the Internet at school (by ISCED level 0 to 4)	
<p>Definition:</p> <p>Total number of students with access to the Internet in schools as percentage of the total number of students in schools for a given country by each ISCED level (0-4).</p>	<p>Purpose:</p> <p>To measure the accessibility to Internet use for educational purposes by students.</p>
<p>Data requirement:</p> <ul style="list-style-type: none"> • Total number of students enrolled in grades where Internet accessibility is offered and scheduled in the school curricula of a given country by each ISCED level (0-4). • Total number of students enrolled only in the schools providing Internet access to students for educational purposes in a country by each ISCED level (0-4). 	<p>Method of collection:</p> <ul style="list-style-type: none"> • Administrative data collection through annual school census (based on school registers); or alternatively • Sample school survey or household survey (self-reported item response by household members attending ISCED levels 0 to 4).
	<p>Data source(s):</p> <p>Statistical units of ministries of education or, alternatively, national statistical offices.</p>
<p>Interpretation:</p> <p>A high percentage for this indicator suggests greater access to the Internet for students. However, in order to have a better sense of its potential effectiveness, one needs to match the number of students with Internet access entitlement to the number of computers used for instructional purposes that are connected to the Internet.</p> <p>Depending on the pedagogical need, 100% access to the Internet for all students may not be an intentional educational goal for all grades.</p>	<p>Methodological and definition issues or operational limitations:</p> <ul style="list-style-type: none"> • Distortion may be possible with some private (or even public) or some specialized institutions offering Internet access from a nationally defined grade or age of students. • The type of bandwidth for Internet connectivity in schools as well as the number of simultaneous users can constrain the amount of Internet resources accessible within a given time span. • This ratio remains theoretical as it does not account for the actual use or frequency of use of the Internet by students.

ED7 Proportion of students enrolled by gender at the tertiary level in ICT-related fields (for ISCED levels 5 and 6)	
Definition: Number of students currently admitted in ICT-related fields ⁴² by gender as a percentage of all students enrolled in educational institutions in a given country by gender for ISCED levels 5 and 6 (combined).	Purpose: To measure the share of students in ICT-related fields of study in tertiary education institutions.
Data requirement: <ul style="list-style-type: none"> • Total number of students by gender enrolled in ICT-related fields in tertiary education institutions in a given country at ISCED levels 5 to 6. • Total number of students by gender enrolled in tertiary education institutions regardless of their fields of study in a given country for ISCED levels 5 to 6. 	Method of collection: Administrative data collection through annual school census (based on school registers).
	Data source(s): Statistical units of ministries of education or, alternatively, national statistical offices.
Interpretation: A high percentage for this indicator may indicate an important demand for ICT-related studies by students in relation to other fields of study. Compared to its value over time, a rapidly increasing percentage may suggest a fast adaptation to the new information age by a country in the provision of larger training opportunities in ICT-related fields. It should be expected that this ratio reaches a level of saturation whereby increases become marginal. A computation of this indicator by key sub-categories may be useful to monitor more adequately some specific sub-fields of studies.	Methodological and definition issues or operational limitations: Further mapping and classificatory work will be required to re-code within the ISCED fields of study those fields that have emerged after 1997.

⁴² ICT-related fields include computer science, computer engineering, information and communication technology, information systems, multimedia systems, ICT management, system support and software development, informatics, etc. These are represented by ISCED97 Fields of Study 48-Computing, together with elements of 21-Arts (audio-visual, media production and design) and 52-Engineering (electronics and automation). These fields involve substantial work in understanding the technical aspects of ICT rather than a more generic or basic use of ICT.

ED8 Proportion of ICT-qualified teachers in primary and secondary schools	
<p>Definition:</p> <p>Number of primary and secondary teachers who have received ICT training, expressed as a percentage of the total number of teachers at these levels of education.</p>	<p>Purpose:</p> <p>To measure the extent to which primary and secondary school teachers receive ICT training.</p>
<p>Data requirement:</p> <ul style="list-style-type: none"> • Total number of teachers in primary and secondary schools regardless of subject(s) taught. • Total number of teachers who have received ICT training in primary and secondary schools. 	<p>Method of collection:</p> <p>Administrative data collection through annual school census (based on school registers).</p>
	<p>Data source(s):</p> <p>Statistical units of ministries of education or, alternatively, national statistical offices.</p>
<p>Interpretation:</p> <p>A high percentage of ICT-qualified teachers among the overall teaching staff of a nation suggests its readiness to offer ICT skills in order to meet emerging and evolving skills requirements in the information economy and society.</p> <p>This does not infer automatically that ICT training is effectively delivered to all staff having the capabilities to teach ICT skills (e.g. if certain pre-requisites - such as computer labs, ICT course syllabus, etc - are not available in schools).</p>	<p>Methodological and definition issues or operational limitations:</p> <ul style="list-style-type: none"> • All teachers trained specifically in pre-service or in-service schemes according to nationally defined qualification standards should be counted as qualified. <p>This indicator only presents the skilled teaching force available to deliver ICT courses but this does not necessarily mean that each of the teachers recorded as qualified does actually teach an ICT course as part of the formal curricula. Also, in schools where there are no or inadequate ICT equipment, course delivery may not be effective even though the schools have teachers qualified to teach ICT.</p>

Reference indicator	
EDR1 Proportion of schools with electricity (by ISCED level 1 to 3)	
Definition: Schools with electricity as a percentage of the total number of schools in the country for each ISCED level (1-3).	Purpose: To measure the availability of a minimum pre-requisite condition for ICTs to be introduced to schools.
Data requirement: <ul style="list-style-type: none"> • Total number of both public and private schools with electricity at ISCED levels 1 to 3. • Total number of both public and private schools at ISCED levels 1 to 3. 	Method of collection: Administrative data collection through annual school census (based on school registers).
	Data source(s): Statistical units of ministries of education or, alternatively, national statistical offices;
Interpretation: A low percentage or value for this indicator reveals that the potential implementation of ICT in education is largely constrained by a poor enabling environment. It suggests that policymakers in this situation should aim first at improving the provision of electricity to schools before introduction of any ICTs, or they should package electricity provision together as a co-requisite to any investment in ICT for education. It should be noted, however, that not all technologies which improve teaching and learning (e.g. radio broadcast classes or lessons) require both permanent and sustainable sources of electricity.	Methodological and definition issues or operational limitations: <ul style="list-style-type: none"> • Some developed countries may find it trivial to include items on electricity in the school questionnaires. National experts should then provide estimates of the number of schools with electricity and specify that the data are estimates. • Whenever disaggregating data on schools by ISCED levels proves complex, countries should supply to the UIS data by their national definition of primary, lower and upper secondary education and append the system of national grade structure as metadata.

Classificatory variables

82. The main classificatory variable used for the ICT in education indicators is the 1997 version of ISCED (the International Standard Classification of Education, maintained by UNESCO). ISCED recognizes several levels of education as follows:

- ISCED 0 – Pre-primary education;
- ISCED 1 – Primary education or first stage of basic education;
- ISCED 2 – Lower secondary or second stage of basic education;
- ISCED 3 – Upper secondary education;
- ISCED 4 – Post-secondary non tertiary education (programmes that lie between the upper-secondary and tertiary levels of education);
- ISCED 5 – First stage of tertiary education (not leading directly to an advanced research qualification); and

- ISCED 6 – Second stage of tertiary education (leading to an advanced research qualification).

83. Other classificatory variables used are the dichotomous variables: gender (ED7), primary/secondary teachers (ED8) and public/private schools (several indicators).⁴³

84. Note that the application of these classificatory variables to individual indicators will be a function of data availability for individual countries.

Conclusion

85. The proposed core indicators on ICT in education are the result of a rigorous scoping process and wide consultation. The selection of indicators has also been guided by pragmatism stemming from the relative lack of experience with these statistics in a majority of countries, especially developing economies where educational challenges are greatest but the acquisition of newer technologies may be more difficult. As a consequence, older technologies remain important in these countries.

86. It is envisaged that the set may be extended in the future to include indicators on skills, intensity of ICT use by learners and impact.

⁴³ A public school (or educational institution) is normally accredited, controlled and managed by a public education authority or agency (national/federal, state/provincial, or local), irrespective of the origin of its financial resources. A private school (or educational institution) is generally established, controlled and managed by private organizations (such as religious bodies, trade unions, business enterprises etc.), whether it is for profit or non-profit making, and whether or not it receives financial support from public authorities.

Chapter 8. Summary and recommendations

87. Chapters 2 to 6 of this paper contain proposals for revisions to the core list of ICT indicators and the statistical standards associated with them. It is expected that the revisions, if adopted and implemented, would improve both international comparability of ICT data and the policy relevance of the core list.

88. A new set of indicators on ICT in education is described in this paper and is recommended for inclusion in the *Partnership* core list of ICT indicators.

89. More generally, close adherence to the core indicator definitions and associated standards will improve international comparability. Countries are urged to carefully consider the core indicators when designing or re-designing ICT surveys.

90. The resources of the *Partnership* are available to assist in this endeavour. Relevant reference works have been cited in this paper and are shown in the Bibliography. In addition, *Partnership* members offer technical assistance for developing economies. Details can be found on the websites of ITU and UNCTAD (see also *Partnership*, 2008 for a detailed discussion of the *Partnership*'s capacity building efforts).

Bibliography

- Eurostat (2006), *Methodological Manual for Statistics on the Information Society, Survey year 2006 v2.0*, Luxembourg, http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-BG-06-004/EN/KS-BG-06-004-EN.PDF.
- Eurostat (2007), *Methodological Manual for Statistics on the Information Society, Survey year 2007 v2.0*, Luxembourg, http://europa.eu.int/estatref/info/sdds/en/isoc/isoc_metmanual_2007.pdf.
- ILO (International Labour Organization) (1993), “Resolution concerning the International Classification of Status in Employment (ICSE), adopted by the Fifteenth International Conference of Labour Statisticians”.
- ITU (2007a), *Telecommunication Indicators Handbook*, <http://www.itu.int/ITU-D/ict/handbook.html>.
- ITU (2007b), *World Telecommunication/ICT Indicators Database (11th edition)*, <http://www.itu.int/ITU-D/ict/publications/world/world.html>.
- ITU (2008a), *Use of Information and Communication Technology by the world's Children and Youth: A Statistical Compilation* (forthcoming).
- ITU (2008b), *Manual for the Measurement of ICT Access and Use by Households and Individuals* (forthcoming).
- Olaya, D. (2007), *Compendium of Practices on the implementation of ICT questions in households and businesses surveys in Latin America and the Caribbean*, UNECLAC.
- OECD (Organisation for Economic Co-operation and Development) (2007) *Guide to Measuring the Information Society*, Paris, www.oecd.org/sti/measuring-infoeconomy/guide.
- Partnership on Measuring ICT for Development (2004), “Project Document”, <http://measuring-ict.unctad.org>.
- Partnership on Measuring ICT for Development (2005a), *Core ICT Indicators*, New York/Geneva, <http://measuring-ict.unctad.org>.
- Partnership on Measuring ICT for Development (2005b), *Measuring ICT: the Global Status of ICT Indicators*, New York/Geneva, <http://measuring-ict.unctad.org>.
- Partnership on Measuring ICT for Development (2008), *The Global Information Society: a Statistical View*, http://www.unctad.org/en/docs/LCW190_en.pdf.
- UNCTAD (United Nations Conference on Trade and Development) (2007), *Manual for the Production of Statistics on the Information Economy*, Geneva, <http://measuring-ict.unctad.org/>.
- UIS (UNESCO Institute for Statistics) (2008), “Proposal for internationally comparable core indicators on ICTs in education”, paper prepared for the Global Event on

- Measuring the Information Society, Geneva, 27-29 May 2008,
<http://www.uis.unesco.org/template/pdf/cscl/ICT/bckgrdcore.pdf>.
- UNIDO (United Nations Industrial Development Organization) (2007), *Home page*,
<http://www.unido.org/>.
- UNSC (United Nations Statistical Commission) (2007), “Report on the Thirty-Eighth Session (27 February to 2 March 2007)”, E/2007/24 and E/CN.3/2007/30, New York, <http://unstats.un.org/unsd/statcom/doc07/FinalReport-Unedited.pdf>.
- UNSD (United Nations Statistics Division) (1993), *System of National Accounts*,
<http://unstats.un.org/unsd/sna1993/introduction.asp>.
- UNSD (2002), *International Standard Industrial Classification of all Economic Activities Rev. 3.1*, <http://unstats.un.org/unsd/cr/family2.asp?Cl=17>.
- UNSD (United Nations Statistics Division) (2005a), *Household Sample Surveys in Developing and Transition Countries*,
http://unstats.un.org/unsd/HHsurveys/pdf/Household_surveys.pdf.
- UNSD (2005b), *Designing Household Survey Samples: Practical Guidelines*,
<http://unstats.un.org/unsd/demographic/sources/surveys/Handbook23June05.pdf>.
- UNSD (2008a), *Principles and Recommendations for Population and Housing Censuses Revision 2*, <http://unstats.un.org/unsd/methods.htm>.
- UNSD (2008b), *Updated System of National Accounts 1993 (1993 SNA): Volume 1: Chapters 1 – 17*, <http://unstats.un.org/unsd/methods.htm>.
- UNSD (2008c), *Draft International Recommendations for Industrial Statistics*,
<http://unstats.un.org/unsd/methods.htm>.
- UNSD (2008d), *International Standard Industrial Classification of All Economic Activities, Revision 4*, draft, <http://unstats.un.org/unsd/cr/registry/isic-4.asp>.
- UNSD (2008e), *UN Commodity Trade Statistics Database (UN COMTRADE)*,
<http://unstats.un.org/unsd/comtrade/>.
- WCO (World Customs Organization) (2002), *Harmonized System 2002*, Brussels.