

 PARTNERSHIP ON
MEASURING ICT
FOR DEVELOPMENT

MEASURING THE WSIS TARGETS

A STATISTICAL FRAMEWORK



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Preface

The World Summit on the Information Society (WSIS) Geneva *Plan of Action* identified ten targets to be achieved by 2015, along with numerous recommendations based on different *action lines*. In 2008, the United Nations Economic and Social Council (ECOSOC) recommended that the Partnership on Measuring ICT for Development track progress towards achievement of the WSIS goals and targets (Resolution 2008/3).

The *Partnership* has developed a set of core ICT indicators designed to monitor ICT developments (*Partnership*, 2010). They cover ICT infrastructure, household ICT access and individual use of ICT, business ICT use, the ICT sector, trade in ICT goods, and ICT in education. Work on defining core indicators on ICT in government is in its final stage.

A number of the core ICT indicators can be applied to measuring the ten WSIS targets. Other WSIS targets go beyond the areas covered so far by the *Partnership's* core indicators and include targets on connecting health centres, libraries, post offices and scientific and research centres, and encouraging linguistic diversity and local content on the Internet. The WSIS outcome documents do not specify quantifiable indicators that could be applied to monitor progress. As a result, to date, no international framework has existed for measuring the WSIS targets.

ITU, in close collaboration with UIS, UNDESA and WHO started to work on a quantitative review of the WSIS targets in 2009 and identified a preliminary set of measurable indicators that could be applied by national and international stakeholders. The outcomes of this effort were presented in the publication *World Telecommunication/ICT Development Report 2010: Monitoring the WSIS Targets* (WTDR) (ITU, 2010a) launched in May 2010 at the WSIS Forum in Geneva. Following release of the WTDR 2010, the work on measuring the WSIS targets was brought under the umbrella of the *Partnership*, in particular through the creation of the Task Group on Measuring the WSIS Targets (TG WSIS).

The indicators to measure the WSIS targets were also presented in a dedicated session at the ITU World Telecommunication/ICT Indicators meeting (WTIM), which took place from 24-26 November 2010, in Geneva, Switzerland. They were further discussed through the TG WSIS online discussion forum, which included 90 experts in the area of ICT measurement. This publication finalizes the work of the Task Group and other members of the online forum, by presenting a statistical framework and a set of indicators for measuring the WSIS targets. It elaborates on each indicator and presents relevant statistical standards, such as classifications, definitions and data sources.

The publication was prepared by Sheridan Roberts, a consultant to the *Partnership on Measuring ICT for Development*. Substantive contributions were received from members of the TG WSIS, in particular, Vanessa Gray and Susan Teltscher from ITU, Misha Kay from WHO, Scarlett Fondeur Gil and Remi Lang from UNCTAD, Seema Hafeez from UNDESA and Elettra Ronchi from the OECD. Other major contributors were Claude Akpabie, Martin Schaaper and José Pessoa from the UNESCO Institute for Statistics, Daniel Pimienta from FUNREDES, Erick Iriarte Ahon from LACTLD, Joie Springer from UNESCO, Georgios Goumas from the UPU and Michael Minges, Lead Consultant, ictDATA.org. Useful comments were also received from other members of the discussion forum.

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Introduction

Background

1. One of the outcomes of the World Summit on the Information Society (WSIS), held in 2003 and 2005, was a clear commitment by governments to foster the achievement of an inclusive information society. To this end, the WSIS Geneva *Plan of Action* identified a number of recommendations and 10 targets, to be achieved by 2015, in line with the deadline for the achievement of the Millennium Development Goals (MDGs).
2. The ITU *World Telecommunication/ICT Development Report 2010: Monitoring the WSIS Targets* (WTDR) (ITU, 2010a) took stock of what had been achieved to date with respect to each of the ten WSIS targets. It also identified a set of numerical indicators to track the targets and to guide countries in their monitoring efforts. Following release of the WTDR 2010, work on measuring the WSIS targets was continued by the Task Group on Measuring the WSIS Targets (TG WSIS), led by ITU.
3. After its first meeting in May 2010, the Task Group primarily worked through the TG WSIS online forum¹ and results were presented to the 8th World Telecommunication/ICT Indicators Meeting (WTIM), held in November 2010 (ITU, 2010b).
4. A number of members of the TG WSIS and the online forum have provided input to this *publication*, which completes the work of the Task Group.

About this publication

5. A statistical framework enables the production of accurate and comparable statistics by setting standards that guide the collection and dissemination of those statistics. It describes a field of statistics in terms of its elements. These include topics, concepts and definitions, actors, classifications, relationships between elements and links to other frameworks. A framework may also include indicators, data sources, methodologies and model questions or surveys.
6. The primary objective of this report – *Measuring the WSIS targets: a Statistical Framework*² – is to present a statistical framework for a set of measurable indicators that will help monitor progress towards achieving the WSIS targets until 2015 and beyond. The indicators include many of the core ICT indicators developed by the *Partnership* (2010).
7. All of the ten WSIS targets are covered by this *Framework*. It should be noted that slight changes have been made to the wording of many of the original targets, mostly to improve their ‘measurability’ by making them more statistically feasible.

¹ See: <http://groups.itu.int/Default.aspx?alias=groups.itu.int/ws-is-targets>.

² Henceforth referred to as the *Framework*.

8. The amended WSIS targets (with changes shown in bold) are:

- Target 1. Connect **all** villages with ICTs and establish community access points;
- Target 2. Connect **all universities, colleges,** secondary schools and primary schools with ICTs;
- Target 3. Connect **all** scientific and research centres with ICTs;
- Target 4. Connect **all** public libraries, ~~cultural centres,~~ museums, post offices and **national** archives with ICTs;
- Target 5. Connect **all** health centres and hospitals with ICTs;
- Target 6. Connect all ~~local and~~ central government departments and establish websites **and email addresses;**
- Target 7. Adapt all primary and secondary school curricula to meet the challenges of the information society, taking into account national circumstances;
- Target 8. Ensure that all of the world's population has access to television and radio services;
- Target 9. Encourage the development of content and put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet;
- Target 10. Ensure that more than half the world's inhabitants have access to ICTs within their reach **and make use of them.**

9. WTDR 2010 recommended that a new target *Connect all businesses with ICTs* be added to the WSIS targets. An annex with this title has been added to the *Framework* and reflects the important role of businesses in the information society and their interaction with the entities covered by the WSIS targets. A suite of business connectivity indicators has been developed by the *Partnership* and are collected by a significant number of countries.

10. While WTDR 2010 highlighted other areas not addressed by the targets, it recommended that progress in these areas should be monitored and indicators ultimately defined.

11. The *Framework* provides statistical standards for the indicators, based on both existing international standards (including those of the *Partnership*) and new standards, created or adapted as 'statistical infrastructure' for the WSIS target indicators. The statistical standards for each of the target indicators include:

- Definitions of each target indicator, including the terms used;
- Derivation of indicators (e.g. use of appropriate denominators for proportions);
- Classifications to be applied to the indicator – these may be both indicator-specific and general;
- Scope – the populations of units about which information is required, for example households with children, people over the age of 65;³ and
- Statistical units – the unit of observation or measurement for which data are collected or compiled.⁴

12. The *Framework* also provides references to other standards that complete the picture, for instance, on data collection methodologies and model questions (for example, ITU, 2009; UNCTAD, 2009).

³ From <http://www.nss.gov.au/nss/home.nsf/NSS/D0948DEA17A97367CA25763F000BF5C3?opendocument>.

⁴ From <http://www.statcan.ca/english/concepts/stat-unit-def.htm>.

13. While there is some commonality across the WSIS target indicators, the standards for each target are comprehensive. This leads to some repetition, for example, in definitions of ICT terms, descriptions of statistical units and classifications.

14. The original WSIS targets were not framed with measurement in mind. Therefore, the indicators and associated statistical standards have been developed to 'best fit' the targets. The WSIS action lines and recommendations were taken into consideration in the interpretation of each target.

15. An emphasis in the *Framework* is on ensuring data quality and, in particular, international comparability of the WSIS target indicators. To this end, statistical standards that are internationally agreed have been adopted or adapted wherever possible. The main international standards used in the *Framework* (in alphabetical order) are:

- International Federation of Library Associations, *IFLA/FAIFE World Report* (IFLA 2007, 2010);
- *ISO 2789:2006(E) Information and documentation – International library statistics*;
- *ITU Manual for Measuring ICT Access and Use by Households and Individuals* (ITU, 2009) (to be revised in 2012);
- *ITU Telecommunication/ICT Indicators Handbook* (ITU, 2010c) (a revised version will be released at the end of 2011);
- Organisation for Economic Co-operation and Development *Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development* (OECD, 2002);
- OECD, Eurostat and World Health Organization *A System of Health Accounts, Version 2.0: Chapters 1 to 15* (pre-edited), (OECD, Eurostat and WHO, 2011);
- Partnership on Measuring ICT for Development *Core ICT Indicators* (Partnership, 2010) (to be revised in 2012);
- Partnership on Measuring ICT for Development *Proposal of e-Government Indicators Report: Draft* (Partnership, 2011);
- United Nations Conference on Trade and Development *Manual for the Production of Statistics on the Information Economy, Revised Edition* (UNCTAD, 2009);
- United Nations Educational, Scientific and Cultural Organization *Questionnaire on archival statistics* (UNESCO, 1984);
- UNESCO *International Standard Classification of Education* (UNESCO, 1997);
- UNESCO Institute for Statistics *Guide to Measuring Information and Communication Technologies (ICT) in Education* (UIS, 2009a);
- UIS *The 2009 UNESCO Framework for Cultural Statistics* (FCS) (UIS, 2009b);
- UIS *Instruction Manual for Completing the Questionnaire on Statistics of Science and Technology (S&T)* (UIS, 2010a);
- United Nations Statistics Division *Principles and Recommendations for Population and Housing Censuses Revision 2* (UNSD, 2008a);
- UNSD *International Standard Industrial Classification of All Economic Activities (ISIC)* (UNSD, 2002, 2008b);
- Universal Postal Union *Postal Statistics Questionnaire, 2009*, (UPU, 2010); and
- World Health Organization *Questionnaire for Global eHealth Survey* (WHO, 2009).

Target audience

16. Most of the indicators are collected at the national level and many will be collected and compiled by countries' statistical agencies, using surveys or administrative data. In a number of cases, relevant ministries and other government agencies will compile indicator data using available administrative data.

17. National agencies collecting and compiling data are therefore the main audience of this *Framework*. However, other users will also be interested in the WSIS target indicators and their associated statistical standards. They include:

- Policy makers wishing to understand the basis and comparability of the indicators;
- Analysts and researchers interested in the information society; and
- International organizations, especially those conducting country collections aimed at providing data for the target indicators.

Major statistical issues

Relationship between the scope of different indicators

18. A statistical framework will often attempt to integrate different components of a topic, for example, through a conceptual model or by segmentation into mutually-exclusive parts. The WSIS targets and their indicators were not conceived as part of such a model so the question arises of how to deal with the scope of different indicators of a similar form, for example, the 'proportion of entities with Internet access'. In particular, it is clear that the units and sectors for Targets 2, 3, 4, 5, 6, 7 and the proposed business connectivity indicators are not mutually-exclusive, that is, they are overlapping in their scope.⁵

19. For example, scientific and research centres (Target 3) will include some museums (Target 4), some public hospitals (Target 5) and some central government organizations (Target 6). Central government organizations in Target 6 will theoretically include many of the R&D performing government organizations in Target 3, and so on. There are two ways to resolve this issue. One is to set the scope for units in each of those targets so that they do not overlap. The other is to ignore the overlap.

20. There are practical reasons to do the latter and they concern the inherently overlapping nature of the units and sectors as well as the different statistical standards used to define and scope units. For example, scientific and research centres are defined and scoped using standards for measuring research and experimental development, while units in Targets 4 and 5 use a diversity of standards to define and scope units. Ignoring the overlap is arguably consistent with the aim of the targets, that is, to consider entities undertaking particular functions in the economy, rather than to split the economy into mutually-exclusive functional units.

⁵ The targets cover the following units and sectors: schools (Targets 2 and 7); scientific and research centres (Target 3); public libraries, museums, post offices and national archives (Target 4); health centres and hospitals (Target 5); central government departments (Target 6); and businesses (Annex 1).

The units comparability issue

21. Many of the target indicators take the form ‘proportion of entities with ICT’. It is very challenging to provide internationally comparable statistics for such indicators,⁶ with the following conditions needing to be satisfied:

- Countries need to consistently use agreed definitions for the entities – these include definitions covering the functions and activities of the entity and its level in a units hierarchy;⁷
- The defined entities need to be identified by countries according to those agreed definitions;⁸ and
- Even with consistent definition and good identification, indicators of this form may not be comparable across countries because of different structures and functions of country systems. For example, country A may have a small number of large entities of a particular type (e.g. museums), whereas country B might have mainly small entities of this type. In this simplistic example, country A is likely to rate higher on ‘proportion of units with ICT’ indicators, simply through structural differences.

22. UNSD (2008b) and the System of National Accounts 2008 (SNA08)⁹ discuss a number of characteristics of statistical units, including legal, accounting or organizational criteria; geographical criteria; and economic criteria.

- Enterprises are broadly defined and are high level units, 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. Enterprises include corporations, non-profit institutions and unincorporated enterprises (which, in turn, include households and government units in their capacity as producers of goods and services).
- The establishment is an enterprise, or part of an enterprise, that is situated in a single location and in which a single productive activity is carried out (or in which the principal productive activity accounts for most of the value added).
- A kind-of-activity unit is an enterprise, or a part of an enterprise, that engages in only one kind of productive activity or in which the principal productive activity accounts for most of the value added.

23. The units comparability issue is illustrated by several examples in ITU (2010a).¹⁰ The challenges can be overcome to a reasonable extent by establishing robust and generally applicable definitions of units and by classifying output by size of organization (thus enabling comparison of small organizations in country A with small organizations in country B etc). A classification based on size has been suggested for all the target indicators affected by the ‘units comparability issue’.

⁶ This does not only apply to ICT indicators. The general form is the ‘proportion of entities with a <characteristic>’.

⁷ For example, what are the activities of a museum or a government department? What are the characteristics of museums or government departments in terms of their legal basis, spread of activities and location?

⁸ For indicators measured by a sample survey, units are typically identified and listed with identifying characteristics allowing for stratification and sampling.

⁹ Jointly published in 2009 by the European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations and World Bank.

¹⁰ For example Table 3.1 shows country data for the number of public scientific and research centres. The number is highly variable, with several countries reporting fewer than five centres, while others report a much larger number (up to 455 centres, reported by Egypt).

Structure of the publication

24. Each of the targets is a section of the publication, which consists of introductory comments, statistical standards applying to the indicators, status of the indicators and details of each indicator.
25. An annex on proposed business connectivity indicators (Annex 1) has been added, as discussed above.
26. Annex 2 is a summary table showing the revised targets, relevant action lines and indicators.
27. The publication concludes with a *Bibliography*.

Target 1. Connect all villages with ICTs and establish community access points¹¹

Introduction

28. Target 1 reflects the importance of connecting people living in rural and remote areas. Such areas generally lag in terms of access to services available in urban areas, and may potentially enjoy greater benefits from improved connectivity due to delivery of services online. There are four indicators suggested to measure Target 1 and they are based on existing core ICT indicators developed and promulgated by the *Partnership*.

29. The four indicators for WSIS Target 1 are:

- Indicator 1.1: Proportion of rural population covered by a mobile cellular telephone network, by type of mobile cellular telephone technology.
- Indicator 1.2: Proportion of households with telephone, by type of network, by urban/rural.
- Indicator 1.3: Proportion of households with Internet access, by type of access, by urban/rural.
- Indicator 1.4: Proportion of individuals using the Internet, by location, by urban/rural.

Statistical standards applying to the indicators

30. Statistical standards applying to indicators 1.1 to 1.4 include scope, statistical units, definitions and classifications. Those applying to only a single indicator are described with the indicator. Other standards refer to more than one indicator and are described here.

31. Indicators 1.2 and 1.3 implicitly refer to the situation at a specified *reference date* (for instance, the day of the survey interview or last day of the previous calendar year). Indicator 1.4 refers to a reference period (the last 12 months). While it is obviously useful if countries harmonize the reference date and period in their data collections, it is unrealistic to expect that to occur. Therefore, no advice is offered on the selection of these time references.

Scope and statistical units

32. For indicators 1.2 to 1.4, standards exist for the scope and definition of the statistical units, *individual* and *household*. These are described in *Partnership* (2010) and can be briefly outlined as follows:

- Most surveys will restrict their scope for individuals to those living in private dwellings. Countries are encouraged to collect information for children and adults.¹²

¹¹ The original WSIS indicator was worded slightly differently “Connect villages with ICTs and establish community access points”.

¹² Though, for practical or legal reasons, a number of countries restrict the scope to individuals of at least 15, 16 or 18 years.

- The household scope is consistent with the individual scope used by a country and therefore should exclude households consisting only of individuals outside the age scope. Consistent with definitions used by the United Nations Statistics Division (UNSD) for population censuses, for the purposes of the core indicators, 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.” (*Partnership*, 2010).

Definitions of terms used

33. **Villages** have been interpreted as referring to the rural population.
34. **Connectivity** is focused on the Internet (including broadband) and both fixed and mobile cellular telephones.
35. **Community access points** have been interpreted as equivalent to the *Partnership’s* Internet use locations, *Community Internet access facility* and *Commercial Internet access facility*.¹³ ITU (2010a) further discusses the interpretation of villages, connectivity and community access points.
36. The **Internet** is defined as a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files.
37. Unfortunately, there is no internationally agreed geographic classification that defines **rural and remote areas** and distinguishes them from urban areas. Nor is there a standard for defining *villages*. Countries vary in their definitions of urban areas¹⁴ and the United Nations Statistics Division (UNSD, 2008a) recognizes this, whilst stating the importance of countries providing the split for population census data. UNSD describes criteria used to distinguish differences between urban and rural as including standards of living, population density, size of localities,¹⁵ and the extent of agricultural employment.
38. It is recommended that countries use the same rural/urban split that they applied to their 2010 (or nearest year) population census. This information is likely to be included on survey frames used for household surveys, which are generally the data source for indicators 1.2 to 1.4.

Classifications

39. Classifications that are indicator-specific are included with the description of each indicator below.
40. There are also general classifications that may be applied to households (indicators 1.2 and 1.3) and individuals (indicator 1.4). These are: household size and composition; individuals’ gender, age, highest education level, labour force status and occupation. More information on these classifications can be found in *Partnership* (2010).

¹³ WTDR 2010 also included the WSIS target indicator, *Percentage of localities with public Internet access centres (PIACs), broken down by size of locality, or by urban/rural*. This indicator, while highly relevant, was removed from the list of WSIS target indicators for feasibility reasons. Data for the indicator are very limited and are not easily collected through administrative data or surveys.

¹⁴ This Wikipedia article illustrates the variation between countries, http://en.wikipedia.org/wiki/Urban_areas.

¹⁵ Defined by UNSD (2008) as “a distinct population cluster in which the inhabitants live in neighbouring sets of living quarters and that has a name or a locally recognized status. It thus includes fishing hamlets, mining camps, ranches, farms, market towns, villages, towns, cities and many other population clusters that meet the criteria specified above.”

41. Note that detailed disaggregations (for example data showing location of Internet use by urban/rural and by age and by gender) present challenges for data reliability due to the increasing magnitude of standard errors. See ITU (2009) for more information on this point.

Status of the indicators

42. The Target 1 indicators are all derived from *Partnership* core ICT indicators, for which comprehensive statistical standards (*Partnership*, 2010) and established data collection practices exist.

43. Indicator 1.1 is based on the existing *Partnership* core ICT indicator A7, which is collected by ITU as part of a large collection of telecommunication indicators. Data are collected from telecommunications operators and, for most countries, aggregated at the national level by telecommunication/ICT regulators and Ministries who provide information annually to ITU. The indicator is widely available for both developed and developing countries. Data are also available for a number of years, thus providing useful information on change in realization of the target over time.

44. Indicators 1.2 to 1.4 are derived from core ICT indicators HH3, HH6, HH7, HH8 and HH11, which are collected using national household surveys. Methodological guidance for the survey-based indicators is provided by ITU through various capacity-building efforts, including the *Manual for Measuring ICT Access and Use by Households and Individuals* (ITU, 2009). The *Manual* provides a comprehensive account of statistical standards and methodologies relevant to the collection of ICT household statistics.

45. The household core ICT indicators are collected by a reasonable number of countries, including developing countries. ITU collects the data in its annual collection on *ICT Access and Use by Households and Individuals*. As part of the collection, ITU asks countries to report the split between urban and rural households and individuals. For most countries that collect the household ICT core indicators, a time series of data (that is, a set of data observations over a number of years) is available.

46. UNSD recommendations for 2010 population censuses included a core topic on the household availability of information and communication technology devices: radio, television set, fixed-line telephone, mobile cellular telephone(s), personal computer(s) and home Internet access. A number of countries asked questions on the presence in households of various ICTs, including fixed and mobile telephones and Internet access. This information will provide useful data for indicators 1.2 and 1.3.¹⁶

47. The only aspect of indicators 1.2, 1.3 and 1.4 that is not well covered by existing statistical standards is the urban/rural split. As discussed above, it is recommended that countries use the same split adopted for their 2010 (or nearest year) population census. This would fit well with the availability of ICT data from the 2010 round of population censuses.

¹⁶ Note that not all population censuses were conducted in 2010. Some were as early as 2005.

Indicators

Indicator 1.1 Proportion of rural population covered by a mobile cellular telephone network, by type of mobile cellular telephone technology

Definition:

Indicator 1.1 refers to the percentage of a country's inhabitants that live within rural areas and that are served by a mobile cellular telephone signal, irrespective of whether or not they are use the service – either as a subscriber or a user who is not a subscriber. The indicator measures the theoretical ability to use mobile cellular services, not the actual use or level of subscription.

Proportion of the population covered by a mobile cellular telephone network is defined as the proportion of inhabitants that are within range of a mobile cellular signal, irrespective of whether or not they are subscribers. Note that this is not the same as the mobile subscription density or penetration.

The *proportion of rural population covered by a mobile cellular telephone network* is calculated by dividing the number of rural inhabitants within range of a mobile cellular signal by the total rural population and then multiplying by 100 to be expressed as a percentage. Assuming that urban areas are covered first, rural coverage can be estimated by subtracting the urban population from the total population covered by a mobile signal. The proportion of rural population covered by a mobile cellular signal is approximated by the formula:

$$\frac{\text{Proportion of total population covered by a mobile cellular signal} \times \text{Total population} - \text{Urban population}}{\text{Rural population}}$$

This proportion is then converted to a percentage by multiplying by 100.

Disaggregations:

This indicator is disaggregated by mobile cellular telephone technology, as follows:

- 2G mobile communication network (providing download speeds of below 256 kbit/s) and
- Mobile broadband signal (providing download speeds of at least 256 kbit/s).

Data sources:

The original data sources for this indicator are telecommunications operators. In almost all countries, data are aggregated at the national level by telecommunication/ICT regulators and Ministries who provide information annually to ITU based on ITU's definition of the indicator *Percentage of the population covered by a mobile cellular telephone network* (ITU, 2010c). Regulators or other respondents may also calculate the proportion of rural population covered by a mobile cellular telephone network using the formula shown above. The indicator is a further disaggregation of the *Partnership* core ICT indicator, A7, *Percentage of the population covered by a mobile cellular telephone network*.

Statistical notes:

There are no known significant statistical issues with this indicator.

There is no internationally agreed definition of a rural population. While the split of this indicator into urban and rural is not collected by most countries, ITU suggests the approximation above based on the assumption that populations in urban areas are all covered by a mobile signal (ITU, 2010a).

This indicator should not be confused with measures of the percentage of the rural land area covered by a mobile cellular signal nor the percentage of the rural population that subscribes to a mobile cellular service.

Indicator 1.2. Proportion of households with telephone, by type of network, by urban/rural**Definition:**

Indicator 1.2 refers to telephone access at home by in-scope urban and rural households. The indicator is split into four parts, as follows:

- Proportion of households with any telephone access.
- Proportion of households with fixed telephone only.
- Proportion of households with mobile cellular telephone only.
- Proportion of households with both fixed and mobile cellular telephone.

The parts of the indicator are calculated as follows:

The *proportion of households with any telephone access* is calculated by dividing the number of in-scope households with access to any telephone (fixed or mobile) by the total number of in-scope households.

The *proportion of households with fixed telephone only* is calculated by dividing the number of in-scope households with a fixed telephone only by the total number of in-scope households. A *fixed telephone line* (previously called main telephone line in operation) is an active line (those that have registered an activity in the past three months) connecting the subscriber's terminal equipment to the public switched telephone network (PSTN) and which has a dedicated port in the telephone exchange equipment. This term is synonymous with the terms main station or Direct Exchange Line (DEL) that are commonly used in telecommunication documents.

The *proportion of households with mobile cellular telephone only* is calculated by dividing the number of in-scope households with a mobile phone only by the total number of in-scope households. A *mobile cellular telephone* is a portable telephone subscribing to a public mobile telephone service that provides access to the PSTN using cellular technology, including all analogue and digital systems.

The *proportion of households with both fixed and mobile cellular telephone* is calculated by dividing the number of in-scope households with both a fixed and mobile phone by the total number of in-scope households.

In all cases, the proportion is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

Each part of the indicator is split by urban/rural, see *Statistical notes* below.

The general classifications described under *Statistical standards* above may also be applied (noting the caution on detailed disaggregations and their impact on data reliability).

Data sources:

This indicator is a further disaggregation, by urban/rural, of the *Partnership* core ICT indicator, HH3, *Proportion of households with telephone*. The core indicator HH3 (and therefore Indicator 1.2) is collected through ICT household surveys, usually conducted by national statistical offices (NSOs). Model questions and methodological notes are provided for HH3 in *Partnership* (2010) and ITU (2009).

Statistical notes:

There is no internationally agreed definition that distinguishes urban and rural, see *Statistical standards* above.

The telephone equipment and services should be in working condition.

Households need to be classified as urban or rural in order to produce estimates for the indicator. It is suggested that countries use the same method of distinguishing urban and rural that they use in their population censuses.

Indicator 1.3. Proportion of households with Internet access, by type of access, by urban/rural**Definition:**

Indicator 1.3 refers to access to the Internet at home by in-scope urban and rural households and the type of Internet access service/s they have. The indicator is split into two parts, as follows:

- Proportion of households with any Internet access.
- Proportion of households with Internet access, by type of access service/s.

The *Internet* is defined under *Statistical standards* above.

The parts of the indicator are calculated as follows:

The *proportion of households with any Internet access* is calculated by dividing the number of in-scope households with any Internet access by the total number of in-scope households. The result is then multiplied by 100 to be expressed as a percentage.

The *proportion of households with Internet access, by type of access service* is calculated by dividing the number of in-scope households with each type of Internet access service by the number of households with Internet access. The results are then multiplied by 100 to be expressed as a percentage. Note that the sum of percentages is likely to exceed 100 as some households will have more than one type of access service. The formula can also be expressed in algebraic terms as follows.

$$\frac{N_{\text{AccessService}_i}}{N_{\text{Inter}}} * 100$$

where N_{inter} is the number of in-scope households in the population with Internet access and $N_{\text{AccessService}_i}$ is the number of in-scope households in the population with access service i (where i is narrowband, (wired) broadband or wireless broadband).

For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

Both parts of the indicator are split by urban/rural, see *Statistical notes* below.

The second part of the indicator is also split by type of Internet access service, classified as follows:

Narrowband includes analogue modem (dial-up via standard phone line), ISDN (Integrated Services Digital Network), DSL at speeds below 256 kbit/s, and mobile phone and other forms of access with an advertised download speed of less than 256 kbit/s. Note that narrowband mobile phone access services include CDMA 1x (Release 0), GPRS, WAP and i-mode.

Fixed (wired) broadband refers to fixed (wired) high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include for example cable modem, DSL, fibre-to-the-home/building and other fixed (wired) broadband subscriptions. It excludes wireless broadband services as defined below.

Wireless broadband refers to wireless high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include satellite Internet, terrestrial fixed wireless and fixed WiMax and fixed wireless access. It also includes broadband terrestrial mobile wireless access, which includes the following two types of subscriptions.

- Standard mobile subscriptions with active use only, which includes mobile subscriptions with advertised data speeds of 256 kbit/s or greater and which have been used to make an Internet data connection via IP in the previous 3 months. To be counted, the subscription must allow access to the greater Internet via HTTP and must have been used to make a data connection using the Internet Protocol in the previous three months. Standard SMS and MMS messaging do not count as an active Internet data connection even if they are delivered via IP.
- Subscriptions to dedicated data services over a mobile network which are purchased separately from voice services either as a stand-alone service (modem/dongle) or as an add-on data package to voice services which requires an additional subscription. All dedicated mobile data subscriptions with recurring subscription fees are included as "active data subscriptions" regardless of actual use. Pre-paid mobile broadband plans require active use if there is no monthly subscriptions. This could also include mobile WiMax subscriptions.

The general classifications described under *Statistical standards* above may also be applied (noting the caution on detailed disaggregations and their impact on data reliability).

Indicator 1.3. Proportion of households with Internet access, by type of access, by urban/rural (continued)**Data sources:**

This indicator is a composite and further disaggregation, by urban/rural, of the *Partnership* core ICT indicators, HH6 and HH11, *Proportion of households with Internet access* and *Proportion of households with access to the Internet by type of access*,¹⁷ respectively. The core indicators, HH6 and HH11 (and therefore Indicator 1.3) are collected through household ICT surveys, usually conducted by NSOs. Model questions and methodological notes are provided in *Partnership* (2010) and ITU (2009).

Statistical notes:

There is no internationally agreed definition that distinguishes urban and rural, see *Statistical standards* above.

The other main statistical issue is the technical nature of the categories and the possibility that respondents will not know what kind of Internet access service/s they have. Suggestions for resolving this issue include using country-specific response categories that are equivalent to (or sub-categories of) those above. See ITU (2009) and *Partnership* (2010) for more information.

As households can have more than one access service, multiple responses are possible.

Access may be by any device enabling Internet access (not only a computer). This includes a mobile phone, PDA, games machine and digital TV.

The Internet connection/s should be functional, that is any equipment, software or services needed should be in working condition.

Households need to be classified as urban or rural in order to produce estimates for the indicator. It is suggested that countries use the same method of distinguishing urban and rural that they use in their population censuses.

¹⁷ Note that the definition of type of Internet access in *Partnership* (2010) has been superseded by definitions adopted by countries and included in ITU (2010c).

Indicator 1.4. Proportion of individuals using the Internet, by location, by urban/rural**Definition:**

Indicator 1.4 refers to the use of the Internet by in-scope urban and rural individuals in the previous 12 months and the location of their Internet use. A focus of this indicator is the proportion of individuals in rural areas who access the Internet through public community and commercial Internet facilities. The indicator is split into two parts, as follows:

- Proportion of all individuals using the Internet at any location in the previous 12 months.
- Proportion of Internet users using the Internet at each location.

The Internet is defined under *Statistical standards* above.

The parts of the indicator are calculated as follows:

The *proportion of individuals using the Internet at any location in the previous 12 months* is calculated by dividing the number of in-scope individuals who used the Internet at any location in the last 12 months by the total number of in-scope individuals.

The *proportion of Internet users using the Internet at each location* is calculated as the number of Internet users using the Internet at each location divided by the total number of Internet users. As many individuals use the Internet at more than one location, at country level, the split by location of use will add up to more than 100 per cent.

In both cases, the results are multiplied by 100 to be expressed as a percentage.

For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

Both parts of the indicator are split by urban/rural, see *Statistical notes* below.

The second part is also split by locations of use, defined as follows:

- Home
- Work. Where a person's workplace is located at his/her home, then he/she would answer yes to the home category only.
- 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 Community Internet access facility category.
- Another person's home. The home of a friend, relative or neighbour.
- Community Internet access facility. For example, public libraries, publicly provided Internet kiosks, non-commercial telecentres, digital community centres, post offices, other government agencies; access is typically free and is available to the general public.
- Commercial Internet access facility. For example, Internet or cybercafés, hotels and airports; access is typically paid (i.e. not free of charge).
- Any place via a mobile cellular telephone. Use of the Internet at any location via a mobile phone (including handheld devices with mobile phone functionality).
- Any place via other mobile access devices. Use of the Internet at any location via other mobile access devices, e.g. a laptop computer or handheld device that uses wireless access (at a WiFi 'hotspot') or a laptop computer connected to a mobile phone network.

The general classifications described under *Statistical standards* above may also be applied (noting the caution on detailed disaggregations and their impact on data reliability).

Data sources:

This indicator is a composite and further disaggregation, by urban/rural, of the *Partnership* core ICT indicators, HH7 and HH8, *Proportion of individuals who used the Internet in the last 12 months* and *Location of individual use of the Internet in the last 12 months*, respectively. The core indicators, HH7 and HH8 are collected through ICT household surveys, usually conducted by NSOs. Model questions and methodological notes are provided in *Partnership* (2010) and ITU (2009).

Statistical notes:

There is no internationally agreed definition that distinguishes urban and rural, see *Statistical standards* above.

Use of the Internet is not assumed to be only via a computer – it may also be by mobile phone, PDA, games machine, digital TV etc. Except for mobile Internet use, the locations are associated with the equipment used e.g. a PC installed at work.

Individuals are asked about all locations of Internet use. Where countries ask about the main location or several most commonly used locations, output will not be comparable with countries that ask about all locations. See *Partnership* (2010).

To improve respondent understanding, countries may replace the community and/or commercial Internet access facility categories with those that reflect equivalent facilities available in their country.

Individuals need to be classified as urban or rural in order to produce estimates for the indicator. It is suggested that the classification of individuals follow that of their households, and that households are categorized as urban or rural, per population censuses.

Target 2. Connect all secondary schools and primary schools with ICTs¹⁸

Introduction

48. Target 2 reflects the importance of connecting schools with ICT. There is considerable policy interest in the potential benefits of ICT in schools, which include use of ICT-based tools for teaching and learning; providing skills needed to participate in the information society; improving attitudes to learning; and provision of community access to ICT.

49. There are four indicators suggested to measure Target 2. All are existing indicators developed by the UNESCO Institute for Statistics, with three of them also *Partnership* core ICT indicators.

50. The four indicators for WSIS Target 2 are:

- Indicator 2.1: Proportion of schools with a radio used for educational purposes.
- Indicator 2.2: Proportion of schools with a television used for educational purposes.
- Indicator 2.3: Learners-to-computer ratio.
- Indicator 2.4: Proportion of schools with Internet access, by type of access.

Statistical standards applying to the indicators

51. Statistical standards applying to indicators 2.1 to 2.4 include scope, statistical units, definitions and classifications. Those applying to only a single indicator are described with the indicator. Other standards refer to more than one indicator and are described here.

52. The standards can be found in the *UIS Guide to Measuring Information and Communication Technologies (ICT) in Education* (UIS, 2009a) and the *Partnership's Core ICT Indicators* (2010).

53. UIS (2009a) includes a *Prototype Questionnaire on Statistics of ICT in Education* in Appendix 1. The questionnaire was piloted by the international Working Group on ICT Statistics in Education (WISE) in 2009. WISE is made up of over 25 countries from various regions. Appendix II of UIS (2009a) contains definitions of terms used in the questionnaire.

Scope and statistical units

54. The scope for Target 2 indicators is all public and private schools, ISCED¹⁹ levels 1 to 3, that is, from primary to upper secondary education. Note that Target 3 covers the connectivity of higher education institutions.

¹⁸ The original WSIS indicator was worded slightly differently "Connect universities, colleges, secondary schools and primary schools with ICTs".

Definitions of terms used

55. **Educational institutions or schools** are defined by the UNESCO Institute for Statistics (UIS, 2009a) as follows: "... schools are established institutions, which have the provision of education as their sole or main purpose. Such institutions are normally accredited or sanctioned by a public authority. While the majority of educational institutions fall under the jurisdiction of – or are operated by – education authorities, other public agencies dealing with such areas as health, training, labour, justice, defence, social services, etc. may also be involved. Educational institutions may also be operated by private organizations, such as religious bodies, special interest groups or private educational and training institutions, both for profit and non-profit."

56. A **secondary school** mainly offers programmes equivalent to ISCED levels 2 and 3, while a **primary school** mainly offers programmes equivalent to level 1.

Classifications

57. The main classificatory variable used is the dichotomous variable *public/private* educational institutions, defined by UIS (2009a) as:

- A public educational institution is controlled and managed by a governmental education authority or agency (national/federal, state/provincial or local), irrespective of the origin of its financial resources.
- A private educational institution is controlled and managed by a non-governmental organization (church, trade union or business enterprise), whether or not it receives financial support from public authorities.

58. General classifications may also be applied to these indicators; in particular, a split of urban/rural would provide insights on any disadvantages of rural and remote schools. Countries may categorize regions as urban or rural based on population census data (see discussion in Target 1).²⁰

Status of the indicators

59. The indicators were developed and piloted with participating country members of the international Working Group on ICT Statistics in Education (WISE). Within countries, data are usually compiled by a statistical unit of the Ministry of Education or the national statistical office, through an annual school census using mainly school records as primary data sources.

60. Statistical standards and data collection practices have been well documented by UIS (2009a). For developing countries, availability of the indicators is increasing. A regional survey launched by the UIS at the end of 2010 in Latin America and Caribbean countries is showing significant data availability in the region, especially in Caribbean countries. As countries further invest in the deployment of ICT infrastructure in educational systems, an overall improvement in data availability is expected as a result of growing national interest in monitoring policy achievements. The UIS can only confirm such a trend after launching a global ICT in education survey rollout planned for 2012.

¹⁹ The International Standard Classification of Education (UNESCO, 1997). Note that ISCED is currently being revised and a new version is likely to be adopted by the end of 2011. It is expected that the revision will mainly affect the tertiary level (where ISCED 1997 levels 5-6 will become ISCED 2011 levels 5-8). For the purposes of these indicators, ISCED levels 1-3 are largely unaffected. ISCED 1997 levels 5 and 6 combined is also directly equivalent to the combination of ISCED 2011 levels 5-8.

²⁰ UIS makes the point that national definitions of rural areas may not be comparable across countries and advises that definitions be based on national statistical practices (UIS, 2009).

Indicators

Indicator 2.1. Proportion of schools with a radio used for educational purposes

Definition:

Indicator 2.1 measures the proportion of primary and secondary schools offering radio-assisted instruction (which includes both radio broadcast education and interactive radio instruction). It does not measure the intensity of use of radios for educational purposes.

A *radio* is defined as a stand-alone device 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, car radio, clock radio, audio cassette or CD players/recorders) are excluded.

The *proportion of schools with a radio used for educational purposes* is calculated by dividing the number of primary and secondary schools providing radio-assisted instruction by the total number of primary and secondary schools. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

According to country data availability, this indicator may be disaggregated by public/private educational institutions. See *Statistical standards* above for details.

Data sources:

This indicator is the *Partnership* core ICT indicator ED1, *Proportion of schools with a radio used for educational purposes*. Data are collected through the annual school census (or extracted from school records) and are generally compiled at country level by the statistical unit of the Ministry of Education or the national statistical office.

Statistical notes:

There are no known significant statistical issues with this indicator. Analysis of data from the Latin America and Caribbean survey of 2010 is expected to provide more information on statistical issues.

For the purposes of this indicator, radios used for educational purposes are in working condition.

Both public and private schools are included.

ISCED levels 1 to 3 cover schools offering primary, lower secondary and upper secondary education.

Indicator 2.2. Proportion of schools with a television used for educational purposes

Definition:

Indicator 2.2 measures the proportion of primary and secondary schools offering television-assisted instruction (which helps to bring abstract concepts to life through clips, animations, simulations, visual effects and dramatization). It does not measure the intensity of use of televisions for educational purposes.

A *television* (TV) is defined as a stand-alone device capable of receiving broadcast television signals using popular access means such as over-the-air, cable and satellite. Television 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.

The *proportion of schools with a television used for educational purposes* is calculated by dividing the total number of primary and secondary schools providing television-assisted instruction by the total number of primary and secondary schools. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

According to country data availability, this indicator may be disaggregated by public/private educational institutions. See *Statistical standards* above for details.

Data sources:

This indicator is the *Partnership* core ICT indicator ED2 *Proportion of schools with a television used for educational purposes*. Data are collected through the annual school census (or extracted from school records) and are generally compiled at country level by the statistical unit of the Ministry of Education or the national statistical office.

Statistical notes:

There are no known significant statistical issues with this indicator. Analysis of data from the Latin America and Caribbean survey of 2010 is expected to provide more information on statistical issues.

For the purposes of this indicator, televisions used for educational purposes are in working condition.

Both public and private schools are included.

ISCED levels 1 to 3 cover schools offering primary, lower secondary and upper secondary education.

Indicator 2.3. Learners-to-computer ratio**Definition:**

Indicator 2.3 refers to the average number of primary and secondary school learners per computer available for pedagogical use. Note that it is not a measure of actual use of computers in schools, nor of time spent by learners using computers.

A *computer* is a desktop or a laptop computer. It does not include equipment with some embedded computing abilities such as mobile cellular phones, personal digital assistants (PDAs) or TV sets.

Learners refer to students enrolled in programmes at educational institutions.

The *learners-to-computer ratio* is calculated by dividing the total number of learners by the total number of computers available for pedagogical use in primary and secondary schools. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

According to country data availability, this indicator may be disaggregated by public/private educational institutions. See *Statistical standards* above for details.

Data sources:

This indicator is ED4bis *Learners-to-computer ratio (for ISCED levels 1-3)* from the UNESCO list of proposed indicators on ICT in education (UIS, 2009a). Data are collected through the annual school census (or extracted from school records) and are generally compiled at country level by the statistical unit of the Ministry of Education or the national statistical office.

Statistical notes:

There are no known significant statistical issues with this indicator. Analysis of data from the Latin America and Caribbean survey of 2010 is expected to provide more information on statistical issues.

Only computers in working condition for use in teaching and learning should be included. The criteria for 'working condition' of computers are left to countries' discretion, taking into consideration their pedagogical requirements, technological environment and financial capacities.

Both public and private schools are included.

ISCED levels 1 to 3 cover schools offering primary, lower secondary and upper secondary education.

Indicator 2.4. Proportion of schools with Internet access, by type of access**Definition:**

Indicator 2.4 measures the proportion of primary and secondary schools with access to the Internet. The indicator is split into four parts, as follows:

- Proportion of schools with any Internet access²¹
- Proportion of schools with access by fixed narrowband only
- Proportion of schools with access by broadband only
- Proportion of schools with both fixed narrowband and broadband access

The *Internet* is defined as a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files.

The parts of the indicator are calculated as follows:

The *proportion of schools with any Internet access* is calculated by dividing the number of primary and secondary schools with any Internet access by the total number of primary and secondary schools.²¹

The *proportion of schools with access by fixed narrowband only* is calculated by dividing the number of primary and secondary schools with access by fixed narrowband only by the total number of primary and secondary schools. *Fixed narrowband* includes analogue modem (dial-up via standard phone line), ISDN (Integrated Services Digital Network), DSL at speeds below 256 kbit/s, and other forms of fixed access with an advertised download speed of less than 256 kbit/s.

The *proportion of schools with access by broadband only* is calculated by dividing the number of primary and secondary schools with access by broadband only by the total number of primary and secondary schools. *Broadband* includes *fixed (wired)* and *wireless broadband*. *Fixed (wired) broadband* refers to fixed (wired) high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include for example cable modem, DSL, fibre-to-the-home/building and other fixed (wired) broadband subscriptions. *Wireless broadband* refers to wireless high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include satellite Internet, terrestrial fixed wireless and fixed WiMax and fixed wireless access. It also includes broadband terrestrial mobile wireless access.

The *proportion of schools with both fixed narrowband and broadband access* is calculated by dividing the number of primary and secondary schools with both fixed narrowband and broadband access by the total number of primary and secondary schools.

In all cases, the result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

According to country data availability, this indicator may be disaggregated by public/private educational institutions. See *Statistical standards* above for details.

Data sources:

This indicator is the *Partnership* core ICT indicator ED5 *Proportion of schools with Internet access by type of access*. Data are collected through the annual school census (or extracted from school records) and are generally compiled at country level by the statistical unit of the Ministry of Education or the national statistical office.

Statistical notes:

There are no known significant statistical issues with this indicator. Analysis of data from the Latin America and Caribbean survey of 2010 is expected to provide more information on statistical issues.

For the purposes of this indicator, Internet connections are functional, that is, any equipment, software or services needed are in working condition.

Both public and private schools are included.

ISCED levels 1 to 3 cover schools offering primary, lower secondary and upper secondary education.

²¹ Including narrowband terrestrial mobile wireless services.

Target 3. Connect all scientific and research centres with ICTs²²

Introduction

61. Target 3 reflects the importance of connecting scientific and research centres with ICT. While the nature of connectivity is not defined by the Geneva *Plan of Action*, Action Line C7²³ indicates, in respect of e-science, that Internet connectivity should be high-speed. Action Line C3, *Access to information and knowledge*, is also directly relevant to this target, with its reference to facilitation of access to journals, books, and archives for scientific information. *Scientific and research centres* are not defined in the target or relevant action lines.

62. There are three indicators suggested to measure Target 3. None are established ICT indicators at this stage. It is therefore necessary to develop statistical standards that will guide countries and enable the production of reliable and comparable indicators for this target. As far as possible, existing standards have been adapted for this purpose.

63. The three indicators proposed for WSIS Target 3 are:

- Indicator 3.1: Proportion of public scientific and research centres with broadband Internet access.
- Indicator 3.2: Presence of a national research and education network (NREN), by bandwidth (Mbit/s).
- Indicator 3.3: Proportion of public scientific and research centres with Internet access to a NREN.

Statistical standards applying to the indicators

64. Statistical standards applying to indicators 3.1 to 3.3 include scope, statistical units, definitions and classifications. Those applying to only a single indicator are described with the indicator. Standards referring to more than one indicator are described here.

65. Important reference standards used to develop standards for Target 3 indicators are the UIS publication *Instruction Manual for Completing the Questionnaire on Statistics of Science and Technology (S&T)* (UIS, 2010a) and the OECD's 2002 *Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development* (OECD, 2002). Note that the UIS manual is based largely on the *Frascati* manual.

²² The original WSIS indicator was worded slightly differently "Connect scientific and research centres with ICTs". Note that universities have been included in this target and removed from Target 2.

²³ Action Line C7 can be found in the *Geneva Plan of Action* (ITU, 2005) and is *ICT applications: benefits in all aspects of life*. Paragraph 22 deals with e-science and describes connectivity and collaboration.

Scope and statistical units

66. Many of the WSIS target indicators, including 3.1 and 3.3, are indicators of the type ‘proportion of entities with ICT’ and are affected by the ‘units comparability issue’. As discussed in the *Introduction* to this *Framework*, it is very challenging to provide internationally comparable statistics for such indicators.

67. These challenges can be overcome to a reasonable extent by establishing robust and generally applicable definitions of units and by classifying output by size of organization. Definitions of units have been suggested based on the UIS and *Frascati* manuals. Regarding a size classification, it is suggested that output for indicators 3.1 and 3.3 be classified by size of organization, using the number of R&D personnel as the most appropriate and available size variable. The suggested size classification is discussed below under *Classifications*.

Scope

68. Indicators 3.1 and 3.3 refer to all scientific and research centres. However, these entities are not described or defined in the WSIS outcomes. For the purposes of this *Framework*, the long-established and internationally agreed statistical standards for measuring science and technology (including research and experimental development) have been used to determine both the scope and the entities to be measured for indicators 3.1 and 3.3.

69. The UIS and OECD manuals deal with research and experimental development (R&D) activities of organizations in four sectors: business enterprises, government, higher education and private non-profit organizations. These sectors are defined in both publications.

70. In respect of higher education, the UIS manual (but not the *Frascati* manual) restricts the scope to ISCED 5 and 6, as follows:

- ISCED level 5 – First stage of tertiary education (not leading directly to an advanced research qualification); and
- ISCED level 6 – Second stage of tertiary education (leading to an advanced research qualification).

71. The UIS manual omits from its scope ISCED level 4, *Post-secondary non-tertiary education*. Given that the main aim of the UIS manual is to help countries measure R&D, this seems to be a reasonable omission and has been adopted in this *Framework*.²⁴

72. A major scope limitation adopted by this *Framework* is to exclude business enterprise and private non-profit sector entities, thus limiting the scope to the mainly public entities in the government and higher education sectors as defined by UIS.²⁵ The reasons for this are largely practical, with the main reason being a lack of survey infrastructure for businesses in developing countries.²⁶ Exclusion of organizations in the private non-profit sector is consistent with the exclusion of businesses.

73. Furthermore, *scientific and research centres* were restricted to those government and higher education organizations that perform R&D. While this scope restriction is probably minor in effect, it

²⁴ In addition, the target itself appears to be limited to institutions that perform scientific and other research. It is expected that these will usually not include institutions classified as ISCED level 4.

²⁵ Following the *Frascati* manual, the higher education sector includes business enterprises and private non-profit organisations whose primary activity is to provide tertiary level education.

²⁶ Personal correspondence, UIS.

enables a closer relationship with the existing statistical standards for measuring R&D. For the many countries that measure R&D, it provides an existing list of units that can be used to provide data for indicators 3.1 and 3.3. It is also consistent with the apparent intent of the target, which is to improve ICT connectivity within the research community. R&D is defined below.

74. The scope of scientific and research centres is thus all R&D-performing higher education and government organizations, defined according to the UIS manual but excluding units covered by other sectors, as follows:

- The higher education sector is composed of all universities, colleges of technology and other institutions providing tertiary education (at ISCED levels 5 and 6), whatever their source of finance or legal status.²⁵ It also includes all research units, experimental stations and clinics operating under the direct control of, or associated with, higher education institutions. The treatment of borderline cases is discussed in the *Frascati* manual.
- The government sector is composed of all departments, offices and other bodies that furnish, but do not normally sell to the community, those common services, other than higher education, which cannot otherwise be conveniently and economically provided, as well as those that administer the state and the economic and social policy of the community. (Public enterprises mainly engaged in market production and sale of goods and services are included in the business enterprise sector.) Non-profit institutions controlled and mainly financed by government, but not administered by the higher education sector, are also included. Government organizations include all levels of administration, that is: central or federal, state or provincial, and local or municipal. Many countries will, in practice, limit this scope, reflecting the low level of R&D activity of lower levels of government.

Statistical units

75. It is not sufficient to simply define statistical units as higher education or government entities. At country level, units will need to be allocated to the correct sector and ideally made as homogeneous as possible across countries.²⁷ Regarding allocation of units to sector, the *Frascati* manual has a very useful decision tree diagram on page 55 as well as extensive descriptions of each sector. Homogeneity of units is likely to be impossible to achieve in the government sector and difficult for the higher education sector. The *Frascati* manual does not discuss the issue for the former but for higher education sector statistical units it recommends a smaller “establishment-type unit” which could be a research institute, a “centre”, a department, a faculty, a hospital or a college. For the higher education sector, countries may use higher level institutions as reporting units in preference to compiling a register of all subunits. In such cases, the reporting unit would respond in respect of each of its subunits (for example, a university may report in respect of individual university departments).

76. While the *Frascati* manual does not make particular recommendations for government statistical units, it does suggest that they be classified into four categories: central and federal government, provincial and state government, local and municipal government, and NPIs controlled and mainly financed by government. Such a classification, if feasible, would most likely have the effect of improving comparability across countries. As with universities, higher level units (for example, an institutional unit for central government) might act as a reporting unit.

²⁷ Homogeneity at the unit level is not a major issue for R&D surveys as they collect volume data (R&D expenditure, personnel etc) rather than data on proportions of units with a certain characteristic (e.g. with Internet access).

77. Countries will be able to use statistical units on their R&D survey frameworks to provide statistics for indicators 3.1 and 3.3. These units may vary significantly between countries and a partial solution is to classify units by size as discussed below.

Definitions of terms used

78. **Connectivity** has been interpreted by ITU (2010a) as meaning high-speed Internet connection. WSIS Action Line C7, in regard to e-science, states that stakeholders should “promote affordable and reliable high-speed Internet connection for all universities and research institutions to support their critical role in information and knowledge production, education and training, and to support the establishment of partnerships, cooperation and networking between these institutions.”

79. According to ITU (2010a), and citing DANTE²⁸, a **national research and education network (NREN)**, is “... a specialized Internet service provider dedicated to supporting the needs of the research and education communities within a country. It usually administers and supports a high-speed backbone network, often offering dedicated channels for individual research projects.” According to ITU, the term “NREN” was originally a service mark of the U.S. government but the term is now applied to national research and education networks more widely.

80. ITU (2010a) cites DANTE that NRENs perform two main functions in relation to scientific research. They act as high-capacity ICT infrastructures to support the work of researchers, promote collaboration, transfer data and share information or confirm experiments. They can also facilitate new research in their own right, by providing platforms and experimental test-beds for testing new services and advanced networking technologies.

81. Note that international networks should be excluded from reported NRENs.

82. **Broadband Internet access** may be fixed or wireless and is defined as follows:

- **Fixed (wired) broadband** refers to fixed (wired) high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include for example cable modem, DSL, fibre-to-the-home/building and other fixed (wired) broadband subscriptions. It excludes wireless broadband services as defined below.
- **Wireless broadband** refers to wireless high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include satellite Internet, terrestrial fixed wireless and fixed WiMax and fixed wireless access. It also includes broadband terrestrial mobile wireless access.²⁹

83. **Research & experimental development (R&D)** is a reasonably broad concept and is defined by UIS as follows: “Research & experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of humanity, culture and society, and the use of this stock of knowledge to devise new applications. The term R&D covers three activities: basic research, applied research and experimental development.

- Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.

²⁸ DANTE (Delivery of Advanced Network Technology to Europe) plans, builds and operates networks for research and education. It is owned by European NRENs and works in partnership with them and the European Commission (ITU, 2010a).

²⁹ Though this form of access is likely to be unusual as the sole form of access for organizations covered by Target 3.

- Applied research is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective.
- Experimental development is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed. R&D covers both formal R&D in R&D units and informal or occasional R&D in other units.”³⁰

Classifications

84. Public scientific and research centres are classified according to type of R&D-performing organization: higher education and government. Definitions for these categories are presented above under *Scope and statistical units*.

85. Following the *Frascati* manual, where possible, government statistical units should be classified into four levels: central and federal government, provincial and state government, local and municipal government, and NPIs controlled and mainly financed by government.

Classification by size

86. To address the ‘units comparability issue’ described above, it is suggested that output for indicators 3.1 and 3.3 be classified by size of organization, using the number of R&D personnel as the most appropriate and available size variable.

87. Data on R&D personnel are collected by many countries and provided to UIS in response to its annual *Questionnaire on Statistics of Science and Technology* (S&T) (UIS, 2010b). R&D personnel include “... all persons employed directly on R&D, as well as those providing direct services such as R&D managers, administrators, and clerical staff. Persons providing an indirect service, such as canteen and security staff, should be excluded.” (UIS, 2010a). Data on R&D personnel can be collected in terms of full-time equivalents (FTE) or head counts (HC). Examination of UIS R&D data indicate that many countries can provide both but that more countries are able to provide HC data. Therefore, it is proposed that HC be used as the sizing variable, where HC data are defined as “... data on the total number of persons who are mainly or partially employed in R&D. This includes staff employed both “full-time” and “part-time”.” (UIS, 2010a)

88. Size ranges should ideally be based on existing standards. However, neither the UIS nor *Frascati* manuals suggest size classifications for higher education or government entities.³¹ The size ranges adopted for this *Framework* are the employment size categories used by the *Partnership* for businesses (*Partnership*, 2010); these are consistent with UNSD standards for businesses (UNSD, 2008c) and are: 1–9, 10–49, 50–249 and 250 or more. These ranges should successfully distinguish small, medium and large organizations.

89. The concept of employment is *persons employed* rather than employees, where the difference is that the former includes non-employees who work for a business.³²

³⁰ The OECD definition of R&D has the same meaning, with the only difference being that the word “man” is used instead of “humanity”.

³¹ The *Frascati* manual recommends a fine size split (also by employment) for R&D-performing businesses as follows: 0, 1-9, 10-49, 50-99, 100-249, 250-499, 500-999, 1,000-4,999, and 5,000 and above.

³² The definition of ‘persons employed’ is from the International Classification of Status in Employment (ILO, 1993) and includes employees, employers, own account workers, members of producers’ cooperatives and contributing family workers. See *Partnership* (2010) and ILO (1993) for full details.

Status of the indicators

90. Indicators 3.1 and 3.3 are not collected on a regular basis by countries. Data for indicators 3.1 and 3.2 were collected in an *ad hoc* survey on reviewing the WSIS targets conducted by ITU in 2009. For indicators 3.2 and 3.3, some information is collected for European and nearby countries via an annual survey of NRENs conducted by the Trans-European Research and Education Networking Association (TERENA, 2009).

91. A reasonably large number of countries were able to respond to the relevant questions in the ITU 2009 survey and results can be found in ITU (2010a). Data for indicator 3.1 show that, for most of the countries that responded, 100 per cent of centres have broadband Internet access. It is suggested that results for this indicator will be more valuable if split by size and type of organization as proposed above. Data for indicator 3.2 show a very useful time series of data by bandwidth from 2001 to 2010. TERENA data for indicator 3.3 show information on the type of organizations that are able to be connected to national NRENs and the percentage that actually are connected. In respect of indicator 3.3, the TERENA categories include *Universities and other ISCED 5 & 6 organizations* and *Research institutes*. Data are available for every year since 2005.

92. Use of the standards recommended in this *Framework* should facilitate country level collection of data for 3.1 using R&D surveys. In respect of indicator 3.3, data for countries not covered by the TERENA surveys could also be collected using R&D surveys. In respect of indicator 3.2, data should be readily available from individual NRENs, relevant country ministries or from surveys such as that conducted by TERENA.

Indicators

Indicator 3.1. Proportion of public scientific and research centres with broadband Internet access

Definition:

Indicator 3.1 measures the proportion of public scientific and research centres with broadband Internet access.

Public scientific and research centres and *broadband Internet access* are defined under *Statistical standards* above.

The *proportion of public scientific and research centres with broadband Internet access* is calculated by dividing the number of public scientific and research centres with broadband Internet access by the number of public scientific and research centres. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by:

- Type of organization (higher education and government).
- Size of organization in ranges of persons employed: 1–9, 10–49, 50–249 and 250 or more.

If possible, government organizations should also be categorized as recommended by the *Frascati* manual, that is: central and federal government, provincial and state government, local and municipal government, and NPIs controlled and mainly financed by government.

See *Statistical standards* above for details.

Data sources:

This indicator could be collected as part of a country's R&D data collection, with scope limited to R&D-performing organizations in the government and higher education sectors. Countries using other survey vehicles should apply the scope and units definitions and classifications described under *Statistical standards* above.

Statistical notes:

There are several statistical issues with this indicator, the main one being the 'units comparability issue' discussed under *Statistical standards* above.

For international reporting, countries should provide a 'statistical standards statement' indicating which government and higher education sector units have been included and how they are defined. Major coverage problems should also be addressed (for example, the omission of small research institutes or local government organizations).

Indicator 3.2. Presence of a national research and education network (NREN), by bandwidth (Mbit/s)**Definition:**

Indicator 3.2 measures whether a country has one or more NRENs and what their bandwidth is. The presence of a NREN indicates a country's ability to participate in national and international research.

National research and education networks (NRENs) are defined under *Statistical standards* above.

Bandwidth in this context refers to the total capacity of NRENs in Mega Bits Per Second (Mbit/s). Bandwidth determines the speed at which data are delivered to and sent from Internet users. It is measured in the number of bits that can be transferred per second. TERENA adopts the concept of **typical core usable backbone capacity** on the network, meaning typical core capacity of the linked nodes in the core. The term 'usable' is included because some NRENs have unused dark fibre with a very high theoretical capacity. For networks that do not have a core backbone (for example, because they have a star topology), TERENA asks for the maximum capacity into the central node of the network (TERENA, 2008, 2009). This definition is in line with the ITU definition of Internet bandwidth (ITU 2010c).

The *presence of a national research and education network (NREN), by bandwidth (Mbit/s)* is presented for each country, preferably as a series of observations over time. Where a country has more than one NREN, they should all be shown if possible.

Disaggregations:

There are no disaggregations proposed for this indicator.

Data sources:

This indicator is not currently collected on a regular or systematic basis. An *ad hoc* survey conducted by ITU in 2009 is the only known source with a global scope. TERENA collects comprehensive data for Europe and nearby countries in the Middle East and North Africa. There are other lists available of existing NRENs and these may be used to provide data on the presence of a NREN if not its bandwidth (for instance, see ITU (2010a), Annexes 3.1 and 3.3, and Wikipedia http://en.wikipedia.org/wiki/National_research_and_education_network).

Individual countries not covered by the TERENA surveys are encouraged to compile indicator 3.2 using the definitions provided in this *Framework*. Where a country has more than one NREN, it should collect data for both or all NRENs. It is expected that, at country level, the information should be readily available from ministries or NRENs.

Statistical notes:

The concept of a NREN appears to be well established and therefore NRENs should be fairly easy to identify. A potential statistical issue may be associated with definition and measurement of NREN bandwidth (for example, see the discussion above about usable versus theoretical capacity).

Other statistical issues associated with this indicator are unknown.

Indicator 3.3. Proportion of public scientific and research centres with Internet access to a NREN**Definition:**

Indicator 3.3 measures the proportion of public scientific and research centres that have direct or indirect broadband Internet access to a national research and education network (NREN), where at least one exists in the country. Note that this indicator only applies to countries that have at least one NREN. Internet access is presumed to be broadband access.

Public scientific and research centres, broadband Internet access and NREN are defined under *Statistical standards* above.

The *proportion of public scientific and research centres with Internet access to a NREN* is calculated by dividing the number of public scientific and research centres with broadband Internet access to a NREN by the number of public scientific and research centres. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by:

- Type of organization (higher education and government).
- Size of organization in ranges of persons employed: 1–9, 10–49, 50–249 and 250 or more.

If possible, government organizations should also be categorized as recommended by the *Frascati* manual, that is: central and federal government, provincial and state government, local and municipal government, and NPIs controlled and mainly financed by government.

See *Statistical standards* above for details.

Data sources:

This indicator could be collected as part of a country's R&D data collection, with scope limited to R&D-performing organizations in the government and higher education sectors. Countries using other survey vehicles should apply the scope and units definitions and classifications described under *Statistical standards* above.

This indicator is also collected by TERENA for European and nearby countries via an annual survey of NRENs. Data are provided on the proportion of organizations of different types connected to the national NRENs. Organizations include universities (defined as ISCED levels 5 and 6) and research institutes.

It is important to note that TERENA units are likely to differ from those recommended in this *Framework*, in particular for universities where university departments and similar are recommended as units for 3.1 and 3.3 but whole universities are the unit for the TERENA survey.

Statistical notes:

There are several statistical issues with this indicator, the main one being the 'units comparability issue' discussed under *Statistical standards* above.

For international reporting, countries should provide a 'statistical standards statement' indicating which government and higher education sector units have been included and how they are defined. Major coverage problems should also be addressed (for example, the omission of small research institutes or local government organizations).

Target 4. Connect all public libraries, museums, post offices and national archives with ICTs³³

Introduction

93. Target 4 deals with the ICT connectivity of a diverse set of (generally) public institutions and is linked with several action lines covering public access to the Internet, ICT infrastructure, use of ICT to preserve and enable access to cultural and linguistic content, and training of information professionals working in various public institutions. Links with these action lines are described in some detail in ITU (2010a).

94. While the entities and the nature of connectivity for Target 4 are not described in the Geneva *Plan of Action*, the goals for these institutions, as expressed in the action lines, indicate a requirement for high-speed Internet connectivity.

95. There are 11 indicators suggested to measure Target 4. Most are not established ICT indicators and it is therefore necessary to develop statistical standards that will guide countries and enable the production of reliable and comparable indicators. As far as possible, existing standards have been adapted for this purpose.

96. Note that the original target included the entity 'cultural centre'. The wording of the target has been amended to exclude cultural centres and no indicators have been proposed for this entity for the following reasons:

- As noted by ITU (2010a), cultural centres are not defined in the Geneva *Plan of Action* and their diversity makes them very difficult to collect data for;³⁴
- Unlike the other entities covered by this target, cultural centres are not defined in existing statistical frameworks, although they are referred to without definition in ISCO-08³⁵ and the UNESCO *Framework for Cultural Statistics* (FCS); and
- The scope of cultural centres is unclear and may overlap with other entities included in the *Framework* for this target. For example, the FCS refers to 'cultural centres' only as an example of a type of museum ("cultural centres ... that facilitate the preservation, continuation and management of tangible or intangible heritage resources").

97. The scope of archives has been restricted to the national archives of a country. These are relatively well defined and exist for most countries. Other archives are not as well defined (especially

³³ The original WSIS indicator was worded "Connect public libraries, cultural centres, museums, post offices and archives with ICTs".

³⁴ Three indicators for cultural centres were described in ITU (2010a). A survey on WSIS targets conducted by ITU in 2009 indicated a range of country definitions of "cultural centre" and a great diversity in the number reported, ranging from 1 in Mexico to 3,487 in Hungary.

³⁵ International Standard Classification of Occupations, ISCO 08, International Labour Organization.

non-government archives) and can cover a number of sectors, including households. The wording of the target has been amended accordingly.

98. There are 11 indicators proposed for WSIS Target 4 as follows:

- Indicator 4.1: Proportion of public libraries with broadband Internet access.
- Indicator 4.2: Proportion of public libraries providing public Internet access.
- Indicator 4.3: Proportion of public libraries with a web presence.
- Indicator 4.4: Proportion of museums with broadband Internet access.
- Indicator 4.5: Proportion of museums with a web presence.
- Indicator 4.6: Proportion of post offices with broadband Internet access.
- Indicator 4.7: Proportion of post offices providing public Internet access.
- Indicator 4.8: National archives organizations with broadband Internet access.
- Indicator 4.9: National archives organizations with a web presence.
- Indicator 4.10: Proportion of items in the national archives that have been digitized.
- Indicator 4.11: Proportion of digitized items in the national archives that are publicly available online.

Statistical standards applying to the indicators

99. Statistical standards applying to indicators 4.1 to 4.11 include scope, statistical units, definitions and classifications. Those standards applying to only a single indicator are described with the indicator. Other standards refer to more than one indicator and are described here.

100. The Target 4 indicators implicitly refer to the situation at a specified *reference date* (for instance, the last day of the previous calendar year). While it is obviously useful if countries harmonize this date in their data collections, it is unrealistic to expect that to occur. Therefore, no advice is offered on the selection of a particular date. For international reporting, countries should include the reference date in a 'statistical standards statement'.

Scope and statistical units

101. Indicators 4.1 to 4.7 are of the type 'proportion of entities with ICT' and are affected by the 'units comparability issue'. As discussed in the *Introduction* to this *Framework*, it is very challenging to provide internationally comparable statistics for such indicators.

102. These challenges can be overcome to a reasonable extent by establishing robust and generally applicable definitions of units and by classifying output by size of organization. Definitions of units for indicators 4.1 to 4.7 have been suggested based on several standards. A size classification is also proposed and is discussed under *Classifications*.

103. Several sources have been used to define the scope and statistical units for the diverse set of institutions covered by Target 4. Foremost amongst them is the *2009 UNESCO Framework for Cultural Statistics* (FCS) (UIS, 2009b), published in 2009 by the UNESCO Institute for Statistics (UIS) and prepared in collaboration with the UNESCO Culture Sector.³⁶

³⁶ The 2009 publication was a revision of the 1986 FCS. The revision was, in part, a response to the transformative impact of new technologies.

104. The FCS defines libraries, museums and the activities of archives. UNESCO (1984) defined archives of various types. Post offices are not included in the FCS but are defined by the Universal Postal Union (UPU, 2010). Other sources for Target 4 standards include ISO 2789 (ISO, 2006) and the International Federation of Library Associations (IFLA 2007, 2010).

105. The *International Standard Industrial Classification of All Economic Activities (ISIC)* (UNSD 2002, 2008b) is the international standard for classifying entities according to their economic activity. National Statistical Offices (NSOs) will generally classify units on their business register³⁷ by ISIC or an equivalent national industrial classification. Where indicator data for Target 4 are collected using a survey run by a NSO, the business register is likely to be used as a survey frame (or at least used as a starting point for constructing a frame). For these reasons, the treatment of the Target 4 entities in ISIC is relevant to a discussion on scope and statistical units.

106. ISIC Rev. 4 (2008) includes classes (the lowest level in ISIC) for museum activities (classes 9102 and 9103) and postal activities (Class 5310). Libraries and archives are included in the same class, 9101 *Library and archives activities*.

107. ISIC Revision 3 (1989) and 3.1 (2002) are still used by some countries. There were some differences from Revision 4 with respect to both archives and postal activities. ISIC Rev. 3.1 and 3 both included maintenance and storage of government records and archives in a broader category on service activities for the government (though they also had Class 9231 *Library and archives activities*). For postal activities, the ISIC Rev. 3.1 and 3 Class 6411 *National post activities* is slightly narrower than Class 5310 in Rev. 4. The categories correspond well for museum classes 9102 and 9103 (9232 and 9233 respectively). More detailed comments on the use of ISIC to determine units are included under the discussion of museums and post offices below.

108. A particular units issue for Target 4 is determining the appropriate unit level for each indicator. Units of complex organizations can be viewed as a hierarchy, rather than a single unit. For example, an *administrative unit* would normally be at a higher level of the hierarchy than an individual *site* or *establishment*. The difference is described by ISO 2789 when referring to libraries. The ISO defines a public library **administrative unit** as “... any independent library, or group of libraries, under a single director or a single administration.”³⁸ In respect of the **site/establishment** level, the International Federation of Library Associations (IFLA) describes statistical units for public libraries as “... public library service points, including branch libraries and library depots...”.

109. For indicators in Target 4 on a web presence, the *administrative unit* or equivalent would seem most suitable as it is most likely to be the level that has a website covering the functions and services of the administrative unit, including its subunits. For the indicators on Internet access and provision of Internet access, the *site/establishment* level would seem more appropriate as that is the level at which staff and users will access the Internet.

110. This *Framework* recommends use of the administrative unit or equivalent for indicators 4.3, 4.5, 4.8, 4.9, 4.10 and 4.11. The site/ establishment level is recommended for the remaining indicators 4.1, 4.2, 4.4, 4.6 and 4.7. However, countries may also wish to ask sites/establishments about a web presence as they may be explicitly represented on the administrative unit’s website.

111. Units at the *site/establishment* level may be listed in some NSO business registers. However, where they are shown at a higher level, countries may prefer to use the latter as reporting units in

³⁷ Also known as a ‘business frame’.

³⁸ The definition was also used by UIS in its 2000 Questionnaire on Statistics of Libraries.

preference to compiling a register of all subunits. In such cases, the reporting unit would respond in respect of each of its subunits.

112. For international reporting, in respect of each indicator, countries should provide a ‘statistical standards statement’ that includes notes on the scope used and the definition of statistical units. Major coverage problems should also be addressed.³⁹

Public library

113. The FCS defines a **library** as follows: “... an organisation, or part of an organisation, whose main aims are to build and maintain a collection and to facilitate the use of such information resources and facilities as are required to meet the informational, research, educational, cultural or recreational needs of its users; these are the basic requirements for a library and do not exclude any additional resources and services incidental to its main purpose (ISO, 2006).⁴⁰ It includes any organized collection of books and periodicals in electronic or in printed form or of any other graphic or audio-visual materials (adapted from UNESCO, 1970). It includes virtual libraries, digital catalogues.”

114. While the FCS does not separately define a **public library**, a UIS pilot survey of libraries (UIS, 2007) provides a definition based on ISO 2789: “... a general library that serves the whole population of a local or regional community and is usually financed, in whole or in part, from public funds. A public library may be intended for the general public or for special groups of users, such as children, visually impaired persons, hospital patients or prisoners. Its basic services are free of charge or available for a subsidized fee. This definition includes services provided to schools by a public library organization and services provided to public libraries in a region by a regional organization.” This definition of public library has been adopted for this *Framework*.

115. In relation to the appropriate unit level for indicators 4.1 to 4.3, it was recommended above that the administrative level unit be used for indicator 4.3 and the site/establishment level be used for 4.1 and 4.2. The use of these units for library surveys can be found in:

- ISO 2789, which refers to a public library administrative unit as one or more libraries under a single director or administration; it could comprise a central/main library, branch libraries and administrative functions.
- ISO 2789 recommends that counts also be made of central/main libraries, branch libraries and mobile libraries; these are the sites/establishments referred to in the discussion above.
- The International Federation of Library Associations (IFLA) surveys member countries every two or three years in respect of public and other libraries. The IFLA statistical units for public libraries are “... public library service points, including branch libraries and library depots...”; this unit appears to be equivalent to the site/establishment unit that is recommended for indicators 4.1 and 4.2.
- UIS (2000) elaborated the concept of *service point* as “... any library in which is provided in separate quarters a service for users, whether it is an independent library or part of a large administration unit. Independent libraries, central libraries and branch libraries (both static and mobile library vans, ships’ libraries, train libraries) are considered as service points provided that

³⁹ Coverage refers to the actual rather than theoretical population surveyed. Undercoverage is the omission of in-scope units from a data collection.

⁴⁰ ISO 2789:2006(E) Information and documentation – International library statistics.

they serve their users directly. The points at which library vans stop are not counted as service points.”⁴¹

Museum

116. The FCS adopts the International Council of Museums’ (ICOM) 2007 definition of museums and defines a museum as “A non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment. It includes live museums.”⁴²

117. The scope of museums per FCS and ICOM⁴³ is broader than institutions designated as 'museums' and includes:

- Natural, archaeological and ethnographic monuments and sites and historical monuments and sites of a museum nature that acquire, conserve and communicate material evidence of people and their environment;
- Institutions holding collections of and displaying live specimens of plants and animals, such as botanical and zoological gardens, aquaria and vivaria;
- Science centres and planetaria;
- Non-profit art exhibition galleries;
- Nature reserves; conservation institutes and exhibition galleries permanently maintained by libraries and archives centres; natural parks;
- International or national or regional or local museum organizations, ministries or departments or public agencies responsible for museums as per the definition given under this article;
- Non-profit institutions or organizations undertaking conservation research, education, training, documentation and other activities relating to museums and museology; and
- Cultural centres and other entities that facilitate the preservation, continuation and management of tangible or intangible heritage resources (living heritage and digital creative activity).

118. The European Group on Museum Statistics (EGMUS) is the only organization known to be currently compiling country data on museums. It defines a museum according to ICOM as follows: “A museum, according to the definition given by the International Council of Museums (ICOM), is a noncommercial, permanent institution in the service of society and of its development, and open to the public, which acquires, conserves, researches, communicates and exhibits, for purposes of study, education and enjoyment, material evidence of man and his environment. In addition to museums designated as such, the following, recognized by ICOM as having the character of museums, are also covered by the surveys:

- a) Conservation institutes and exhibition galleries on libraries and archives centres;
- b) Natural, archaeological and ethnographic monuments and sites and historical monuments and sites of a museum nature, owing to their acquisition, conservation and communication activities.” (EGMUS, 2004).

⁴¹ Paragraph 22 of UIS (2000) contains examples of enumeration of administrative units and service points.

⁴² For ICOM definition, see <http://icom.museum/who-we-are/the-vision/museum-definition.html>.

⁴³ Note that ICOM’s extended definition can be found in its categories of membership: <http://icom.museum/where-we-work/join-us/categories.html>. There are some relatively minor differences between the inclusions. The FCS wording is used in this *Framework*.

119. It appears that the EGMUS definition may be a little narrower in scope than that of FCS and ICOM, in that it specifically includes only two of the ICOM/FCS institutions that qualify as museums though not designated as such.

120. Another approach that countries can use to determine the scope and definition of museums is to include all organizations classified to ISIC Rev. 4 Class 9102 *Museums activities and operation of historical sites and buildings* and Class 9103 *Botanical and zoological gardens and nature reserves activities*. Together, the two categories appear to have a similar scope to FCS/ICOM and include the operation of:

- Museums of all kinds (art museums, museums of jewellery, furniture, costumes, ceramics, silverware, natural history, science and technological museums, historical museums, including military museums, other specialized museums, open-air museums);
- Historical sites and buildings;
- Botanical and zoological gardens, including children's zoos; and
- Nature reserves, including wildlife preservation, etc. (UNSD, 2008b).

121. In ISIC Rev. 3 and 3.1 (UNSD, 2002), the classes are equivalent; they are 9232 (*Museums activities and preservation of historic sites and buildings*) and 9233 (*Botanical and zoological gardens and nature reserves activities*). Where data for indicators 4.4 and 4.5 are collected using a survey run by a NSO, the business register is likely to be used as a survey frame (or at least used as a starting point for constructing a frame). Countries with a business frame that both: includes an industrial classification code compatible with ISIC Rev. 4 or Rev. 3/3.1 and has good coverage of non-profit museums, could use their frame as a basis for surveying museums, and botanical and zoological gardens. A deficient business frame could be supplemented with other information on museums. For a discussion on how this might be done, see ABS (2009).

122. In terms of unit level, EGMUS asks countries to provide data on sites. This *Framework* proposes the use of both levels of unit per the discussion above. However, the distinction may be less of an issue for museums, which are more likely than some of the other units covered by this target to be single sites or establishments.

Post office

123. Post offices are not included in the FCS. However, the Universal Postal Union (UPU) conducts an annual *Postal statistics* survey of designated operators from about 200 UPU member countries (UPU, 2010). It defines two main categories of post offices as follows:

- *Postal establishments open to the public* are post offices to which customers may apply for postal services. Sections of exchange offices or sorting offices offering similar services are also included in this category. These offices may be run by the designated operator or by third parties, and may be permanent or mobile.
- *Postal establishments not open to the public* are those that carry out postal operations not involving customer contact. They include *sorting centres*, which are establishments whose main activity is sorting (sorting sections of post offices open to the public are not included in this category).

124. Sub-categories are also defined and include: full service and secondary permanent post offices, permanent post offices staffed by officials of the designated operator, permanent post offices managed by people from outside the designated operator, mobile post offices and post offices accepting financial transactions.

125. The UPU appears to collect most of its statistics on a site/establishment basis. A question on post offices connected to an electronic network refers to the number of permanent post offices, while the question on provision of Internet access refers to the number of post offices. Note that the UPU also collects information about the website address of the designated operator (which is the respondent to the questionnaire). While this is not a recommended indicator, the data are likely to be available from the UPU.

126. As with museums, an approach that countries can use to determine the scope and definition of post offices is to include all organizations classified to ISIC Rev. 4 Class 5310 *Postal activities* (which include all postal services operating under a universal service obligation). The nearly equivalent category in ISIC Rev. 3/3.1 is Class 6411 *National post activities*, which is slightly broader than Class 5310 in Rev. 4 (it includes mail box rental which is excluded from 5310). Where data for indicators 4.6 or 4.7 are collected using a survey run by a NSO, the business register is likely to be used as a survey frame (or at least used as a starting point for constructing a frame). Countries with a business frame that includes an industrial classification code compatible with ISIC Rev. 4 or Rev. 3/3.1 and has good coverage of post offices (or operators), could use their business register as a basis for surveying post offices. However, it is probably more efficient to collect the information directly from postal operators, as the UPU does.

National archives

127. The FCS refers to the activity of archives as follows: “archives preserve original documents such as manuscripts, photographs, books, films and radio recordings.” It defines archiving as follows: “Archiving represents the collection and repository of cultural forms (movable objects and intangible) for the purposes of preserving for posterity, exhibition and re-use (e.g. the preservation of historic sites and buildings, sound archives and picture libraries).”

128. Clearly, archiving is an activity that may be undertaken by any type of organization, including households. This *Framework* restricts the scope to government national archives as discussed in the *Introduction* above. Government national archives are included by UNESCO (1984) in *general archival institutions* which are responsible for “... the preservation of the archives of all or most agencies at a particular level of government”. General archival institutions are further categorized by UNESCO as *national*,⁴⁴ *regional*⁴⁵ or *local*.

129. The proposed statistical unit for government national archives is the single *national archives* entity, likely to be equivalent to the administrative unit. The unit appears to be well understood; national archives are listed for a number of countries on the UNESCO archives portal <http://www.unesco-ci.org/cgi-bin/portals/archives/page.cgi> (a gateway to information for archivists and archives users).⁴⁶

Definitions of terms used

130. The **Internet** is a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files.

131. **Broadband Internet access** may be fixed (wired) or wireless and is defined as follows:

⁴⁴ Also includes central and federal archives.

⁴⁵ Also includes state archives.

⁴⁶ Note that the links to national archives shown in the portal are not up to date.

- **Fixed (wired) broadband** refers to fixed (wired) high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include for example cable modem, DSL, fibre-to-the-home/building and other fixed (wired) broadband subscriptions. It excludes wireless broadband services as defined below.
- **Wireless broadband** refers to wireless high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include satellite Internet, terrestrial fixed wireless and fixed WiMax and fixed wireless access. It also includes broadband terrestrial mobile wireless access.⁴⁷

132. A **web presence** includes a website, home page or presence on another entity's website (including a related entity). It excludes inclusion in an on-line directory and any other web pages where the library does not have control over the content of the page.⁴⁸

133. Two indicators deal with **digitized content in the national archives**. Indicator 4.10 is a measure of the proportion of items that have been digitized and 4.11 deals with the proportion of digitized items that are publicly available online. There is no guidance associated with the target on how digitized content should be measured. However, ISO 2789 (Information and documentation – International library statistics) deals with electronic content in libraries and contains definitions as follows:

- A **content unit** is “a computer-processed uniquely identifiable textual or audiovisual piece of published work”. It is the unit accessed by users, for example, an electronic file. Multiple content units may be associated with a single document (for example different file formats of the same document and associated image files).
- A **database** is defined as a collection of electronic records or content units.
- An **electronic serial** is a serial published in electronic form only, or in both electronic and another format. A **serial** is a document issued in successive parts and intended to be continued indefinitely. Serials are further split into periodicals and newspapers.
- A **digital document** is “an information unit with a defined content that has been digitized ...” Digital documents include eBooks, electronic patents, networked audiovisual documents and other digital documents such as reports and maps. A digital document may consist of one or more files, and one or more content units. Databases and electronic serials are not examples of digital documents.
- An **electronic collection** is all resources in electronic form and includes databases, electronic serials, digital documents and computer files (data or software program).

134. As indicators 4.10 and 4.11 implicitly compare hardcopy with electronic content, it is suggested that a digitized **item** would normally be the electronic equivalent of a hardcopy document (a ‘digital document’ or ‘electronic serial’ as described above). As national archives organizations will catalogue their holdings in some manner, it is suggested that the unit that would normally be catalogued as an ‘item’,⁴⁹ whether hardcopy or digital, be the unit of measurement for that national archives. Examples of ‘items’ could include individual government records, files, books, reports, letters, theses, maps, photographs, films and sound recordings.

⁴⁷ Though this form of access is likely to be unusual as the sole form of access for organizations covered by Target 4.

⁴⁸ The term *web presence* is used rather than *web site*, based on the presumption that a presence on the WWW is more important than a web site *per se*.

⁴⁹ Though it might not be referred to as an ‘item’.

135. It is clear that more work is needed on the concepts associated with the measurement of digitized content held in national archives. UNESCO plans to hold an international conference in 2012 to explore all aspects of digital preservation and it is hoped that its output will guide further work in this area.

Classifications

136. To address the ‘units comparability issue’ described in the *Introduction*, it is suggested that country level output for indicators 4.1 to 4.7 be classified by size of organization. This enables comparison of similarly sized units across countries. The size classification could be the same across units and both unit levels (the administrative unit and the site/establishment level) covered by this target or it could be different depending on the nature of the unit and data likely to be available. For simplicity and consistency with other standards, a uniform size classification is proposed based on *Partnership* (2010) and is the same as the ranges used for scientific and research centres in Target 3. The size variable is the number of persons employed by head count (HC).⁵⁰

137. Where the indicators are collected by surveys, employment data should be collected in the same survey unless reliable data on employment by HC are available on countries’ business registers (or other survey frames). The proposed size classification consists of ranges of number of persons employed as follows: 1–9, 10–49, 50–249 and 250 or more.

Status of the indicators

138. The International Federation of Library Associations (IFLA) surveys member countries every two or three years in respect of public libraries. Results are published in their *World Reports* (IFLA, 2005, 2007, 2010). IFLA collects data on provision of Internet access in public libraries (as the percentage of public libraries), which is equivalent to indicator 4.2, *Proportion of public libraries providing public Internet access*. The IFLA statistical unit (public library service point) is consistent with the unit recommendation for indicator 4.2.

139. IFLA does not collect data on indicator 4.3 *Proportion of public libraries with a web presence*. A 2007 library pilot survey, conducted by UIS in Latin America and the Caribbean, did collect information on the number of public libraries with websites. However, UIS currently has no plans to resume its library survey in the short-term.⁵¹ Neither IFLA nor UIS collect data on indicator 4.1 *Proportion of public libraries with broadband Internet access*.

140. Therefore, for libraries, countries would need to collect data for at least indicators 4.1 and 4.3, using the standards in this *Framework*. Some countries may be able to compile the data from the sources used to provide data to IFLA.⁵²

141. EGMUS collects and publishes museum statistics for Europe by country and by type of museum. It includes data on the number of museums with a website. There are no other international collections of data on museums and only few at the national level.⁵³

⁵⁰ The definition of ‘persons employed’ is from the International Classification of Status in Employment (ILO, 1993) and includes employees, employers, own account workers, members of producers’ cooperatives and contributing family workers. Note that volunteer workers are excluded. See *Partnership* (2010) and ILO (1993) for full details.

⁵¹ Personal correspondence, UIS.

⁵² It appears that countries use a diversity of sources to respond to the IFLA questionnaire (IFLA, 2010).

⁵³ Including Australia which conducts a dedicated museums survey, see ABS (2009).

142. EGMUS discusses the statistical challenges in compiling museum statistics and notes that “The source of these data, national statistics and surveys, still vary considerably. The main reason for these differences are differences in the scope of these sources. For instance, some national statistics only cover museums which are financed by the state, or professionally-run, while other statistics omit certain aspects of the museums such as staff, income or expenditure.”⁵⁴

143. For museums, countries would need to collect data for indicator 4.4 *Proportion of museums with broadband Internet access*. Non-European countries would also need to collect data for indicator 4.5, *Proportion of museums with a web presence*. European countries may also wish to collect data for that indicator, or use the data already collected by EGMUS. Data collection should use the standards in this *Framework*.

144. The UPU collects data annually from post office operators. Country level data include: number of post office staff, number of post offices by type, number of post offices providing public Internet access points, number of permanent post offices connected to an electronic network, and availability of various online services. Post offices appear to be the best covered by existing data sources and the statistical units appear to be appropriate. However, some countries may wish to collect information for indicators 4.6 (*Proportion of post offices with broadband Internet access*) and 4.7 (*Proportion of post offices providing public Internet access*) directly from post offices or operators, using the standards in this *Framework*.

145. IFLA, EGMUS and the UPU provide some statistics over time, thus enabling a useful set of statistics on change in status of the sub-targets.

146. There are no known data collections of national archives. While the UNESCO Archives Portal⁵⁵ provides links to websites of national archives, those links are out of date. An incomplete list of national archives organizations and links to their websites can also be found in Wikipedia.⁵⁶ These sources could be used to provide some information for indicator 4.9 (*National archives organizations with a web presence*). However, given that they are not current or complete, it is suggested that countries collect data for all of the national archives indicators 4.8 to 4.11 from their national archives organization, using standards presented in this *Framework*.

⁵⁴ See: <http://www.egmus.eu/index.php?id=9>.

⁵⁵ See: <http://www.unesco-ci.org/cgi-bin/portals/archives/page.cgi>.

⁵⁶ See: http://en.wikipedia.org/wiki/List_of_national_archives.

Indicators

Indicator 4.1. Proportion of public libraries with broadband Internet access

Definition:

Indicator 4.1 measures the proportion of public libraries that have access to broadband Internet.

A *public library* is defined under *Statistical standards* above.

The *Internet* and *Broadband Internet access* are defined under *Statistical standards* above.

The *proportion of public libraries with broadband Internet access* is calculated by dividing the number of public libraries with broadband Internet access by the total number of public libraries. The proportion is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by size of organization in ranges of persons employed: 1–9, 10–49, 50–249 and 250 or more.

Data sources:

It is not known whether any countries currently collect this information. It is suggested that countries collect the information for this indicator using the standards in this *Framework*. Data may be collected by statistical surveys or other methods, such as compilation from ministries' administrative records. Some countries may be able to provide the data using the sources used to provide data to IFLA.

Statistical notes:

The main statistical issue with this indicator is the 'units comparability issue' discussed under *Statistical standards* above. The impact of this issue can be reduced by adherence to the definition of a public library, use of the site/establishment level of unit and tabulation of output by size as shown above.

For international reporting, countries should provide a 'statistical standards statement' indicating the reference date that has been used, which public libraries have been included and how they are defined. Major coverage problems should also be addressed.

Indicator 4.2. Proportion of public libraries providing public Internet access

Definition:

Indicator 4.2 measures the proportion of public libraries providing Internet access to the public.

A *public library* is defined under *Statistical standards* above.

The *Internet* is defined under *Statistical standards* above.

Public Internet access refers to a public library at which Internet access is made available to the public, on a full-time or part-time basis. A public library should have at least one computer available for public Internet access.

The *proportion of public libraries providing public Internet access* is calculated by dividing the number of public libraries providing Internet access to the public by the total number of public libraries. The proportion is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by size of organization in ranges of persons employed: 1–9, 10–49, 50–249 and 250 or more.

Data sources:

This indicator is collected from countries by the IFLA survey and so data are likely to be available, at country level, for a large number of countries. It is not known whether employment data are also available as a sizing variable (they are not collected by IFLA).

It is suggested that countries wishing to collect the information for this indicator by statistical surveys or other methods (such as compilation from ministries' administrative records) use the standards in this *Framework*.

Statistical notes:

The main statistical issue with this indicator is the 'units comparability issue' discussed under *Statistical standards* above. The impact of this issue can be reduced by adherence to the definition of a public library, use of the site/establishment level of unit and tabulation of output by size as shown above.

For international reporting, countries should provide a 'statistical standards statement' indicating the reference date that has been used, which public libraries have been included and how they are defined. Major coverage problems should also be addressed.

Indicator 4.3. Proportion of public libraries with a web presence

Definition:

Indicator 4.3 measures the proportion of public libraries with a web presence.

A *public library* is defined under *Statistical standards* above.

A *web presence* is defined under *Statistical standards* above.

The *proportion of public libraries with a web presence* is calculated by dividing the number of public libraries with a web presence by the total number of public libraries. The proportion is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by size of organization in ranges of persons employed: 1–9, 10–49, 50–249 and 250 or more.

Data sources:

It is not known whether any countries currently collect this information. It is suggested that countries collect the information for this indicator using the standards in this *Framework*. Data may be collected using statistical surveys or other methods (such as compilation from ministries' administrative records). Some countries may be able to provide the data using the sources used to provide data to IFLA.

Statistical notes:

The main statistical issue with this indicator is the 'units comparability issue' discussed under *Statistical standards* above. The impact of this issue can be reduced by adherence to the definition of a public library, use of the administrative unit level and tabulation of output by size as shown above.

For international reporting, countries should provide a 'statistical standards statement' indicating the reference date that has been used, which public libraries have been included and how they are defined. Major coverage problems should also be addressed.

Indicator 4.4. Proportion of museums with broadband Internet access**Definition:**

Indicator 4.4 measures the proportion of museums that have access to broadband Internet. They may or may not provide Internet access to the public.

A *museum* is defined under *Statistical standards* above.

The *Internet* and *Broadband Internet access* are defined under *Statistical standards* above.

The *proportion of museums with broadband Internet access* is calculated by dividing the number of museums with broadband Internet access by the total number of museums. The proportion is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by size of organization in ranges of persons employed: 1–9, 10–49, 50–249 and 250 or more.

Data sources:

It is suggested that countries collect the information for this indicator using the standards in this *Framework*. Data may be collected by statistical surveys or other methods, such as compilation from ministries' administrative records.

Statistical notes:

The main statistical issue with this indicator is the 'units comparability issue' discussed under *Statistical standards* above. The impact of this issue can be reduced by adherence to the definition of a museum, use of the site/establishment level of unit and tabulation of output by size as shown above.

For international reporting, countries should provide a 'statistical standards statement' indicating the reference date that has been used, which museums have been included and how they are defined. Major coverage problems should also be addressed.

Indicator 4.5. Proportion of museums with a web presence**Definition:**

Indicator 4.5 measures the proportion of museums with a web presence.

A *museum* is defined under *Statistical standards* above.

A *web presence* is defined under *Statistical standards* above.

The *proportion of museums with a web presence* is calculated by dividing the number of museums with a web presence by the total number of museums. The proportion is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by size of organization in ranges of persons employed: 1–9, 10–49, 50–249 and 250 or more.

Data sources:

For European countries, this indicator is available from EGMUS, which collects data on the number of European museums with a website. EGMUS also splits museums by type. Countries not covered by the EGMUS survey should collect the information for this indicator using the standards in this *Framework*. European countries may also directly collect data for this indicator. Data may be collected by statistical surveys or other methods, such as compilation from ministries' administrative records.

Statistical notes:

The main statistical issue with this indicator is the 'units comparability issue' discussed under *Statistical standards* above. The impact of this issue can be reduced by adherence to the definition of a museum, use of the administrative unit level and tabulation of output by size as shown above. While EGMUS uses the site/establishment unit, the use of that level for this indicator may be less problematic than for other units covered by Target 4 (assuming that museums are more likely to be single establishments).

For international reporting, countries should provide a 'statistical standards statement' indicating the reference date that has been used, which museums have been included and how they are defined. Major coverage problems should also be addressed.

Indicator 4.6. Proportion of post offices with broadband Internet access

Definition:

Indicator 4.6 measures the proportion of post offices that have access to broadband Internet.

A *post office* is defined under *Statistical standards* above.

The *Internet* and *Broadband Internet access* are defined under *Statistical standards* above.

The *proportion of post offices with broadband Internet access* is calculated by dividing the number of post offices with broadband Internet access by the total number of post offices. The proportion is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by size of organization in ranges of persons employed: 1–9, 10–49, 50–249 and 250 or more.

Data sources:

The UPU collects information on the number of permanent post offices connected to an electronic network. This indicator may be suitable as a proxy for the proportion of post offices with broadband Internet access. Countries can also collect information on the number of post offices with broadband Internet access directly from postal operators, using the standards in this *Framework*. The information is likely to be fairly readily available.

Statistical notes:

It is not known to what extent connection to an electronic network is equivalent to having broadband Internet access.

Ideally, the indicator should be available split by size as shown above. However, the UPU does not collect a size distribution from operators at the establishment/site level (it collects the total number of staff at operator level – likely to be equivalent to administrative unit).

Indicator 4.7. Proportion of post offices providing public Internet access

Definition:

Indicator 4.7 measures the proportion of post offices providing Internet access to the public.

A *post office* is defined under *Statistical standards* above.

The *Internet* is defined under *Statistical standards* above.

Public Internet access refers to a post office at which Internet access is made available to the public, on a full-time or part-time basis. A post office should have at least one computer available for public Internet access.

The *proportion of post offices providing public Internet access* is calculated by dividing the number of post offices providing Internet access to the public by the total number of post offices. The proportion is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by size of organization in ranges of persons employed: 1–9, 10–49, 50–249 and 250 or more.

Data sources:

The UPU collects information on the number of post offices providing public Internet access. Data are available for a large number of countries. Countries can also collect information for this indicator directly from operators, using the standards in this *Framework*. The information is likely to be fairly readily available.

Statistical notes:

Ideally, the indicator should be available split by size as shown above. However, the UPU does not collect a size distribution from operators at the establishment/site level (it collects the total number of staff at operator level – likely to be equivalent to administrative unit).

Indicator 4.8. National archives organizations with broadband Internet access**Definition:**

Indicator 4.8 ascertains whether the national archives organization has broadband Internet access. It may or may not provide Internet access to the public.

Some countries do not have a national archives organization, in which case this indicator does not apply.

National archives are defined under *Statistical standards* above.

The *Internet* and *Broadband Internet access* are defined under *Statistical standards* above.

Whether the national archives organization has broadband Internet access is presented for each country. Where a country has more than one institution considered to be a national archives organization, they should all be shown.

Disaggregations:

There are no disaggregations proposed for this indicator.

Data sources:

There are no existing data sources for this indicator. It is suggested that countries collect data from their national archives organization using the standards in this *Framework*. It is likely that the data will be readily available.

Statistical notes:

There are unlikely to be any significant statistical issues with this indicator.

Indicator 4.9. National archives organizations with a web presence**Definition:**

Indicator 4.9 ascertains whether the national archives organization has a web presence. Some countries do not have a national archives organization, in which case this indicator does not apply.

National archives are defined under *Statistical standards* above.

A *web presence* is defined under *Statistical standards* above.

Whether the national archives organization has a web presence is presented for each country. Where a country has more than one institution considered to be a national archives organization, they should all be shown.

Disaggregations:

There are no disaggregations proposed for this indicator.

Data sources:

There are no existing data sources for this indicator. It is suggested that countries collect data from their national archives using the standards in this *Framework*. It is likely that the data will be readily available.

Statistical notes:

There are unlikely to be any significant statistical issues with this indicator.

Indicator 4.10. Proportion of items in the national archives that have been digitized

Definition:

Indicator 4.10 measures the proportion of items held in the national archives that have been digitized and can therefore be preserved and shared in digital format.

National archives are defined under *Statistical standards* above.

Items that have been digitized are defined under *Statistical standards* above.

The *proportion of items in the national archives that have been digitized* is calculated by dividing the number of items that have been digitized by the total number of items held in the national archives. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

There are no disaggregations suggested for this indicator.

Data sources:

There are no existing data sources for this indicator. It is suggested that countries collect data from their national archives using the standards in this *Framework*.

Statistical notes:

The statistical issues associated with this indicator are unknown but there may be differences in how national archives define catalogued items. It is not known to what extent this will affect the international comparability of indicator 4.10.

Indicator 4.11. Proportion of digitized items in the national archives that are publicly available online

Definition:

Indicator 4.11 measures the proportion of digitized items in the national archives that are actually publicly available online.

National archives are defined under *Statistical standards* above.

Digitized items are defined under *Statistical standards* above.

The *proportion of digitized items in the national archives that are publicly available online* is calculated by dividing the number of digitized items that are publicly available online by the number of items that have been digitized. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

There are no disaggregations suggested for this indicator.

Data sources:

There are no existing data sources for this indicator. It is suggested that countries collect data from their national archives using the standards in this *Framework*.

Statistical notes:

The statistical issues associated with this indicator are unknown but there may be differences in how national archives define catalogued items. It is not known to what extent this will affect the international comparability of indicator 4.11.

Target 5. Connect all health centres and hospitals with ICTs⁵⁷

Introduction

147. Target 5 deals with the ICT connectivity of health institutions. As described in ITU (2010a), health is also referred to in Action Lines C2 (“... provide and improve ICT connectivity for all ... health institutions ...”) and C7 (*E-health*).

148. ICT applications in the health area include use of electronic health records; telemedicine, decision support systems; ICT as enabling complex and networked medical equipment; and the Internet as a source of information about health. Most of these applications rely on high-speed connectivity.

149. There are three indicators suggested to measure Target 5 and only one is an established ICT indicator. For the other two, it is necessary to develop statistical standards that will guide countries and enable the production of reliable and comparable statistics. Existing standards have been adapted for this purpose.

150. The three indicators proposed for WSIS Target 5 are:

- Indicator 5.1: Proportion of public hospitals with Internet access, by type of access.
- Indicator 5.2: Proportion of public health centres with Internet access, by type of access.
- Indicator 5.3: Level of use of computers and the Internet to manage individual patient information.

Statistical standards applying to the indicators

151. Statistical standards applying to indicators 5.1 to 5.3 include scope, statistical units, definitions and classifications. Those standards applying to only a single indicator are described with the indicator. Other standards refer to more than one indicator and are described here.

152. Indicators 5.1 and 5.2 implicitly refer to the situation at a specified *reference date* (for instance, the last day of the calendar year). While it is obviously useful if countries harmonize this date in their data collections, it is unrealistic to expect that to occur. Therefore, no advice is offered on the selection of a particular date. For international reporting, countries should include the reference date in a ‘statistical standards statement’.

⁵⁷ The original WSIS indicator was worded slightly differently “Connect health centres and hospitals with ICTs”.

Scope and statistical units

153. Indicators 5.1 and 5.2 are of the type ‘proportion of entities with ICT’ which, as we have seen, is affected by the ‘units comparability issue’. As discussed in the *Introduction* to this *Framework*, it is very challenging to provide internationally comparable statistics for such indicators.

154. These challenges can be overcome to a reasonable extent by establishing robust and generally applicable definitions of units and by classifying output by size of organization. Definitions and a size classification are proposed below.

155. For practical reasons, the scope of the target indicators has been limited to public organizations, while acknowledging that the private health system plays an important role in the provision of health services to those who can afford it. Following evaluation, private organizations could be added later.

156. As discussed in ITU (2010a), hospitals and health centres are not easily defined. In addition, they can be complex types of units operating within complex systems.

157. The International Standard Industrial Classification of All Economic Activities (ISIC) (UNSD 2002, 2008b) is the international standard for classifying entities according to their economic activity. National Statistical Offices (NSOs) will generally classify units on their business register⁵⁸ by ISIC or an equivalent national industrial classification. Where data for indicators 5.1 and 5.2 are collected using a survey run by a NSO, the business register is likely to be used as a survey frame (or at least used as a starting point for constructing a frame). For these reasons, the treatment of health activities in ISIC is relevant to a discussion on scope and statistical units.

158. ISIC Revision 4 (released in 2008) categorizes and describes human health activities as follows:

- Class 8610 *Hospital activities*;
- Class 8620 *Medical and dental practice activities*;
- Class 8690 *Other human health activities* (activities for human health not performed by hospitals or by medical doctors or dentists); and
- Division 87 *Residential care activities*.

159. ISIC Revision 3 (1989) and 3.1 (2002) are still used by some countries. While their categories correspond for classes 8610 and 8620, Class 8690 is narrower than Class 8519 in ISIC Rev.3 and 3.1 (which is also called *Other human health activities* but includes parts of Division 87 *Residential care activities* in ISIC Rev. 4).

160. ISIC Class 8610 (Rev. 4) and Class 8511 (Rev. 3 and 3.1) is *Hospital activities*. It includes (per ISIC Rev. 4) “short- or long-term hospital activities, i.e. medical, diagnostic and treatment activities, of general hospitals (e.g. community and regional hospitals, hospitals of non-profit organizations, university hospitals, military-base and prison hospitals) and specialized hospitals (e.g. mental health and substance abuse hospitals, hospitals for infectious diseases, maternity hospitals, specialized sanatoriums).” Activities are chiefly directed to inpatients and are carried out under the direct supervision of medical doctors.

161. ISIC Rev. 4 does not define health centres, but their activities appear to be parts of classes 8620 *Medical and dental practice activities* and 8690 *Other human health activities*.

⁵⁸ Also known as a ‘business frame’.

162. In the health sector, there are very detailed standards for producing health accounts. The most recent version of *A System of Health Accounts* (SHA) was released as a draft in 2011 and was produced jointly by the OECD, Eurostat and the World Health Organization (WHO). The classification of providers included in the SHA includes provider definitions, which are linked to ISIC Rev. 4. The definition of *Hospital activities* in ISIC Rev. 4 meshes well with the SHA definition for *Hospitals* (HP.1).⁵⁹ Other health provider entities in the SHA are:

- HP.2 Residential long-term care facilities;
- HP.3 Providers of ambulatory health care;
- HP.4 Providers of ancillary services;
- HP.5 Retailers and other providers of medical goods;
- HP.6 Providers of preventive care;
- HP.7 Providers of health care system administration and financing;
- HP.8 Rest of economy; and
- HP.9 Rest of the world.

163. A suitable definition for health centre may be found in the SHA provider category HP.3.4 *Ambulatory health care centres*, defined as "... establishments that are engaged in providing a wide range of out-patient services by a team of medical, paramedical and often also support staff, usually bringing together several specialities and/or serving specific functions of primary and secondary care. These establishments generally treat patients who do not require in-patient treatment. ... " HP.3.4 includes family planning centres, ambulatory mental health and substance abuse centres, free standing ambulatory surgery centres, dialysis care centres and all other ambulatory centres (which include "...establishments engaged in providing a wide range of out-patient services, by a team of medical, paramedical and often also support staff, usually bringing together several specialities and/or serving specific functions of primary care and/or secondary care ...").

164. This *Framework* defines a **hospital** according to SHA HP.1 and ISIC Rev. 4 Class 8610. A **health centre** is defined according to SHA HP.3.4.⁶⁰ Because there is no corresponding class level category for health centres in ISIC, countries will need to construct survey frames to collect data on health centres using surveys.

165. While ISIC does not distinguish public from private entities, the System of National Accounts 2008 (SNA08)⁶¹ institutional sector classification (which is likely to be included on NSO business registers) recognizes general government as an institutional sector and therefore enables the identification of general government units.⁶² This *Framework* defines both **public hospitals** and **public health centres** as belonging to the general government sector, according to the SNA08, that is "... consisting of all units of central, state or local government; all non-market non-profit institutions (NPIs) that are controlled by government units ... The general government sector does not include

⁵⁹ In the SHA, "Hospitals comprise licensed establishments primarily engaged in providing medical, diagnostic, and treatment services that include physician, nursing, and other health services to in-patients and the specialised accommodation services required by in-patients. Hospitals provide in-patient health services, many of which can only be delivered by using specialised facilities and professional knowledge as well as advanced medical technology and equipment, which form a significant and integral part of the provision process. Although the principal activity is the provision of in-patient medical care they may also provide day care, out-patient, and home health care services as secondary activities. ..."

⁶⁰ This appears to mesh reasonably well with the definition of health centre proposed in ITU (2010a) as "... a facility that provides (ambulatory) medical and sanitary services to a specific group in a population."

⁶¹ Jointly published in 2009 by the European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations and World Bank.

⁶² The SNA does not use "public" in this sense, though for simplicity the word is used in this *Framework*.

public corporations, even when all the equity of such corporations is owned by government units. Nor does it include quasi-corporations that are owned and controlled by government units. However, unincorporated enterprises owned by government units that are not quasi-corporations remain integral parts of those units and are therefore included in the general government sector.”

166. As with Targets 3 and 4, one of the units issues affecting indicators 5.1 and 5.2 is determination of the appropriate unit ‘level’, where units of complex organizations can be viewed as a hierarchy, rather than a single unit. An *administrative unit* would normally be at a higher level of the hierarchy than an individual *site* or *establishment*. Indicators 5.1 and 5.2 appear to be more relevant to *sites* (or *establishments*), and therefore that level is recommended in this *Framework*.

167. Units at the *site* (or *establishment*) level may be listed in some NSO business registers. However, where they are shown at a higher level, countries may prefer to use the latter as reporting units in preference to compiling a register of all subunits. In such cases, the reporting unit would respond in respect of each of its subunits (for example, a regional health administration may report in respect of individual health centres and hospitals under its control).⁶³

168. For international reporting, in respect of indicators 5.1 and 5.2, countries should provide a ‘statistical standards statement’ that includes notes on the scope used and the definition of statistical units. Major coverage problems should also be addressed.⁶⁴

169. Indicator 5.3 comes from an existing WHO survey and is derived from questions about the format of records kept by different levels of the public health care system of a country. Unlike data for indicators 5.1 and 5.2, information is not collected from, or about, individual health establishments.

Definitions of terms used

170. The **Internet** is a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files.

Classifications

171. **Type of Internet access** is classified as follows:

172. **Narrowband** includes analogue modem (dial-up via standard phone line), ISDN (Integrated Services Digital Network), DSL at speeds below 256 kbit/s, and mobile phone and other forms of access with an advertised download speed of less than 256 kbit/s. Note that narrowband mobile phone access services include CDMA 1x (Release 0), GPRS, WAP and i-mode.

173. **Fixed (wired) broadband** refers to fixed (wired) high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include for example cable modem, DSL, fibre-to-the-home/building and other fixed (wired) broadband subscriptions. It excludes wireless broadband services as defined below.

⁶³ The SHA also deals with statistical units though it does not make a particular recommendation. It states that “... each unit is a specific entity, which is defined in such a way that it can be recognised and identified and not confused with any other unit. It may be an identifiable legal or physical entity or, ... a statistical construct”.

⁶⁴ Coverage refers to the actual rather than theoretical population surveyed. Undercoverage is the omission of in-scope units from the survey.

174. **Wireless broadband** refers to wireless high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include satellite Internet, terrestrial fixed wireless and fixed WiMax and fixed wireless access. It also includes broadband terrestrial mobile wireless access.⁶⁵

175. To address the ‘units comparability issue’ described in the *Introduction*, it is suggested that country level output for indicators 5.1 and 5.2 be classified by size of organization. This enables comparison of similarly sized units across countries. For simplicity and consistency with other standards, a uniform size classification is proposed based on *Partnership* (2010) and is the same as the ranges used for Targets 3 and 4. The size variable is the number of persons employed by head count (HC).⁶⁶

176. Where data for indicators 5.1 and 5.2 are collected by surveys, employment data should be collected in the same survey unless reliable data on employment by HC are available on countries’ business registers (or other survey frames). The proposed size classification consists of ranges of number of persons employed as follows: 1–9, 10–49, 50–249 and 250 or more.

Status of the indicators

177. It appears that there is very limited or no data collection, internationally or nationally, that would support indicators 5.1 and 5.2. Therefore, data for the indicators would need to be collected or compiled by countries using the standards in this *Framework*. Further comments are provided against each indicator below.

178. Indicator 5.3 was collected in the World Health Organization’s 2009 Global Observatory for eHealth survey (WHO, 2009).⁶⁷ The survey is expected to be conducted every two to three years, though it is possible that survey questions will change over time.

⁶⁵ Though this form of access is likely to be unusual as the sole form of access for a hospital or health centre.

⁶⁶ The definition of ‘persons employed’ is from the International Classification of Status in Employment (ILO, 1993) and includes employees, employers, own account workers, members of producers’ cooperatives and contributing family workers. See *Partnership* (2010) and ILO (1993) for full details.

⁶⁷ Data from the survey on “local healthcare facilities using paper, electronic and electronic plus transmissible patient information, by level of use” were published in ITU (2010a).

Indicators

Indicator 5.1. Proportion of public hospitals with Internet access, by type of access

Definition:

Indicator 5.1 refers to Internet access of public hospitals and the type of Internet access service/s they have. The indicator is split into two parts, as follows:

- Proportion of public hospitals with any Internet access.
- Proportion of public hospitals with Internet access, by type of access service/s.

The *Internet* and *Hospitals* are defined under *Statistical standards* above.

The parts of the indicator are calculated as follows:

The *proportion of public hospitals with any Internet access* is calculated by dividing the number of public hospitals with Internet access by the total number of public hospitals. The result is then multiplied by 100 to be expressed as a percentage.

The *proportion of public hospitals with Internet access, by type of access service* is calculated by dividing the number of public hospitals with each type of Internet access service by the number of public hospitals with Internet access. The results are then multiplied by 100 to be expressed as a percentage. Note that the sum of percentages will exceed 100 as many public hospitals will have more than one type of access service. The formula can also be expressed in algebraic terms as follows.

$$\frac{N_{AccessService_i}}{N_{Inter}} * 100$$

where N_{Inter} is the number of public hospitals with Internet access and $N_{AccessService_i}$ is the number of public hospitals with access service i (where i is narrowband, fixed (wired) broadband or wireless broadband).

For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

Both parts of this indicator should be disaggregated by size of organization in ranges of persons employed: 1–9, 10–49, 50–249 and 250 or more.

The second part of the indicator is also split by type of Internet access service (narrowband, fixed (wired) broadband and wireless broadband). The classification is shown under *Statistical standards* above.

Data sources:

This indicator should be collected by countries using the standards in this *Framework*. Data may be collected by statistical surveys or other methods, such as compilation from ministries' administrative records.

Statistical notes:

A major statistical issue with this indicator is the 'units comparability issue' discussed under *Statistical standards* above. The impact of this issue can be reduced by adherence to the definition of a public hospital, use of the site/establishment level of unit and tabulation of output by size as shown above.

Another possible statistical issue is the technical nature of the categories and the possibility that respondents will not know what kind of Internet access service/s they have.

The Internet connection/s should be functional.

For international reporting, countries should provide a 'statistical standards statement' indicating the reference date that has been used, which public hospitals have been included and how they are defined. Major coverage problems should also be addressed.

Indicator 5.2. Proportion of public health centres with Internet access, by type of access**Definition:**

Indicator 5.2 refers to Internet access of public health centres and the type of Internet access service/s they have. The indicator is split into two parts, as follows:

- Proportion of public health centres with any Internet access.
- Proportion of public health centres with Internet access, by type of access service/s.

The *Internet* and *Public health centres* are defined under *Statistical standards* above.

The parts of the indicator are calculated as follows:

The *proportion of public health centres with any Internet access* is calculated by dividing the number of public health centres with Internet access by the total number of public health centres. The result is then multiplied by 100 to be expressed as a percentage.

The *proportion of public health centres with Internet access, by type of access service* is calculated by dividing the number of public health centres with each type of Internet access service by the number of public health centres with Internet access. The results are then multiplied by 100 to be expressed as a percentage. Note that the sum of percentages will exceed 100 as many public health centres will have more than one type of access service. The formula can also be expressed in algebraic terms as shown for indicator 5.1.

For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

Both parts of this indicator should be disaggregated by size of organization in ranges of persons employed: 1–9, 10–49, 50–249 and 250 or more.

The second part of the indicator is also split by type of Internet access service (narrowband, fixed (wired) broadband and wireless broadband). The classification is shown under *Statistical standards* above.

Data sources:

This indicator should be collected by countries using the standards in this *Framework*. Data may be collected by statistical surveys or other methods, such as compilation from ministries' administrative records.

Statistical notes:

A major statistical issue with this indicator is the 'units comparability issue' discussed under *Statistical standards* above. The impact of this issue can be reduced by adherence to the definition of a public health centre, use of the site/establishment level of unit and tabulation of output by size as shown above.

Another possible statistical issue is the technical nature of the categories and the possibility that respondents will not know what kind of Internet access service/s they have.

The Internet connection/s should be functional.

For international reporting, countries should provide a 'statistical standards statement' indicating the reference date that has been used, which public health centres have been included and how they are defined. Major coverage problems should also be addressed.

Indicator 5.3. Level of use of computers and the Internet to manage individual patient information**Definition:**

Indicator 5.3 refers to the level of use of three patient information formats (paper, computerized data and electronic data transmission) to manage individual patient information, at the local, district or regional, and national levels within a country.

The *level of use* of the three patient information formats is shown in ranges: None, Low – less than 25%, Medium – more than 25% less than 50%, High – more than 50% – less than 75%, and Very high – more than 75%.

The *level of use of computers and the Internet to manage individual patient information* is presented at a country level (see example table below).

Disaggregations:

This indicator is disaggregated by levels of health service administration and patient information format, as shown below.

Levels of health service administration are:

- Local health care facilities include primary care facilities, clinics and hospitals. They are any facilities where direct patient care is provided.
- Regional/district administration refers to the health administrative, management, and planning functions needed to manage the operations of local health care facilities. The specific roles of regional / district health administrative bodies vary from country-to-country.
- National administration of the health system refers to the health administrative, management, policy, planning and functions needed to manage a country's health system and services. The specific roles of national health administrative bodies vary from country-to-country.

Patient information formats are:

- Paper. ICT is not used to collect, process or transmit patient information. (e.g. paper patient records, paper-based mail to communicate results).
- Computerized data. ICT is used to collect and process patient information. Internet is not available to transmit the data to other centres.
- Computerized data plus electronic transmission via the Internet. ICT is used to collect and process patient information and data can be transmitted to other centres using the Internet.

The table below shows how data for indicator 5.3 might be presented for country A.

Example, country A. Level of use of computers and the Internet to manage individual patient information, in ranges

Level of use	Local health care	District/regional health care	National health system
Paper	Medium	High	Very high
Computerized data	High	Medium	Low
Computerized data plus electronic transmission via the Internet	Low	Low	Low

Data sources:

Indicator 5.3 is based on data collected in the World Health Organization's biennial Global Observatory for eHealth survey (WHO, 2009). The 2009 survey collected country data on management of individual patient information in respect of: levels of health service administration, patient information formats, and the level of use of the patient information formats (as described above). The survey also collected the same information in respect of aggregate patient information. Data were collected by the WHO from selected eHealth experts in each country.

Statistical notes:

The major statistical issue for this indicator is that reported information will likely be an estimate of the status of paper, computerized data, and computerized data and Internet transmission usage across the three administrative sectors.

Target 6. Connect all central government departments and establish websites⁶⁸

Introduction

179. Target 6 reflects the importance of connecting government departments and equipping them with a web presence.

180. Government organizations are mentioned in several of the WSIS action lines. However, the most relevant to this target is Action Line C7, *ICT applications: benefits in all aspects of life*. One of the elements of C7 is *E-government*, where the emphases are on applications aimed at transparency in public administration and democratic processes, accountability, efficiency and responding to the needs of citizens and businesses.

181. The WSIS target refers to departments. This has been interpreted more broadly to include all government organizations. However, for measurability purposes, the scope has been changed from the original *local and central government* to *central government*.

182. There are seven indicators suggested to measure Target 6. Most are under consideration for inclusion in the *Partnership's* list of core ICT indicators.

183. The indicators proposed for WSIS Target 6 are:

- Indicator 6.1: Proportion of persons employed in central government organizations routinely using computers.
- Indicator 6.2: Proportion of persons employed in central government organizations routinely using the Internet.
- Indicator 6.3: Proportion of central government organizations with a Local Area Network (LAN).
- Indicator 6.4: Proportion of central government organizations with an intranet.
- Indicator 6.5: Proportion of central government organizations with Internet access, by type of access.
- Indicator 6.6: Proportion of central government organizations with a web presence.
- Indicator 6.7: Level of development of online service delivery by national governments.

Statistical standards applying to the indicators

184. Statistical standards applying to the Target 6 indicators include scope, statistical units, definitions and classifications. Those applying to only a single indicator are described with the indicator. Standards referring to more than one indicator are described here.

⁶⁸ The original WSIS indicator was worded somewhat differently "Connect all local and central government departments and establish websites and e-mail addresses".

185. The main reference standards used to develop the standards for Target 6 indicators are two *Partnership* publications (2010 and 2011) and *E-Government Survey 2010: Leveraging e-government at a time of financial and economic crisis* (UNDESA, 2010).

186. The Target 6 indicators implicitly refer to the situation at a specified *reference date* (for instance, the last day of the previous calendar year). While it is obviously useful if countries harmonize this date in their data collections, it is unrealistic to expect that to occur. Therefore, no advice is offered on the selection of a particular date. For international reporting of indicators 6.1 to 6.6, countries should include the reference date in a 'statistical standards statement'.

Scope and statistical units

187. The WSIS Target 6 indicators of the type 'proportion of central government organizations with ICT' (6.3 to 6.6) are affected by the 'units comparability issue'. As discussed in the *Introduction* to this *Framework*, it is very challenging to provide internationally comparable statistics for such indicators. The discussion below indicates that there are particular difficulties for central government units.

188. Indicators 6.1 and 6.2 are less challenging because they refer to the proportion of employed persons (using ICT) rather than the proportion of central government entities (with ICT). While scope is still an important issue for these two indicators, selection of the statistical unit is less so.

189. Indicator 6.7 is methodologically distinct from the other indicators, deriving from a survey of websites rather than government entities.

Scope

190. Indicators 6.1 to 6.6 refer to central government organizations, which constitute a subsector of the general government sector. The latter is defined in the *System of National Accounts 2008* (SNA08)⁶⁹ as consisting of all units of central, state or local government; all non-market non-profit institutions (NPIs) that are controlled by government units; and social security funds. The general government sector does not include public corporations, even when all the equity of such corporations is owned by government units. Nor does it include quasi-corporations that are owned and controlled by government units. However, unincorporated enterprises owned by government units that are not quasi-corporations remain integral parts of those units and are therefore included in the general government sector.

191. According to SNA08, the central government subsector consists of the institutional unit or units making up the central government plus non-market NPIs that are controlled by central government. SNA08 describes the characteristics of central government in terms of its authority in areas such as imposition of taxes, national defence, maintenance of law and order and relations with foreign governments. The concept of control in respect of NPIs is defined by SNA08 as the ability to determine the general policy or programme of the NPI, with five indicators of control to be considered. They include control according to enabling instruments (e.g. constitution), contractual agreements, degree of funding⁷⁰ and exposure to financial risk of the NPI. Control may be established using one or more of these criteria and, ultimately, the establishment of control is a judgemental in nature.

⁶⁹ Jointly published in 2009 by the European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations and World Bank.

⁷⁰ Per the SNA 2008, even if a NPI is largely financed by government, it may still be able to determine its policy or programme to a significant extent and therefore not be considered controlled by government.

192. The *International Standard Industrial Classification of All Economic Activities (ISIC)* (UNSD 2002, 2008b) is the international standard for classifying entities according to their economic activity. National Statistical Offices (NSOs) will generally classify units on their business register⁷¹ by ISIC or an equivalent national industrial classification. Where data for any of the indicators 6.1 to 6.6 are collected using a survey run by a NSO, the business register may be used as a survey frame (or at least used as a starting point for constructing a frame). The activities of governments are more difficult to deal with than some of the entities in other targets because ISIC refers to activities, not types of units.⁷² Therefore, ISIC cannot be used alone to determine government units (because some of the activities of government will be outside the section, *Public administration and defence; compulsory social security*,⁷³ and, arguably, non government units may also have activities covered by this section). In addition, ISIC does not distinguish the activities of central government; these will vary for individual countries (as an example, countries with a level of 'state' government will have more limited central government functions).

193. Indicator 6.7 utilises data collected in the biennial (since 2008) United Nations E-Government Survey (UNDESA, 2010). It is methodologically quite different from indicators 6.1 to 6.6, which collect information about central government entities. The UN survey collects information about government websites, in particular national portals and websites of ministries of health, education, social welfare, labour and finance. While the focus is on national websites, the content of state and local government sites is taken into account where they are linked to an in-scope national site.

Statistical units

194. **Government** units are defined according to SNA08 as "... unique kinds of legal entities established by political processes that have legislative, judicial or executive authority over other institutional units within a given area. Viewed as institutional units, 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."

195. An **institutional unit** is defined by SNA08 as "... an economic entity that is capable, in its own right, of owning assets, incurring liabilities and engaging in economic activities and in transactions with other entities." An important attribute of the institutional unit is that a set of economic accounts exists or can be compiled for the unit. This set of accounts includes consolidated financial accounts and/or a balance sheet of assets and liabilities (UNSD, 2008b).

196. According to SNA08 "Central government is a large and complex sub-sector in most countries. It is generally composed of a central group of departments or ministries that make up a single institutional unit plus, in many countries, other institutional units."

197. For indicators of the type 'proportion of central government organizations with ICT' (6.3 to 6.6), use of the institutional unit presents difficulties for those countries where the institutional unit comprises all (or most) central government departments or ministries. In such cases, the institutional unit will consist of a number of subunits (e.g. individual ministries and agencies), each of which has its own ICT characteristics. There will not be a clear indication of the ICT characteristics of the institutional unit, unless all the subunits have identical ICT characteristics.

⁷¹ Also known as a 'business frame'.

⁷² "ISIC does not make any distinction regarding the institutional sector to which a statistical unit belongs. For instance, there is no category that would describe all activities carried out by a government as such. Activities carried out by government units that are specifically attributable to other areas of ISIC should be classified in the appropriate class of ISIC and not in division 84 (Public administration and defence; compulsory social security)." (UNSD, 2008b)

⁷³ Section O in ISIC Rev. 4 and Section L in ISIC Rev. 3.1.

198. A partial solution to this problem is to use a unit that is at a lower level than the institutional unit in cases where the institutional unit comprises all (or most) of central government. SNA08 discusses a number of government units that may be part of an institutional unit or be institutional units in their own right. They include:

- Departments or ministries of central government that are part of a single institutional unit;
- Branch offices or agencies of central government (for example located in different parts of the country) that are part of a single institutional unit; and
- Agencies of central government with separate legal identity and substantial autonomy that may be established to carry out specific functions (such as road construction, or the non-market production of health or education services); these are separate institutional units if they maintain full sets of accounts.

199. In some, but not all, cases these types of units will be equivalent to sites or establishments. In others, they will be higher level units, with associated subunits including establishments. It is clear that it is impractical to collect or compile information in respect of all establishments that are part of a central government entity. In many countries, such establishments would include individual schools, hospitals, museums, police stations, post offices etc.

200. It is therefore suggested that, where the institutional unit comprises all (or most) of central government, the highest level below the institutional unit be selected as the appropriate statistical unit of central government. Such units would include portfolio departments (e.g. education, health, education, culture, justice) and central government agencies such as national postal operators. Where there is no such unit between an establishment and a single institutional unit of central government, then the establishment would be the appropriate statistical unit. In some cases, an institutional unit may be appropriate, for instance, where it is an agency of central government with a separate legal identity.

201. The suggested unit will, in many cases, be analogous to the *kind-of-activity* units defined by SNA08: "A kind-of-activity unit is an enterprise, or a part of an enterprise, that engages in only one kind of productive activity or in which the principal productive activity accounts for most of the value added." This is a higher level unit than the establishment level, which is location-based ("... 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 ...").

202. Where the selected unit has one or more subunits that are not establishments and have different ICT characteristics from the selected statistical unit, the response should reflect the situation applying to the majority of persons employed. For example, a particular statistical unit is a government department with Internet access at its head office, where 100 people work. The department has several regional offices, all without Internet access and employing in total 150 employees. The response should indicate that the statistical unit does not have Internet access.

203. It is obvious that central government statistical units are very heterogeneous and are not able to be defined in a way that can be applied uniformly across countries, yet still satisfy the requirements of indicators 6.3 to 6.6.

204. In addition, the functions of central government will vary across countries, thus compounding comparability problems.⁷⁴ In this situation, a classification of organizations by size is particularly

⁷⁴ For a discussion on this topic, see OECD (2009).

important in creating some level of homogeneity of central government units across countries. A size classification is presented below.

205. Where countries' business registers (or equivalent registers of government units) have only institutional government units, countries may prefer to use those units as reporting units in preference to compiling a register of all subunits. In such cases, the reporting unit would respond in respect of each of its subunits (for example, departments or ministries, branch offices and agencies).

206. Countries using a business register to conduct surveys to measure any of the indicators 6.1 to 6.6 should ensure that they have covered all the central government units classified to ISIC Section O *Public administration and defence; compulsory social security*. It is reiterated that central government activities may be classified to various other ISIC classes, for instance (in ISIC Rev. 4), Section P *Education*; Section Q *Human health and social work activities*, and Section R *Arts, entertainment and recreation*. In addition, units that are not central government entities may be classified to ISIC Section O.

Definitions of terms used

207. **Persons employed** refers to all persons working for the central government organization, not only those working in clerical jobs. They include short-term, casual and seasonal employees.⁷⁵

208. **Routinely** refers to at least once a week (UNCTAD, 2009).

Classifications

209. For indicators 6.1 and 6.2, *persons employed* could be classified by characteristics applying to individuals, for example, occupation or gender.

210. As discussed above, the 'units comparability issue' is a major one for central government. It is strongly recommended that output for at least indicators 6.3 to 6.6 be classified by size of central government organization, thus enabling comparison of similarly sized units across countries. The size variable is the number of persons employed by head count (HC) and the size ranges are the employment size categories used by the *Partnership* for businesses (*Partnership*, 2010); these are: 1–9, 10–49, 50–249 and 250 or more.

211. Where data for the indicators 6.1 to 6.6 are collected by surveys, employment data should be collected in the same survey unless reliable data on employment by HC are available on countries' business registers (or other survey frames).

Status of the indicators

212. There are very few countries that collect data on indicators 6.1 to 6.6. The *Partnership* is currently finalizing a set of core indicators on e-government (*Partnership*, 2011), which it is hoped, will encourage further data collection.

213. Indicator 6.7 is available for all UNDESA member states⁷⁶ through the biennial UN E-Government Survey (UNDESA, 2010). While the survey has been conducted since 2003, the treatment of online services has varied between surveys. Therefore, a time series of data covering all years is not available.

⁷⁵ The definition is adapted from ILO (1993).

⁷⁶ 192 countries in 2010.

Indicators

Indicator 6.1. Proportion of persons employed in central government organizations routinely using computers

Definition:

Indicator 6.1 is a measure of the extent of routine computer usage among persons employed by central government organizations.

A *computer* is a desktop or a laptop computer. It does not include equipment with some embedded computing abilities such as mobile cellular phones, personal digital assistants (PDAs) or TV sets.

Central government organizations are defined under *Statistical standards* above.

Routinely and *Persons employed* are defined under *Statistical standards* above.

The *proportion of persons employed in central government organizations routinely using computers* is calculated by dividing the number of persons employed by central government organizations, who routinely use computers, by the number of persons employed by central government organizations. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by size of central government organization in ranges of persons employed: 1-9, 10-49, 50-249, 250 and above.

It may also be disaggregated by gender or other characteristics of individuals where that information is available.

Data sources:

This indicator is the proposed *Partnership* e-Government indicator EG1 *Percentage of persons employed in central government organizations routinely using computers* (*Partnership*, 2011).

Indicator 6.1 should be collected by countries using the standards in this *Framework*. Data may be collected by statistical surveys or other methods, such as compilation from ministries' administrative records. A forthcoming *Partnership* publication will offer further methodological advice for this indicator.

Statistical notes:

The main statistical issue with this indicator is that the result reflects the functions and statistical units of central government organizations as well as the propensity towards computer use. For example, if a country has a large number of central government statistical units involved in labouring activities (such as road building), it may show a lower result on this indicator simply because labourers are less likely to use computers as part of their job than clerical workers.

For international reporting, countries should provide a 'statistical standards statement' indicating the reference date that has been used, which central government organizations have been included and how they are defined. Major coverage problems should also be addressed.

Indicator 6.2. Proportion of persons employed in central government organizations routinely using the Internet**Definition:**

Indicator 6.2 is a measure of the extent of routine Internet usage among persons employed by central government organizations.

The *Internet* is a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files.

Central government organizations are defined under *Statistical standards* above.

Routinely and *Persons employed* are defined under *Statistical standards* above.

The *proportion of persons employed in central government organizations routinely using the Internet* is calculated by dividing the number of persons employed by central government organizations, who routinely use the Internet, by the number of persons employed by central government organizations. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by size of central government organization in ranges of persons employed: 1-9, 10-49, 50-249, 250 and above.

It may also be disaggregated by gender or other characteristics of individuals where that information is available.

Data sources:

This indicator is the proposed *Partnership e-Government* indicator EG2 *Percentage of persons employed in central government organizations routinely using the Internet* (*Partnership*, 2011).

Indicator 6.2 should be collected by countries using the standards in this *Framework*. Data may be collected by statistical surveys or other methods, such as compilation from ministries' administrative records. A forthcoming *Partnership* publication will offer further methodological advice for this indicator.

Statistical notes:

The main statistical issue with this indicator is that the result reflects the functions and statistical units of central government organizations as well as the propensity towards Internet use. For example, if a country has a large number of central government statistical units involved in labouring activities (such as road building), it may show a lower result on this indicator simply because labourers are less likely to use the Internet as part of their job than clerical workers.

For international reporting, countries should provide a 'statistical standards statement' indicating the reference date that has been used, which central government organizations have been included and how they are defined. Major coverage problems should also be addressed.

Indicator 6.3. Proportion of central government organizations with a Local Area Network (LAN)

Definition:

Indicator 6.3 refers to the proportion of central government organizations with a LAN.

A LAN refers to a network connecting computers within a localized area such as a single building, department or site; it may be wireless.

Central government organizations are defined under *Statistical standards* above.

The proportion of central government organizations with a LAN is calculated by dividing the number of central government organizations with a LAN by the total number of central government organizations. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by size of central government organization in ranges of persons employed: 1-9, 10-49, 50-249, 250 and above.

Data sources:

This indicator is the proposed *Partnership* e-Government indicator EG3 *Percentage of central government institutions with a Local Access Network (LAN) connecting at least two computers (Partnership, 2011)*.

Indicator 6.3 should be collected by countries using the standards in this *Framework*. Data may be collected by statistical surveys or other methods, such as compilation from ministries' administrative records. A forthcoming *Partnership* publication will offer further methodological advice for this indicator.

Statistical notes:

A major statistical issue with this indicator is the 'units comparability issue' discussed under *Statistical standards* above. The impact of this issue can be reduced by adherence to the standards shown under *Scope and statistical units* and tabulation of output by size as shown above.

For international reporting, countries should provide a 'statistical standards statement' indicating the reference date that has been used, which central government organizations have been included and how they are defined. Major coverage problems should also be addressed.

Indicator 6.4. Proportion of central government organizations with an intranet

Definition:

Indicator 6.4 refers to the proportion of central government organizations with an intranet.

An intranet 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.

Central government organizations are defined under *Statistical standards* above.

The proportion of central government organizations with an intranet is calculated by dividing the number of central government organizations with an Intranet by the total number of central government organizations. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by size of central government organization in ranges of persons employed: 1-9, 10-49, 50-249, 250 and above.

Data sources:

This indicator is the proposed *Partnership* e-Government indicator EG4 *Percentage of central government institutions with an Intranet (Partnership, 2011)*.

Indicator 6.4 should be collected by countries using the standards in this *Framework*. Data may be collected by statistical surveys or other methods, such as compilation from ministries' administrative records. A forthcoming *Partnership* publication will offer further methodological advice for this indicator.

Statistical notes:

A major statistical issue with this indicator is the 'units comparability issue' discussed under *Statistical standards* above. The impact of this issue can be reduced by adherence to the standards shown under *Scope and statistical units* and tabulation of output by size as shown above.

For international reporting, countries should provide a 'statistical standards statement' indicating the reference date that has been used, which central government organizations have been included and how they are defined. Major coverage problems should also be addressed.

Indicator 6.5. Proportion of central government organizations with Internet access, by type of access**Definition:**

Indicator 6.5 refers to Internet access of central government organizations and the type of Internet access service/s they have. The indicator is split into two parts, as follows:

- Proportion of central government organizations with any Internet access.
- Proportion of central government organizations with Internet access, by type of access service/s.

The *Internet* is a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files.

Central government organizations are defined under *Statistical standards* above.

The parts of the indicator are calculated as follows:

The *proportion of central government organizations with any Internet access* is calculated by dividing the number of central government organizations with Internet access by the total number of central government organizations. The result is then multiplied by 100 to be expressed as a percentage.

The *proportion of central government organizations with Internet access, by type of access service* is calculated by dividing the number of central government organizations with each type of Internet access service by the number of central government organizations with Internet access. The results are then multiplied by 100 to be expressed as a percentage. Note that the sum of percentages will exceed 100 as many central government organizations will have more than one type of access service. The formula can also be expressed in algebraic terms as follows.

$$\frac{N_{AccessService_i}}{N_{Inter}} * 100$$

where N_{Inter} is the number of central government organizations with Internet access and $N_{AccessService_i}$ is the number of central government organizations with access service i (where i is narrowband, (wired) broadband or wireless broadband).

For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

The type of Internet access is classified as follows:

Narrowband includes analogue modem (dial-up via standard phone line), ISDN (Integrated Services Digital Network), DSL at speeds below 256 kbit/s, and mobile phone and other forms of access with an advertised download speed of less than 256 kbit/s. Note that narrowband mobile phone access services include CDMA 1x (Release 0), GPRS, WAP and i-mode.

Fixed (wired) broadband refers to fixed (wired) high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include for example cable modem, DSL, fibre-to-the-home/building and other fixed (wired) broadband subscriptions. It excludes wireless broadband services as defined below.

Wireless broadband refers to wireless high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include satellite Internet, terrestrial fixed wireless and fixed WiMax and fixed wireless access. It also includes broadband terrestrial mobile wireless access.⁷⁷

This indicator should be disaggregated by size of central government organization in ranges of persons employed: 1-9, 10-49, 50-249, 250 and above.

Data sources:

This indicator is the proposed *Partnership e-Government* indicator EG5 *Percentage of central government institutions with Internet access by type of access (narrowband, broadband)* (*Partnership*, 2011).

Indicator 6.5 should be collected by countries using the standards in this *Framework*. Data may be collected by statistical surveys or other methods, such as compilation from ministries' administrative records. A forthcoming *Partnership* publication will offer further methodological advice for this indicator.

⁷⁷ Though this form of access is likely to be unusual as the sole form of access for a central government organization.

Indicator 6.5. Proportion of central government organizations with Internet access, by type of access (continued)

Statistical notes:

A major statistical issue with this indicator is the 'units comparability issue' discussed under *Statistical standards* above. The impact of this issue can be reduced by adherence to the standards shown under *Scope and statistical units* and tabulation of output by size as shown above.

Another possible statistical issue is the technical nature of the categories and the possibility that respondents will not know what kind of Internet access service/s they have.

As organizations can use more than one access service, multiple responses are possible.

Use may be by any device enabling Internet access (not only a computer). This includes a mobile phone, PDA, games machine and digital TV.

The Internet connection/s should be functional, that is any equipment, software or services needed should be in working condition.

For international reporting, countries should provide a 'statistical standards statement' indicating the reference date that has been used, which central government organizations have been included and how they are defined. Major coverage problems should also be addressed.

Indicator 6.6. Proportion of central government organizations with a web presence

Definition:

Indicator 6.6 refers to the proportion of central government organizations with a web presence.

A *web presence* includes a website, home page or presence on another entity's website (including a related entity). It excludes inclusion in an online directory and any other web pages where the entity does not have control over the content of the page.⁷⁸

Central government organizations are defined under *Statistical standards* above.

The *proportion of central government organizations with a web presence* is calculated by dividing the number of central government organizations with a web presence by the total number of central government organizations. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by size of central government organization in ranges of persons employed: 1-9, 10-49, 50-249, 250 and above.

Data sources:

This indicator is the proposed *Partnership* e-Government indicator EG6 *Percentage of central government institutions with a web presence* (*Partnership*, 2011).

Indicator 6.6 should be collected by countries using the standards in this *Framework*. Data may be collected by statistical surveys or other methods, such as compilation from ministries' administrative records. A forthcoming *Partnership* publication will offer further methodological advice for this indicator.

Statistical notes:

A major statistical issue with this indicator is the 'units comparability issue' discussed under *Statistical standards* above. The impact of this issue can be reduced by adherence to the standards shown under *Scope and statistical units* and tabulation of output by size as shown above.

For international reporting, countries should provide a 'statistical standards statement' indicating the reference date that has been used, which central government organizations have been included and how they are defined. Major coverage problems should also be addressed.

⁷⁸ The term *web presence* is used rather than *web site*, based on the presumption that a presence on the WWW is more important than a web site *per se*.

Indicator 6.7. Level of development of online service delivery by national governments**Definition:**

Indicator 6.7 refers to the level of development of online service delivery by national governments, through national portals, and websites of ministries of health, education, social welfare, labour and finance.

The *level of development of online service delivery* is split into four stages, described by UNDESA (2010 and personal correspondence) as follows:

- Stage 1. Emerging services. Government websites provide information on public policy, governance, laws and regulations. They have links to ministries, departments and other branches of government. Citizens are easily able to obtain information on what is new in the national government and ministries and can follow links to archived information. The website provides features for easy access of information.
- Stage 2. Enhanced services. Government websites deliver expanded one-way e-information and e-services between government and citizen, such as providing downloadable forms for government services and applications. The sites have an expanded and advanced array of technical features to search information such as RSS feeds, audio and video capabilities and are multi-lingual. The flow is from government to citizen and websites provide disability access features for inclusion of special groups; facilities for citizen feedback and participation in public policy decision making; and calendar listing of e-participation events.
- Stage 3. Transactional services. Government websites engage in two-way communication and transaction with citizens, including requesting and receiving inputs on government policies, programmes, regulations, etc. Some form of electronic authentication of the citizen's identity is required to successfully complete the exchange. Government websites process transactions, such as e-voting, downloading and uploading forms, filing taxes online or applying for certificates, licenses and permits. They also handle financial transactions, i.e. where money is transferred on a secure network to government. The government reports on citizen website use, and provides e-participation services such as bulletin boards and surveys on citizen input into participatory processes, and reports the results of online voting on key public policy issues.
- Stage 4. Connected services. Government websites have changed the way governments communicate with their citizens. They have integrated and /or one-stop-shop services for the citizen and are proactive in requesting information and opinions from citizens using Web 2.0 and other interactive tools. E-services and e-solutions cut across the departments and ministries in a seamless manner. Information, data and knowledge is transferred from government agencies through integrated applications. Governments have moved from a government-centric to a citizen-centric approach, where e-services are targeted to citizens through life cycle events and segmented groups to provide tailor-made services. Governments create an environment that empowers citizens to be more involved with government activities to have a voice in decision-making.

The presence of a *national/integrated portal* is established for each country, using a set of criteria including: whether there is a distinct national government site or portal, whether there is a Presidential or Prime Minister's site that clearly states that it is the national government site; and/or whether there is any other site that is clearly identified as the national government site.

While the focus is on *national* websites, the content of state and local government sites is taken into account where they are linked to an in-scope national website.

The *level of development of online service delivery by national governments* is presented for each country as the score for each stage, where the score is calculated as the sum of points for particular services (each scored as zero or one).

Disaggregations:

There are no disaggregations proposed for this indicator.

Data sources:

The data for this indicator are collected in the UN E-Government Survey, which is carried out and published biennially (since 2008) by the United Nations Department of Economic and Social Affairs. The latest publication was released in 2010 (UNDESA, 2010). The methodology is based on a comprehensive survey of websites of Member State governments.⁷⁹

⁷⁹ In 2010, Member States were also invited to supply the addresses of their top-level national and ministerial websites to be used as a starting point for the web survey. Approximately thirty per cent of Member States responded.

Target 7. Adapt all primary and secondary school curricula to meet the challenges of the information society, taking into account national circumstances

Introduction

214. Target 7 reflects the importance of enabling schools to benefit from ICT. Emphases for this target are on teacher training and use of ICT as a pedagogical aid. This target is linked to Target 2, which focuses on ICT connectivity of schools.

215. Among the benefits of ICT in schools is the provision of skills needed in an information society increasingly reliant on ICT. Conversely, students who enter such a world without ICT skills may be disadvantaged.

216. There are four indicators suggested to measure Target 7. All are existing indicators developed by the UNESCO Institute for Statistics and one is also a *Partnership* core ICT indicator.

217. The four indicators for WSIS Target 7 are:

- Indicator 7.1: Proportion of ICT-qualified teachers in schools.
- Indicator 7.2: Proportion of teachers trained to teach subjects using ICT.
- Indicator 7.3: Proportion of schools with computer-assisted instruction.
- Indicator 7.4: Proportion of schools with Internet-assisted instruction.

Statistical standards applying to the indicators

218. Statistical standards applying to indicators 7.1 to 7.4 include scope, statistical units, definitions and classifications. Those applying to only a single indicator are described with the indicator. Other standards refer to more than one indicator and are described here.

219. The standards can be found in the *UIS Guide to Measuring Information and Communication Technologies (ICT) in Education* (UIS, 2009a) and the *Partnership's Core ICT Indicators* (2010).

220. UIS (2009a) includes a *Prototype Questionnaire on Statistics of ICT in Education* in Appendix 1. The questionnaire was piloted by the international Working Group on ICT Statistics in Education (WISE) in 2009. WISE is made up of over 25 countries from various regions. Appendix II contains definitions of terms used in the questionnaire.

Scope and statistical units

221. The school scope for Target 7 indicators is all public and private schools, ISCED levels 1 to 3 (that is from primary to upper secondary education). The teacher scope is all teachers (in headcounts – part-time and full-time) who are teaching at those schools.

Definitions of terms used

222. **Educational institutions or schools** are defined by the UNESCO Institute for Statistics (UIS, 2009a) as follows: “... schools are established institutions, which have the provision of education as their sole or main purpose. Such institutions are normally accredited or sanctioned by a public authority. While the majority of educational institutions fall under the jurisdiction of – or are operated by – education authorities, other public agencies dealing with such areas as health, training, labour, justice, defence, social services, etc. may also be involved. Educational institutions may also be operated by private organizations, such as religious bodies, special interest groups or private educational and training institutions, both for profit and non-profit.”

223. A **secondary school** mainly offers programmes equivalent to ISCED levels 2 and 3, while a **primary school** mainly offers programmes equivalent to level 1.

224. Teachers and teaching staff are defined by UIS (2009a) as “... persons employed in an official capacity for the purpose of guiding and directing the learning experience of learners, irrespective of qualifications or the delivery mechanism, i.e. whether face-to-face and/or at a distance. This definition excludes educational personnel who have no active teaching duties (e.g. headmasters who do not teach) or work occasionally or in a voluntary capacity in educational institutions (e.g. parents).”

Classifications

225. The main classificatory variable used is the dichotomous variable *public/private* educational institutions, defined by UIS (2009a) as:

- A public educational institution is controlled and managed by a governmental education authority or agency (national/federal, state/provincial or local), irrespective of the origin of its financial resources.
- A private educational institution is controlled and managed by a non-governmental organization (church, trade union or business enterprise), whether or not it receives financial support from public authorities.

226. General classifications may also be applied to these indicators; in particular, a split of urban/rural would provide insights on any disadvantages of rural and remote schools. Countries may categorize regions as urban or rural based on population census data (see discussion in Target 1).⁸⁰

Status of the indicators

227. The indicators were developed and piloted with participating country members of in the international Working Group on ICT Statistics in Education (WISE). Within countries, data are usually

⁸⁰ UIS makes the point that national definitions of rural areas may not be comparable across countries and advises that definitions be based on national statistical practices (UIS, 2009).

compiled by a statistical unit of the Ministry of Education or the national statistical office, through an annual school census using mainly school records as primary data sources.

228. Statistical standards and data collection practices have been well documented by UIS (2009a). In practice, availability of the indicators is relatively low, in particular the indicators related to teachers. As countries further integrate ICT-assisted instruction into their curriculum, there is a growing need to monitor this phenomenon by collecting data through their annual school censuses or other specialized surveys.

Indicators

Indicator 7.1. Proportion of ICT-qualified teachers in schools

Definition:

Indicator 7.1 measures the proportion of teachers trained to teach basic computer skills (or computing) in primary and secondary schools. The indicator presents the skilled teaching force available to deliver computing courses. This does not necessarily mean that teachers recorded as qualified actually teach a computing course, nor does it ensure that course delivery is effective.

ICT-qualified teachers are those who have been trained specifically in pre-service or in-service schemes to teach basic computer skills (or computing) according to nationally defined qualification standards. The teacher training is formal pre-service or in-service training, which is designed to equip teachers with the knowledge, attitude, behaviour and skills required for teaching at the relevant level.

The *proportion of ICT-qualified teachers in schools* is calculated by dividing the number of primary and secondary teachers who have been trained to teach basic computer skills (or computing) by the total number of teachers in primary and secondary schools. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

According to country data availability, this indicator may be disaggregated by public/private educational institutions. See *Statistical standards* above for details.

Data sources:

This indicator is the *Partnership* core ICT indicator ED8 *Proportion of ICT-qualified teachers in schools*. Data are collected through the annual school census (or extracted from school records) and are generally compiled at country level by the statistical unit of the Ministry of education or the national statistical office.

Statistical notes:

There are no known significant statistical issues with this indicator. Analysis of data from the Latin America and Caribbean survey of 2010 is expected to provide more information on statistical issues.

Both public and private schools are included.

ISCED levels 1 to 3 cover schools offering primary, lower secondary and upper secondary education.

Trained teachers are counted according to nationally defined qualification standards.

Indicator 7.2. Proportion of teachers trained to teach subjects using ICT**Definition:**

Indicator 7.2 measures the availability of teachers trained to use ICT to teach subjects in primary and secondary schools. The indicator presents the skilled teaching force available to teach subjects using ICT. This does not necessarily mean that teachers recorded as qualified actually teach subjects using ICT, nor does it ensure the quality and effectiveness of course delivery.

Teachers trained to teach subjects using ICT are those teachers who have received a nationally defined minimum of formal training to teach one or more subjects at the relevant level(s) using ICT to support their teaching. The teacher training is formal pre-service or in-service training, which is designed to equip teachers with the knowledge, attitude, behaviour and skills required for teaching at the relevant level.

The *proportion of teachers trained to teach subjects using ICT* is calculated by dividing the number of primary and secondary school teachers trained to teach subject(s) using ICT by the total number of teachers in primary and secondary schools. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

According to country data availability, this indicator may be disaggregated by public/private educational institutions. See *Statistical standards* above for details.

Data sources:

This indicator is ED38 *Proportion of primary and secondary school teachers trained to teach subject(s) using ICT facilities (for ISCED levels 1-3)* from the UNESCO list of proposed indicators on ICT in education (UIS, 2009a). Data are collected through the annual school census (or extracted from school records) and are generally compiled at country level by the statistical unit of the Ministry of Education or the national statistical office.

Statistical notes:

There are no known significant statistical issues with this indicator. Analysis of data from the Latin America and Caribbean survey of 2010 is expected to provide more information on statistical issues.

Both public and private schools are included.

ISCED levels 1 to 3 cover schools offering primary, lower secondary and upper secondary education.

Trained teachers are counted according to nationally defined qualification standards.

Indicator 7.3. Proportion of schools with computer-assisted instruction

Definition:

Indicator 7.3 measures the proportion of primary and secondary schools offering computer-assisted instruction. It reflects the presence and accessibility of computer-assisted instruction in schools, not the actual intensity of use.

Computer-assisted instruction is defined as an interactive learning method in which a computer is used to present instructional material, monitor learning and help in selecting and accessing additional material in accordance with individual learner needs. Educational institutions with a computer laboratory devoted to pedagogical use are considered to have computer-assisted instruction.

The *proportion of schools with computer-assisted instruction* is calculated by dividing the total number of primary and secondary schools with computer-assisted instruction by the total number of primary and secondary schools. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

According to country data availability, this indicator may be disaggregated by public/private educational institutions. See *Statistical standards* above for details.

Data sources:

This indicator is ED22 *Proportion of schools with computer-assisted instruction (for ISCED levels 1-3)* from the UNESCO list of proposed indicators on ICT in education (UIS, 2009a). Data are collected through the annual school census (or extracted from school records) and are generally compiled at country level by the statistical unit of the Ministry of Education or the national statistical office.

Statistical notes:

There are no known significant statistical issues with this indicator. Analysis of data from the Latin America and Caribbean survey of 2010 is expected to provide more information on statistical issues.

Both public and private schools are included.

ISCED levels 1 to 3 cover schools offering primary, lower secondary and upper secondary education.

Indicator 7.4. Proportion of schools with Internet-assisted instruction**Definition:**

Indicator 7.4 measures the proportion of primary and secondary schools offering Internet-assisted instruction. It reflects the presence and accessibility of Internet-assisted instruction in schools, not the actual intensity of use.

Internet-assisted instruction is defined as an interactive learning method in which the Internet is used to deliver instructional material on a computer or through other devices, in accordance with learners' pedagogical needs. It helps to develop autonomy in research activities and information literacy skills.

The *proportion of schools with Internet-assisted instruction* is calculated by dividing the total number of primary and secondary schools with Internet-assisted instruction by the total number of primary and secondary schools. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

According to country data availability, this indicator may be disaggregated by public/private educational institutions. See *Statistical standards* above for details.

Data sources:

This indicator is ED23 *Proportion of schools with Internet-assisted instruction (for ISCED levels 1-3)* from the UNESCO list of proposed indicators on ICT in education (UIS, 2009a). Data are collected through the annual school census (or extracted from school records) and are generally compiled at country level by the statistical unit of the Ministry of Education or the national statistical office.

Statistical notes:

There are no known significant statistical issues with this indicator. Analysis of data from the Latin America and Caribbean survey of 2010 is expected to provide more information on statistical issues.

Both public and private schools are included.

ISCED levels 1 to 3 cover schools offering primary, lower secondary and upper secondary education.

Target 8. Ensure that all of the world's population has access to television and radio services

Introduction

229. Target 8 reflects the importance of providing television and radio access to the world's population. While TV and radio are older ICTs, they remain very important for providing information to people in both developed and developing countries. As discussed in ITU (2010a), they also provide an opportunity to express national identity, provide vehicles for domestic content and fulfil educational purposes. TV and radio are particularly important where other information sources such as newspapers and the Internet are not widely accessible.

230. One of the challenges with statistics on TV and radio broadcasting is convergence with the Internet, with both TV and radio programmes able to be streamed via the Internet⁸¹ or broadcast using IP technology.

231. While it is possible for people to have access to TV or radio only via the public Internet, this is not covered in this set of indicators as it is likely to be unusual, especially in developing countries.⁸²

232. Another aspect of Target 8 is the extent to which programmes are broadcast in minority and indigenous languages. This links Target 8 with Action Line C8 *Cultural diversity and identity, linguistic diversity and local content* and with Target 9 *Encourage the development of content and put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet*.

233. Of the three indicators suggested to measure Target 8, two are based on existing core ICT indicators developed and promulgated by the *Partnership on Measuring ICT for Development*.

234. The three indicators for WSIS Target 8 are:

- Indicator 8.1: Proportion of households with a radio.
- Indicator 8.2: Proportion of households with a TV.
- Indicator 8.3: Proportion of households with multichannel television service, by type of service.

⁸¹ ITU (2010a) discusses this issue in Box 8.1.

⁸² Note that the streaming via the public Internet is not the same as IPTV; only the latter is included in indicators for this target.

Statistical standards applying to the indicators

235. Statistical standards applying to Target 8 indicators include scope, statistical units, definitions and classifications. Those standards applying to only a single indicator are described with the indicator. Other standards refer to more than one indicator and are described here.

236. The indicators implicitly refer to the situation at a specified *reference date* (for instance, the day of the survey interview or last day of the previous calendar year). While it is obviously useful if countries harmonize this date in their data collections, it is unrealistic to expect that to occur. Therefore, no advice is offered on the selection of a particular date.

Scope and statistical units

237. Standards exist for the scope and definition of the statistical unit, *household*, described in *Partnership* (2010). In particular, consistent with definitions used by the United Nations Statistics Division (UNSD) for population censuses, 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.”

Classifications

238. There are general classifications that may be applied to households for indicators 8.1 to 8.3. They are household size (number of members) and household composition. More information can be found in *Partnership* (2010). In addition, households could be classified as urban and rural using the methods recommended for Target 1.

Status of the indicators

239. Indicators 8.1 and 8.2 are well established and are *Partnership* core ICT household indicators, HH1 and HH2 respectively. Comprehensive statistical standards are available for these two indicators and established data collection practices exist (*Partnership*, 2010; ITU, 2009). While indicator 8.3 is a new indicator, it would be collected using a similar methodology to 8.1 and 8.2. All the Target 8 indicators are collected using national household surveys.

240. Methodological guidance for household survey-based indicators is provided by ITU through various capacity-building efforts, including the *Manual for Measuring ICT Access and Use by Households and Individuals* (ITU, 2009). The *Manual* provides a comprehensive account of statistical standards and methodologies relevant to the collection of ICT household statistics. General standards and methodologies associated with household surveys are well covered by existing household survey manuals (for instance, UNSD 2005a and 2005b).

241. The household core ICT indicators, HHI and HH2, are collected by a reasonable number of countries, including developing countries. ITU collects the data in its annual collection on *ICT Access and Use by Households and Individuals*. For most countries that collect the household ICT core indicators, a time series of data (that is, a set of data observations over a number of years) is available. This provides useful information showing change in realization of the target over time.

242. A potentially useful data source for these two indicators is the 2010 round of population censuses, where household availability of a radio and of a television set are questions in a core topic

on ICT. A number of countries asked questions on the presence in households of various ICTs, including television and radio.⁸³

243. Indicator 8.3 is more problematic. It is likely that very few, if any, countries currently collect the breakdowns required using household surveys. While some subscriptions data are available from ITU and pay TV operators, these are not ideal sources for several reasons, including:

- Not all users pay for the multichannel service/s they use at home, that is, they are not subscribers;
- Definitions of services are not standardized;
- The lack of household data required to create a 'proportion of households' statistic;⁸⁴ and
- The current ITU subscription categories (ITU 2010c) are not exactly in line with those required for this indicator (in particular, they do not include IPTV subscriptions). Note that the subscription categories will be revised so that, in the future, ITU will be able to produce relevant subscriptions data for indicator 8.3.

⁸³ Though note that not all population censuses were conducted in 2010. Some were as early as 2005.

⁸⁴ Unlike data on populations of individuals, which are readily available.

Indicators

Indicator 8.1. Proportion of households with a radio

Definition:

Indicator 8.1 refers to radio access at home by in-scope households.

A *radio* is a device capable of receiving broadcast radio signals, using popular frequencies, such as FM, AM, LW and SW. It includes a radio set integrated in a car or an alarm clock and digital audio player (MP3 player) but excludes radios integrated with a mobile phone or in a computer.⁸⁵

The *proportion of households with a radio* is calculated by dividing the number of in-scope households with a radio by the total number of in-scope households. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

The general classifications for households described under *Statistical standards* above may be applied.

Data sources:

This indicator is the *Partnership* core ICT indicator, HH1, *Proportion of households with a radio*. The core indicator is collected through ICT household surveys, usually conducted by national statistical offices (NSOs). A model question and methodological notes are provided for HH1 in *Partnership* (2010) and ITU (2009).

Statistical notes:

There are no known significant statistical issues with this indicator, although care should be taken to fully define radio in questionnaires.

The radio should be in working condition.

Indicator 8.2. Proportion of households with a TV

Definition:

Indicator 8.2 refers to television access at home by in-scope households.

A *TV* (television) is a stand-alone device capable of receiving broadcast television signals, using popular access means such as over-the-air, cable and satellite. It excludes TV functionality integrated with another device, such as a computer or a mobile phone.⁸⁵

The *proportion of households with a TV* is calculated by dividing the number of in-scope households with a TV by the total number of in-scope households. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

The general classifications for households described under *Statistical standards* above may be applied.

Data sources:

This indicator is the *Partnership* core ICT indicator, HH2, *Proportion of households with a TV*. The core indicator is collected through ICT household surveys, usually conducted by NSOs. A model question and methodological notes are provided for HH2 in *Partnership* (2010) and ITU (2009).

Statistical notes:

There are no known significant statistical issues with this indicator, although the exclusion of TV functionality integrated with another device should be noted.

The TV should be in working condition.

⁸⁵ Household access to mobile phones and computers is covered by other *Partnership* core indicators.

Indicator 8.3. Proportion of households with multichannel television service, by type of service**Definition:**

Indicator 8.3 refers to multichannel television access at home by in-scope households. The indicator is split into two parts, as follows:

- Proportion of households with access to any multichannel television service.
- Proportion of households with access to multichannel television, by type of service/s.

Multichannel television refers to services that provide additional TV programming beyond the free-to-air analogue terrestrial channels. Multichannel TV services are cable TV, direct-to-home satellite services, Internet-protocol TV and digital terrestrial TV. They may or may not be subscription-based.

The parts of the indicator are calculated as follows:

The *proportion of households with access to any multichannel television service* is calculated by dividing the number of in-scope households with access to any multichannel television service by the total number of in-scope households. The result is then multiplied by 100 to be expressed as a percentage.

The *proportion of households with access to multichannel television, by type of service* is calculated by dividing the number of in-scope households with each type of multichannel television service by the number of households with any multichannel television service. The results are then multiplied by 100 to be expressed as a percentage. Note that the sum of percentages is likely to exceed 100 as some households will have more than one type of service. The formula can also be expressed in algebraic terms as follows.

$$\frac{N_{\text{MultichannelTVService}_i}}{N_{\text{MultichannelTVService}}} * 100$$

where $N_{\text{MultichannelTVService}}$ is the number of in-scope households in the population with any multichannel TV service and $N_{\text{MultichannelTVService}_i}$ is the number of in-scope households in the population with multichannel TV service i (where i is cable TV, direct-to-home satellite services, Internet-protocol TV or digital terrestrial TV).

For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

Multichannel TV services are categorized and defined as follows:

- Cable television (CATV) service – multichannel programming delivered over a coaxial cable for viewing on television sets;
- Direct-to-home (DTH) satellite services – received via a satellite dish capable of receiving satellite television broadcasts;
- Internet-protocol TV (IPTV) –multimedia services such as television/video/audio/text/graphics/data delivered over an IP-based network managed to support the required level of quality of service, quality of experience, security, interactivity and reliability; it does not include video accessed over the public Internet, for example, by streaming. IPTV services are also generally aimed at viewing over a television set rather than a personal computer; and⁸⁶
- Digital terrestrial television (DTT) – the technological evolution and advance from analogue terrestrial television, which broadcasts land-based (terrestrial) signals.

The general classifications for households described under *Statistical standards* above may also be applied.

Data sources:

There is no single existing data source for this indicator, although some data are available for subscriptions to some multichannel services. For reasons described under *Status of the indicators* above, it is recommended that countries collect the data from household ICT surveys and use the standards in this *Framework*.

Statistical notes:

The statistical issues with this indicator are largely unknown but are likely to include problems with respondents' technical understanding of types of multichannel services. Where feasible, it would be useful if countries could provide examples (in questionnaires and/or interviewer instructions) based on the major multichannel TV services available in their countries.

⁸⁶ Some elements of this definition were taken from TMG (2008).

Target 9. Encourage the development of content and put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet

Introduction

244. Target 9 presents several measurement challenges. The main challenge is the size of the WWW and the growing diversity of web content. It has become increasingly difficult to measure content using traditional techniques, such as web crawlers. However, with Internet use increasing each year, measuring the availability of content in local languages is as important as ever.

245. Target 9 is closely linked to Action Line C8 *Cultural diversity and identity, linguistic diversity and local content*, which describes the importance of cultural and linguistic diversity to an information society.

246. The five indicators proposed for WSIS Target 9 are:

- Indicator 9.1: Proportion of Internet users by language, country level.
- Indicator 9.2: Proportion of Internet users by language, top ten languages, global level.⁸⁷
- Indicator 9.3: Proportion of webpages, by language.
- Indicator 9.4: Number of domain name registrations for each country-code top-level domain, weighted by population.
- Indicator 9.5: Number and share of Wikipedia articles by language.

Statistical standards applying to the indicators

247. Statistical standards applying to indicators for Target 9 include scope, statistical units, definitions and classifications. The standards for these indicators are diverse and are described with each indicator.

Status of the indicators

248. Data for indicators 9.2, 9.4 and 9.5 are currently available. Data for indicator 9.1 can be collected through the same household surveys that collect ICT data and may be available for some countries. Indicator 9.3 currently has limited availability, although it is hoped that new methodologies will improve the outlook for this indicator.

⁸⁷ Indicator 9.2 provides a global view of Internet use for the top ten languages (plus remaining languages in a single category), whereas indicator 9.1 provides data on Internet use by language at a country level.

Indicators

Indicator 9.1. Proportion of Internet users by language, country level

Definition:

Indicator 9.1 refers to the use of the Internet by in-scope individuals in the previous 12 months and is classified by language. Use may be from any location, including mobile access via a mobile cellular telephone or another mobile access device.

Note that indicator 9.1 provides a country view, whereas indicator 9.2 provides a global view, albeit it for only ten languages.

The *Internet* is a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files.

Language refers to *usual language* or *mother tongue* (as collected and defined by the country's population census or other household surveys).

The *proportion of Internet users by language* is calculated in two forms (see the table below for an example tabulation). The first form is the proportion of the speakers of each language using the Internet. The second is the proportion of Internet users distributed by language. The first form is calculated by dividing the number of Internet users for each language by the number of speakers of that language. The second form is calculated by dividing the number of Internet users for each language by the total number of Internet users. The second form is a distribution, with percentages totalling 100.

For both forms, the result is multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

The data are classified by language, either usual language or mother tongue. UNSD (2008a) defines *usual language* as the language currently spoken, or most often spoken, by the individual in his or her present home and *mother tongue* as the language usually spoken in the individual's home in his or her early childhood. Countries should select one of these language definitions, based on usual practice (for example, the variable used in their population census).

General classifications, such as age and gender, may also be applied (see *Partnership* (2010) and Targets 1 and 10 for details).

The table below shows how data for indicator 9.1 might be presented for Country A.

Example Country A. Proportion of Internet users by language, percentage (assuming five main languages)

Language	Number of Internet users (a)	Total in-scope population (b)	Percentage of speakers using the Internet	Percentage of Internet users by language
Language 1			= (a)/(b)*100	= (a)/Total (a)*100
Language 2			= (a)/(b)*100	= (a)/Total (a)*100
Language 3			= (a)/(b)*100	= (a)/Total (a)*100
Language 4			= (a)/(b)*100	= (a)/Total (a)*100
Language 5			= (a)/(b)*100	= (a)/Total (a)*100
Remaining languages			= (a)/(b)*100	= (a)/Total (a)*100
Total				100%

Data sources:

This indicator is an elaboration of the *Partnership* core ICT indicator, HH7, *Proportion of individuals who used the Internet in the last 12 months*. HH7 is collected through ICT household surveys, usually conducted by NSOs. A model question and methodological notes are provided in *Partnership* (2010) and ITU (2009). Data on language (usual language or mother tongue) also need to be collected for each individual in the survey, using the definitions above.

Statistical notes:

The only likely statistical issue with this indicator is determining the individual's language. Readers are referred to UNSD (2008a) for a more detailed discussion of collection of language data.

Any survey scope limitations or undercoverage that disproportionately affect speakers of a different language will result in biased results. Examples might be exclusion of remote areas or indigenous populations.

Use of the Internet is not assumed to be only via a computer – it may also be by mobile phone, PDA, games machine, digital TV etc. Except for mobile Internet use, the locations are associated with the equipment used e.g. a PC installed at work.

Indicator 9.2. Proportion of Internet users by language, top ten languages, global level**Definition:**

Indicator 9.2 refers to the use of the Internet by language, shown by the top ten languages plus remaining languages (in one category).

Note that indicator 9.2 provides a global view, unlike indicator 9.1. An important feature of this indicator is its time series value. For example, data on ten-year growth rates (2000 to 2010) are available.

The *proportion of Internet users by language, top ten languages* is calculated in two forms. The first form is the proportion of the world-wide speakers of each language who use the Internet. The second is the proportion of Internet users distributed by language (with percentages totalling 100). The first form is calculated by dividing the number of Internet users for each language by the number of speakers of that language. The second form is calculated by dividing the number of Internet users for each language by the total number of Internet users.

For both forms, the result is multiplied by 100 to be expressed as a percentage.

Disaggregations:

As at 2010, the top ten languages (in alphabetical order) are: Arabic, Chinese, English, French, German, Japanese, Korean, Portuguese, Russian and Spanish. The remaining world languages constitute a separate category (and contributed an estimated 18% of world Internet users in 2010).

Data sources:

This indicator is estimated by Internet World Stats, <http://www.internetworldstats.com/> using a variety of data sources including ITU and the US Bureau of the Census (see <http://www.internetworldstats.com/stats7.htm>).

Statistical notes:

Internet World Stats notes that "tallying the number of speakers of the world's languages is an increasingly complex task, particularly with the push in many countries to teach English in their public schools ... many people are bilingual or multilingual, but here we assign only one language per person in order to have all the language totals add up to the total world population (zero-sum approach). No adjustments have been made for infants or illiteracy in the Internet penetration rate calculations. Very few countries have 100% literacy."

Because of the complexities outlined above, it should be assumed that the data for this indicator are indicative rather than precise estimates.

Indicator 9.3. Proportion of webpages, by language**Definition:**

Indicator 9.3 refers to the proportion of webpages on the WWW by language of page.

In the past, the *proportion of webpages by language* has been derived by web crawling techniques or counting by search engines. However, one of the major challenges for both these methods is the increasing size of the WWW, which now has many billions of pages. The *Language Observatory Project (LOP)*⁸⁸ method, described below, is currently still viable, although limited in its scope.

Disaggregations:

There are no disaggregations suggested for this indicator.

Data sources:

This indicator is currently available for selected countries using the *Language Observatory Project (LOP)* methodology, which crawls country code top-level domains (ccTLD) of selected countries. The method identifies the scripts used and counts pages written in a given script. Where a script is shared by a number of languages (for instance, the Latin alphabet), a language recognition algorithm is applied. Because the process is time consuming and expensive, the LOP method has so far been limited to smaller countries and omits generic domains (which introduces an unknown bias). Data are available for some countries in Asia and Africa, and work is underway in Latin America and the Caribbean.

Possible future approaches to webpage measurement include vastly increasing the computer power available for crawling the WWW and using statistical sampling to reduce the size of the task.

Statistical notes:

This indicator is very difficult to measure for the reasons described above. However, it is expected that future work will improve the measurement outlook.

⁸⁸ LOP is a consortium of universities initiated and coordinated by the University of Technology of Nagaoka, Japan. See <http://gii2.nagaokaut.ac.jp/gii/blog/lopdiary.php/lopdiary.php?catid=109&blogid=8>.

Indicator 9.4. Number of domain name registrations for each country-code top-level domain, weighted by population**Definition:**

Indicator 9.4 refers to domain name registrations by country, weighted by population. It does not include generic top-level domains (such as .com, .net and .org) registered within the country. However, it does include registrations of ccTLDs that are made outside the country (not all countries allow this).

Domain names are formed according to the international Domain Name System (DNS). The first-level consists of the top-level domains (TLDs) – generic top-level domains (gTLDs) and country-code top-level domains (ccTLDs). Second and third-level domain names are available for reservation by end-users.

Domain name registration is usually administered by domain name registrars authorized by the Internet Corporation for Assigned Names and Numbers (ICANN).

A *country-code top-level domain* (ccTLD) is a top-level domain generally used by or reserved for a country. Examples include *au* (Australia), *ca* (Canada), *jp* (Japan) and *uk* (United Kingdom). Country codes are shown in the Internet Assigned Numbers Authority (IANA) Root Zone Database, see <http://www.iana.org/domains/root/db/>. IDN ccTLDs are *internationalized country code top-level domains* and have an encoded domain name that is displayed in a native language script, alphabet or writing system (for example, the Arabic alphabet or Chinese characters).

Population refers to a country's official population.

The *number of domain name registrations for each country-code top-level domain, weighted by population* is presented for each country for which data are available. Data presented for each country are the total number of registrations, the population and the ratio, *registrations per 1,000 inhabitants*.

Disaggregations:

There are no disaggregations suggested for this indicator.

Data sources:

ccTLD registration data are expected to be available for most countries through the regional top level domain associations (CENTR, APTLD, AfTLD and LACTLD), whose members are domain name registrars. For some countries, registration information is publicly available from registrars' websites. At the global level, ZookNIC also collects ccTLD data (ITU 2010a).

Annual population data are available from the United Nations Population Division database, <http://esa.un.org/UNPP/>.

Statistical notes:

IDN ccTLDs are not necessarily managed by ccTLD registries so may be under-represented in registration counts.

Counts include registrations of ccTLDs that are unrelated to the country but are made because of the commercial value of the country-code (not all countries allow this). Some examples are .tv, the country code for Tuvalu; .fm, for the Federated States of Micronesia; and .ad for Andorra.

Indicator 9.5. Number and share of Wikipedia articles by language**Definition:**

Indicator 9.5 provides information about the languages used in Wikipedia articles and each language's share of the total articles.

Wikipedia is a "... free, web-based, collaborative, multilingual encyclopedia project supported by the non-profit Wikimedia Foundation. Its 18 million articles (over 3.5 million in English) have been written collaboratively by volunteers around the world, and almost all of its articles can be edited by anyone with access to the site. Wikipedia was launched in 2001 ...". As of March 2011, there were 279 language editions of Wikipedia. (<http://meta.wikimedia.org/wiki/Wikipedia>).

A *Wikipedia article* is described as "... a page that has encyclopedic information on it. A well written encyclopedia article identifies a notable encyclopedic topic, summarizes that topic comprehensively, contains references to reliable sources, will have a reading list, and will link to other related topics." (http://en.wikipedia.org/wiki/Wikipedia:What_is_an_article%3F).

Data for *number and share of Wikipedia articles by language* are shown for each language, with an emphasis on change over time. *Share* is calculated as the proportion of each language's articles as a percentage of total articles.

Disaggregations:

There are no disaggregations suggested for this indicator.

Data sources:

Data on article counts by language are publicly available from Wikipedia's *Statistics* page, see <http://stats.wikimedia.org/EN/Sitemap.htm>. Data refer to official article counts for each of the nearly 300 languages supported by Wikipedia.

A good time series is available for each language, showing monthly data. The starting point for time series varies, with data for major languages available from 2001 or 2002. Data should be shown as growth in the number of articles for each language and change in each language's share of total articles over time.

Statistical notes:

There do not appear to be any major statistical issues with this indicator.

Target 10. Ensure that more than half the world's inhabitants have access to ICTs within their reach and make use of them⁸⁹

Introduction

249. Target 10 reflects the importance of providing access to, and encouraging use of, ICT. It is linked to Action Lines C2, C3 and C6 dealing with ICT infrastructure, access to information and knowledge, and creation of an enabling regulatory environment.

250. While the wording of the original target did not include the phrase “and make use of them”, it is clear that the benefits of having ICTs within reach will only be realized if they are used. This target has therefore been reworded to reflect ICT use and appropriate indicators included. The target does not specify ICTs but this *Framework* includes telephones (mobile and fixed) and the Internet. Target 8 covered radio and TV access. Computers have not been included as the Internet is increasingly accessible through other devices, such as mobile phones.

251. There are five indicators suggested to measure Target 10 and all are based on existing core ICT indicators developed and promulgated by the *Partnership on Measuring ICT for Development*.

252. The five indicators for WSIS Target 10 are:

- Indicator 10.1: Mobile cellular telephone subscriptions per 100 inhabitants.
- Indicator 10.2: Proportion of households with telephone, by type of network.
- Indicator 10.3: Proportion of individuals using a mobile cellular telephone.
- Indicator 10.4: Proportion of individuals using the Internet.
- Indicator 10.5: Proportion of households with Internet access, by type of access.

Statistical standards applying to the indicators

253. Statistical standards applying to Target 10 indicators include scope, statistical units, definitions and classifications. Those applying to only a single indicator are described with the indicator. Other standards refer to more than one indicator and are described here.

254. Indicators 10.2 and 10.5 implicitly refer to the situation at a specified *reference date* (for instance, the day of the survey interview or last day of the previous calendar year). Indicators 10.3 and 10.4 refer to a reference period (the last 12 months). While it is obviously useful if countries harmonize the reference date and period in their data collections, it is unrealistic to expect that to occur. Therefore, no advice is offered on the selection of these time references.

⁸⁹ The original WSIS indicator was worded somewhat differently “Ensure that more than half the world’s inhabitants have access to ICTs within their reach”.

Scope and statistical units

255. For indicators 10.2 to 10.5, standards exist for the scope and definition of the statistical units, *individual* and *household*. These are described in *Partnership* (2010) and can be briefly outlined as follows:

- Most surveys will restrict their scope for individuals to those living in private dwellings. Countries are encouraged to collect information for children and adults.⁹⁰
- The household scope is consistent with the individual scope used by a country and therefore excludes households consisting only of individuals outside the age scope. Consistent with definitions used by the United Nations Statistics Division (UNSD) for population censuses, for the purposes of the core indicators, 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.” (*Partnership*, 2010).

Definitions of terms used

256. **Connectivity** is focused on the Internet (including broadband) and both fixed and mobile cellular telephones.

257. The **Internet** is defined as a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files.

258. A **mobile cellular telephone** is a portable telephone subscribing to a public mobile telephone service that provides access to the PSTN using cellular technology, including all analogue and digital (2G, 3G, and beyond) cellular systems.

Classifications

259. Classifications that are indicator-specific are included with the description of each indicator below.

260. There are also general classifications that may be applied to households (indicators 10.2 and 10.5) and individuals (indicators 10.3 and 10.4). These are: household size and composition; individuals' gender, age, highest education level, labour force status and occupation. More information on these classifications can be found in *Partnership* (2010).

Status of the indicators

261. The Target 10 indicators are all *Partnership* core ICT indicators, for which comprehensive statistical standards (*Partnership*, 2010) and established data collection practices exist.

262. Indicator 10.1 is the existing *Partnership* core indicator A2, which is collected by ITU as part of a large collection of telecommunication indicators. Data are collected from telecommunications operators and, for most countries, aggregated at the national level by telecommunication/ICT regulators and Ministries who provide information annually to ITU. The indicator is widely available for both developed and developing countries. Data are also available for a number of years, thus providing useful information on change in realization of the target over time.

⁹⁰ For practical or legal reasons, a number of countries restrict the scope to individuals of at least 15, 16 or 18 years.

263. Indicators 10.2 to 10.5 correspond to the core ICT indicators HH3, HH6, HH7, HH8, HH10 and HH11, which are collected mainly by national statistical offices, using household surveys. Methodological guidance for the survey-based indicators is provided by ITU through various capacity-building efforts, including the *Manual for Measuring ICT Access and Use by Households and Individuals* (ITU, 2009). The *Manual* provides a comprehensive account of statistical standards and methodologies relevant to the collection of ICT household statistics. More general standards and methodologies associated with household surveys are well covered by existing household survey manuals (for instance, UNSD 2005a and 2005b).

264. The household core ICT indicators are collected by a reasonable number of countries, including many developing and most developed countries. ITU collects the data in its annual collection on *ICT Access and Use by Households and Individuals*. For most countries that collect the household ICT core indicators, a time series of data (that is, a set of data observations over a number of years) is available. This provides useful data showing change in realization of the target.

Indicators

Indicator 10.1. Mobile cellular telephone subscriptions per 100 inhabitants

Definition:

Indicator 10.1 refers to the number of mobile cellular telephone subscriptions in a country for each 100 inhabitants.

Mobile cellular telephone subscriptions refer to the number of subscriptions to a public mobile telephone service which provides access to the public switched telephone network (PSTN) using cellular technology. It includes the number of post-paid subscriptions and the number of pre-paid SIM cards that are active during the past three months (including analogue and digital cellular systems and all mobile cellular subscriptions that offer voice communications). Subscriptions via data cards or USB modems, and subscriptions to public mobile data services, private trunked mobile radio, telepoint, radio paging, and telemetry services are excluded.⁹¹

Mobile cellular telephone subscriptions per 100 inhabitants is calculated by dividing the number of mobile cellular telephone subscriptions by the total country population and then multiplying by 100.

Disaggregations:

There are no disaggregations recommended for this indicator.

Data sources:

The indicator is the *Partnership* core ICT indicator, A2, *Mobile cellular telephone subscriptions per 100 inhabitants*. The original data sources are telecommunication operators. In almost all countries, data are aggregated at the national level by telecommunication/ICT regulators and Ministries who provide information annually to ITU.

Statistical notes:

Subscriptions are distinguished from users. *Subscriptions* are taken by entities (e.g. businesses, individuals) that subscribe to a mobile phone service by a postpaid or prepaid account. This means that one person may have several mobile cellular subscriptions, for example, one subscription for personal use and another for professional use. One subscriber may even have multiple subscriptions across different countries.

⁹¹ The definition is from ITU's forthcoming *Telecom/ICT Indicators Handbook*, expected to be released in 2011.

Indicator 10.2. Proportion of households with telephone, by type of network**Definition:**

Indicator 10.2 refers to telephone access at home by in-scope households. The indicator is split into four parts, as follows:

- Proportion of households with any telephone access.
- Proportion of households with fixed telephone only.
- Proportion of households with mobile cellular telephone only.
- Proportion of households with both fixed and mobile cellular telephone.

The parts of the indicator are calculated as follows:

The *proportion of households with any telephone access* is calculated by dividing the number of in-scope households with access to any telephone (fixed or mobile) by the total number of in-scope households.

The *proportion of households with fixed telephone only* is calculated by dividing the number of in-scope households with a fixed telephone only by the total number of in-scope households. A fixed telephone line (previously called main telephone line in operation) is an active line (those that have registered an activity in the past three months) connecting the subscriber's terminal equipment to the public switched telephone network (PSTN) and which has a dedicated port in the telephone exchange equipment. This term is synonymous with the terms main station or Direct Exchange Line (DEL) that are commonly used in telecommunication documents. It may not be the same as an access line or a subscriber.

The *proportion of households with mobile cellular telephone only* is calculated by dividing the number of in-scope households with a mobile phone only by the total number of in-scope households. A *mobile cellular telephone* is defined under *Statistical standards* above.

The *proportion of households with both fixed and mobile cellular telephone* is calculated by dividing the number of in-scope households with both a fixed and mobile phone by the total number of in-scope households.

In all cases, the proportion is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

The general classifications described under *Statistical standards* above may be applied.

Data sources:

This indicator is the *Partnership* core ICT indicator, HH3, *Proportion of households with telephone*. The core indicator HH3 is collected through ICT household surveys, usually conducted by national statistical offices (NSOs). Model questions and methodological notes are provided for HH3 in *Partnership* (2010) and ITU (2009).

Statistical notes:

There are no known significant statistical issues with this indicator.

The telephone equipment and services should be in working condition.

Indicator 10.3. Proportion of individuals using a mobile cellular telephone

Definition:

Indicator 10.3 refers to mobile cellular telephone use in the previous 12 months by in-scope individuals.

A *mobile cellular telephone* is defined under *Statistical standards* above.

The *proportion of individuals using a mobile cellular telephone* is calculated by dividing the number of in-scope individuals who used a mobile cellular telephone in the last 12 months by the total number of in-scope individuals. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

The general classifications described under *Statistical standards* above may be applied.

Data sources:

Indicator 10.3 is the *Partnership* indicator HH10, *Proportion of individuals who used a mobile cellular telephone in the last 12 months*. The core indicator HH10 is collected through ICT household surveys, usually conducted by NSOs. A model question and methodological notes are provided for HH10 in *Partnership* (2010) and ITU (2009).

Statistical notes:

The main statistical issue with this indicator is ensuring that the question does not only measure use by mobile phone subscribers and owners but all those who used a mobile cellular telephone during the reference period.

Use of a mobile phone does not require that the telephone is owned or paid for by the user. It may be available through work, a friend or family member. It may be owned collectively by several individuals or the use could be purchased from a public telephone call service.

Indicator 10.4. Proportion of individuals using the Internet

Definition:

Indicator 10.4 refers to the use of the Internet by in-scope individuals in the previous 12 months. Use may be from any location, including mobile access via a mobile cellular telephone or another mobile access device.

The *Internet* is defined under *Statistical standards* above.

The *proportion of individuals using the Internet* is calculated by dividing the 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. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

The general classifications described under *Statistical standards* above may be applied.

Data sources:

This indicator is the *Partnership* core ICT indicator, HH7, *Proportion of individuals who used the Internet in the last 12 months*. HH7 is collected through ICT household surveys, usually conducted by NSOs. A model question and methodological notes are provided in *Partnership* (2010) and ITU (2009).

Statistical notes:

There are no known significant statistical issues with this indicator.

Use of the Internet is not assumed to be only via a computer – it may also be by mobile phone, PDA, games machine, digital TV etc. Except for mobile Internet use, the locations are associated with the equipment used e.g. a PC installed at work.

Indicator 10.5. Proportion of households with Internet access, by type of access**Definition:**

Indicator 10.5 refers to access to (not use of) the Internet at home by in-scope households and the type of Internet access service/s they have. The indicator is split into two parts, as follows:

- Proportion of households with any Internet access.
- Proportion of households with Internet access, by type of access service/s.

The *Internet* is defined under *Statistical standards* above.

The parts of the indicator are calculated as follows:

The *proportion of households with any Internet access* is calculated by dividing the number of in-scope households with Internet access by the total number of in-scope households. The result is then multiplied by 100 to be expressed as a percentage.

The *proportion of households with Internet access, by type of access service* is calculated by dividing the number of in-scope households with each type of Internet access service by the number of households with Internet access. The results are then multiplied by 100 to be expressed as a percentage. Note that the sum of percentages is likely to exceed 100 as some households will have more than one type of access service. For an algebraic representation, see indicator 1.3.

For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

The second part of the indicator is split by type of Internet access service, classified as follows:

Narrowband includes analogue modem (dial-up via standard phone line), ISDN (Integrated Services Digital Network), DSL at speeds below 256 kbit/s, and mobile phone and other forms of access with an advertised download speed of less than 256 kbit/s. Note that narrowband mobile phone access services include CDMA 1x (Release 0), GPRS, WAP and i-mode.

Fixed (wired) broadband refers to fixed (wired) high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include for example cable modem, DSL, fibre-to-the-home/building and other fixed (wired) broadband subscriptions. It excludes wireless broadband services as defined below.

Wireless broadband refers to wireless high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include satellite Internet, terrestrial fixed wireless and fixed WiMax and fixed wireless access. It also includes terrestrial mobile wireless access, which includes the following two types of subscriptions.

- Standard mobile subscriptions with active use only, which includes mobile subscriptions with advertised data speeds of 256 kbit/s or greater and which have been used to make an Internet data connection via IP in the previous 3 months. To be counted, the subscription must allow access to the greater Internet via HTTP and must have been used to make a data connection using the Internet Protocol in the previous three months. Standard SMS and MMS messaging do not count as an active Internet data connection even if they are delivered via IP.
- Subscriptions to dedicated data services over a mobile network which are purchased separately from voice services either as a stand-alone service (modem/dongle) or as an add-on data package to voice services which requires an additional subscription. All dedicated mobile data subscriptions with recurring subscription fees are included as "active data subscriptions" regardless of actual use. Pre-paid mobile broadband plans require active use if there is no monthly subscriptions. This could also include mobile WiMax subscriptions.

The general classifications described under *Statistical standards* above may also be applied.

Data sources:

This indicator is a composite of the *Partnership* core ICT indicators, HH6 and HH11, *Proportion of households with Internet access* and *Proportion of households with access to the Internet by type of access*, respectively. The core indicators, HH6 and HH11 are collected through household ICT surveys, usually conducted by NSOs. Model questions and methodological notes are provided in *Partnership* (2010) and ITU (2009).

Statistical notes:

The main statistical issue is the technical nature of the categories and the possibility that respondents will not know what kind of Internet access service/s they have. Suggestions for resolving this issue include using country-specific response categories that are equivalent to (or sub-categories of) those above. See ITU (2009) and *Partnership* (2010) for more information.

As households can have more than one access service, multiple responses are possible.

The Internet connection/s should be functional, that is any equipment, software or services needed should be in working condition.

Annex 1. Connect all businesses with ICTs

Introduction

265. A new target on business connectivity, *Connect all businesses with ICTs*, was proposed by ITU (2010a). The proposal reflects the important role of businesses in the information society and their interaction with the entities that are covered by the original 10 targets. WSIS Action Line C7 discusses the importance of businesses as providers and users of ICT. The role of the private sector is also mentioned in Action Line C1 (as a stakeholder in the promotion of ICTs for development).

266. This *Framework* proposes three indicators that measure the level of connectivity of businesses. Two are existing core ICT indicators developed and promulgated by the *Partnership on Measuring ICT for Development*.

267. The three proposed indicators for measuring the connectivity of businesses are:

- Indicator A.1: Proportion of businesses using computers.
- Indicator A.2: Proportion of businesses using the Internet, by type of access.
- Indicator A.3: Proportion of businesses using mobile cellular telephones.

Statistical standards applying to the indicators

268. Statistical standards applying to indicators A.1 to A.3 include scope, statistical units, definitions and classifications. Those applying to only a single indicator are described with the indicator. Other standards refer to more than one indicator and are described here.

Scope and statistical units

269. Comprehensive standards exist for the scope and definition of the statistical unit, *business*. These are described in *Partnership (2010)* and UNCTAD's 2009 *Manual for the Production of Statistics on the Information Economy* (UNCTAD, 2009), and can be outlined as follows:

- The organizational scope is limited to enterprises from the private and public sectors that are operating in the country. General government organizations are excluded.
- The minimum industry (activity) scope is, for ISIC Rev. 3.1, sections D, F, G, H, I and K. For those countries that have introduced ISIC Rev. 4, the minimum scope is sections C, F, G, H, I, J, L, M (part), N and S (part). See *Partnership (2010)* for full details.
- The minimum size scope is enterprises with 10 or more persons employed. However, countries are encouraged to survey businesses with fewer than 10 persons employed (including unincorporated businesses).⁹²
- The recommended statistical unit is the 'enterprise'. The concept of an enterprise has been aligned with the System of National Accounts, SNA (2008 revision), which describes an enterprise

⁹² The definition of 'persons employed' is from the International Classification of Status in Employment (ILO, 1993) and includes employees, employers, own account workers, members of producers' cooperatives and contributing family workers. See *Partnership (2010)* and ILO (1993) for full details.

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.” See *Partnership* (2010) and UNSD (2008c) for full details. Some countries use establishment⁹³ surveys to collect data on business use of ICT. Where this is the case, it should be made clear in survey metadata because proportions data may not be comparable where different types of units are used. As an example, if country A uses the establishment as a unit and country B uses the enterprise, then it is likely that country B will report higher proportions of ICT use. As with the units issues discussed in earlier targets, a size classification will assist in overcoming lack of comparability arising from differences in statistical units across countries.

Definitions of terms used

270. **Connectivity** is focused on the Internet (including broadband) and mobile cellular telephones.

271. **Reference period** refers to the time period during which ICT has been used. The *Partnership* recommendation is for a reference period of 12 months. This would commonly be the last calendar or fiscal year.

Classifications

272. Classifications that are indicator-specific are included with the description of each indicator below.

273. There are also general classifications that may be applied to business. The *Partnership* recommends business size and industry (in terms of ISIC Rev. 3.1 or Rev. 4). More information on these classifications can be found in *Partnership* (2010). UNCTAD (2009) also suggests classification by geographical location (urban, rural), where such a definition exists (UNCTAD, 2009). See Target 1 for a recommendation on urban/rural split based on population census regions.

274. As with the indicators for Targets 3, 4, 5 and 6, it is suggested that the proposed business indicators be classified by size in order to improve comparability across countries. The size classification recommended by the *Partnership* is defined in terms of ranges of persons employed and is: 1–9, 10–49, 50–249 and 250 or more persons employed.⁹² Employment data would usually be collected in the same survey as the indicator data, unless reliable data on employment are available on countries’ business registers.

275. Note that detailed disaggregations (for example, data showing size by industry) present challenges for data reliability due to increasing standard errors.

Status of the indicators

276. Proposed indicators, A.1 and A.2, are derived from the *Partnership* core ICT indicators, B1, B3 and B9. Comprehensive statistical standards and established data collection practices exist for these indicators (*Partnership*, 2010; UNCTAD, 2009). Statistics on business use of ICT are usually collected by NSOs using a stand-alone business ICT use survey or through a module of ICT use questions in another business survey. Most OECD and European Union countries have been collecting business ICT use statistics for a number of years and a number of developing countries also collect them,

⁹³ 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.”

although to a lesser extent than for the household core ICT indicators. UNCTAD collects business ICT use core indicator data annually from member countries.⁹⁴

277. For most countries that collect the business ICT use core indicators, a time series of data (that is, a set of data observations over a number of years) exists.

278. Indicator A.3 is not a core ICT indicator but is described in UNCTAD (2009). The standards for scope, statistical unit and classifications are the same as those for the other two indicators. A mobile cellular telephone is defined the same way as for the two household indicators, HH3 and HH10 and is therefore consistent with WSIS target indicators 1.2, 10.2 and 10.3. A small number of countries collect data on mobile phone use by businesses.

⁹⁴ The business ICT use core indicators are published in UNCTAD's annual *Information Economy Report* (<http://www.unctad.org/ier/series>) and a database is expected to be launched in 2011.

Indicators

Indicator A.1. Proportion of businesses using computers

Definition:

Indicator A.1 refers to the use of computers by in-scope businesses during the reference period.

A *computer* is a desktop or a laptop computer. It does not include equipment with some embedded computing abilities such as mobile cellular phones, personal digital assistants (PDAs) or TV sets.

Reference period is discussed under *Statistical standards* above.

The *proportion of businesses using computers* is calculated by dividing the number of in-scope businesses using computers during the reference period by the total number of in-scope businesses. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by business size in ranges of persons employed: 1-9, 10-49, 50-249, 250 and above.

The general classifications described under *Statistical standards* above may also be applied (noting the caution on detailed disaggregations and their impact on data reliability).

Data sources:

This indicator is the *Partnership* core ICT indicator B1, *Proportion of businesses using computers*. The core indicator is collected through business ICT use surveys, usually conducted by NSOs. A model question and methodological notes are provided in *Partnership* (2010) and UNCTAD (2009).

Statistical notes:

There are no known significant statistical issues for this indicator, although care should be taken with the definition of a computer.

Use can be at the business's premises or elsewhere.

Indicator A.2. Proportion of businesses using the Internet, by type of access

Definition:

Indicator A.2 refers to use of the Internet by in-scope businesses during the reference period and the type of Internet access service/s they use. The indicator is split into two parts, as follows:

- Proportion of businesses with any Internet use.
- Proportion of businesses using the Internet, by type of access service/s used.

The *Internet* is a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files.

Reference period is discussed under *Statistical standards* above.

The parts of the indicator are calculated as follows:

The *proportion of businesses with any Internet use* is calculated by dividing the number of in-scope businesses using the Internet by the total number of in-scope businesses. The result is then multiplied by 100 to be expressed as a percentage.

The *proportion of businesses using the Internet, by type of access service used* is calculated by dividing the number of in-scope businesses using each type of access service by the number of Internet-using businesses. The results are then multiplied by 100 to be expressed as a percentage. Note that the sum of percentages will exceed 100 as many businesses will use more than one type of access service. The formula can also be expressed in algebraic terms as follows.

$$\frac{N_{\text{AccessService}_i}}{N_{\text{Inter}}} * 100$$

where N_{Inter} is the number of in-scope businesses in the population that used the Internet and $N_{\text{AccessService}_i}$ is the number of in-scope businesses in the population using access service i (where i is narrowband, (wired) broadband or wireless broadband).

For international reporting, countries should provide numerator and denominator data separately.

Indicator A.2. Proportion of businesses using the Internet, by type of access (continued)**Disaggregations:**

The type of Internet access is classified as follows:

Narrowband includes analogue modem (dial-up via standard phone line), ISDN (Integrated Services Digital Network), DSL at speeds below 256 kbit/s, and mobile phone and other forms of access with an advertised download speed of less than 256 kbit/s. Note that narrowband mobile phone access services include CDMA 1x (Release 0), GPRS, WAP and i-mode.

Fixed (wired) broadband refers to fixed (wired) high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include for example cable modem, DSL, fibre-to-the-home/building and other fixed (wired) broadband subscriptions. It excludes wireless broadband services as defined below.

Wireless broadband refers to wireless high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include satellite Internet, terrestrial fixed wireless and fixed WiMax and fixed wireless access. It also includes terrestrial mobile wireless access, which includes the following two types of subscriptions.

- Standard mobile subscriptions with active use only, which includes mobile subscriptions with advertised data speeds of 256 kbit/s or greater and which have been used to make an Internet data connection via IP in the previous 3 months. To be counted, the subscription must allow access to the greater Internet via HTTP and must have been used to make a data connection using the Internet Protocol in the previous three months. Standard SMS and MMS messaging do not count as an active Internet data connection even if they are delivered via IP.
- Subscriptions to dedicated data services over a mobile network which are purchased separately from voice services either as a stand-alone service (modem/dongle) or as an add-on data package to voice services which requires an additional subscription. All dedicated mobile data subscriptions with recurring subscription fees are included as "active data subscriptions" regardless of actual use. Pre-paid mobile broadband plans require active use if there is no monthly subscriptions. This could also include mobile WiMax subscriptions.

This indicator should be disaggregated by business size in ranges of persons employed: 1-9, 10-49, 50-249, 250 and above.

The general classifications described under *Statistical standards* above may also be applied (noting the caution on detailed disaggregations and their impact on data reliability).

Data sources:

This indicator is a composite of the *Partnership* core ICT indicators, B3 and B9, *Proportion of businesses using the Internet* and *Proportion of businesses using the Internet by type of access*, respectively. The core indicators, B3 and B9 are collected through business ICT use surveys, usually conducted by NSOs. Model questions and methodological notes are provided in *Partnership* (2010) and UNCTAD (2009).

Statistical notes:

The main statistical issue is the technical nature of the categories and the possibility that respondents will not know what kind of Internet access service/s they have. Suggestions for resolving this issue include using country-specific response categories that are equivalent to (or sub-categories of) those above.

As businesses can use more than one access service, multiple responses are possible.

Use may be by any device enabling Internet access (not only a computer). This includes a mobile phone, PDA, games machine and digital TV.

The Internet connection/s should be functional, that is any equipment, software or services needed should be in working condition.

Use can be at the business's premises or elsewhere. The UNCTAD (2009) model questionnaire distinguishes Internet use that takes place inside the business from use that takes place outside the business premises.

Indicator A.3. Proportion of businesses using mobile cellular telephones**Definition:**

Indicator A.3 refers to the use of one or more mobile cellular phones by in-scope businesses during the reference period.

A *mobile cellular telephone* is a portable telephone subscribing to a public mobile telephone service that provides access to the PSTN using cellular technology (including all analogue and digital (2G, 3G, and beyond) cellular systems).

Reference period is discussed under *Statistical standards* above.

The *proportion of businesses using mobile cellular telephones* is calculated by dividing the number of in-scope businesses using mobile cellular telephones during the reference period by the total number of in-scope businesses. The result is then multiplied by 100 to be expressed as a percentage. For international reporting, countries should provide numerator and denominator data separately.

Disaggregations:

This indicator should be disaggregated by business size in ranges of persons employed: 1-9, 10-49, 50-249, 250 and above.

The general classifications described under *Statistical standards* above may also be applied (noting the caution on detailed disaggregations and their impact on data reliability).

Data sources:

Indicator A.3 is the indicator M1, *Proportion of businesses using mobile phones*, from UNCTAD's *Proposed indicators and model questions on mobile phone use in businesses* (UNCTAD, 2009). The indicator should be collected through business ICT use surveys, usually conducted by NSOs.

Statistical notes:

Use of a mobile phone does not require that the telephone is owned or paid for by the business, but it has to be used for business purposes.

There are no known significant statistical issues for this indicator.

Annex 2. WSIS targets, action lines and indicators

Revised WSIS targets	Most relevant WSIS Action Lines	Proposed indicators for monitoring progress
<p>Target 1. Connect all villages with ICTs and establish community access points</p>	<p>C2. Information and communication infrastructure C3. Access to information and knowledge C4. Capacity building</p>	<p>1.1 Proportion of rural population covered by a mobile cellular telephone network, by type of mobile cellular telephone technology. 1.2 Proportion of households with telephone, by type of network, by urban/rural. 1.3 Proportion of households with Internet access, by type of access, by urban/rural. 1.4 Proportion of individuals using the Internet, by location, by urban/rural.</p>
<p>Target 2. Connect all universities, colleges, secondary schools and primary schools with ICTs</p>	<p>C2. Information and communication infrastructure C3. Access to information and knowledge C7. E-learning</p>	<p>2.1 Proportion of schools with a radio used for educational purposes. 2.2 Proportion of schools with a television used for educational purposes. 2.3 Learners-to-computer ratio. 2.4 Proportion of schools with Internet access, by type of access.</p>
<p>Target 3. Connect all scientific and research centres with ICTs</p>	<p>C2. Information and communication infrastructure C3. Access to information and knowledge C7. E-science</p>	<p>3.1 Proportion of public scientific and research centres with broadband Internet access. 3.2 Presence of a national research and education network (NREN), by bandwidth (Mbit/s). 3.3 Proportion of public scientific and research centres with Internet access to a NREN.</p>
<p>Target 4. Connect all public libraries, cultural centres, museums, post offices and national archives with ICTs</p>	<p>C2. Information and communication infrastructure C3. Access to information and knowledge C4. Capacity building C8. Cultural diversity and identity, linguistic diversity and local content</p>	<p>4.1 Proportion of public libraries with broadband Internet access. 4.2 Proportion of public libraries providing public Internet access. 4.3 Proportion of public libraries with a web presence. 4.4 Proportion of museums with broadband Internet access. 4.5 Proportion of museums with a web presence. 4.6 Proportion of post offices with broadband Internet access. 4.7 Proportion of post offices providing public Internet access. 4.8 National archives organizations with broadband Internet access. 4.9 National archives organizations with a web presence. 4.10 Proportion of items in the national archives that have been digitized. 4.11 Proportion of digitized items in the national archives that are publicly available online.</p>
<p>Target 5. Connect all health centres and hospitals with ICTs</p>	<p>C2. Information and communication infrastructure C7. E-Health</p>	<p>5.1 Proportion of public hospitals with Internet access, by type of access. 5.2 Proportion of public health centres with Internet access, by type of access. 5.3 Level of use of computers and the Internet to manage individual patient information.</p>

Revised WSIS targets	Most relevant WSIS Action Lines	Proposed indicators for monitoring progress
<p>Target 6. Connect all local and central government departments and establish websites and e-mail addresses</p>	<p>C1. The role of public governance authorities and all stakeholders in the promotion of ICTs for development C2. Information and communication infrastructure C3. Access to information and knowledge C7. E-government</p>	<p>6.1 Proportion of persons employed in central government organizations routinely using computers. 6.2 Proportion of persons employed in central government organizations routinely using the Internet. 6.3 Proportion of central government organizations with a Local Area Network (LAN). 6.4 Proportion of central government organizations with an intranet. 6.5 Proportion of central government organizations with Internet access, by type of access. 6.6 Proportion of central government organizations with a web presence. 6.7 Level of development of online service delivery by national governments.</p>
<p>Target 7. Adapt all primary and secondary school curricula to meet the challenges of the information society, taking into account national circumstances</p>	<p>C4. Capacity building C7. E-learning</p>	<p>7.1 Proportion of ICT-qualified teachers in schools. 7.2 Proportion of teachers trained to teach subjects using ICT. 7.3 Proportion of schools with computer-assisted instruction. 7.4 Proportion of schools with Internet-assisted instruction.</p>
<p>Target 8. Ensure that all of the world's population has access to television and radio services</p>	<p>C2. Information and communication infrastructure C3. Access to information and knowledge C8. Cultural diversity and identity, linguistic diversity and local content C9. Media</p>	<p>8.1 Proportion of households with a radio. 8.2 Proportion of households with a TV. 8.3 Proportion of households with multichannel television service, by type of service.</p>
<p>Target 9. Encourage the development of content and put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet</p>	<p>C3. Access to information and knowledge C8. Cultural diversity and identity, linguistic diversity and local content</p>	<p>9.1 Proportion of Internet users by language, country level. 9.2 Proportion of Internet users by language, top ten languages, global level. 9.3 Proportion of webpages, by language. 9.4 Number of domain name registrations for each country-code top-level domain, weighted by population. 9.5 Number and share of Wikipedia articles by language.</p>
<p>Target 10. Ensure that more than half the world's inhabitants have access to ICTs, within their reach and make use of them</p>	<p>C2. Information and communication infrastructure C3. Access to information and knowledge C6. Enabling environment C7. ICT applications: benefits in all aspects of life</p>	<p>10.1 Mobile cellular telephone subscriptions per 100 inhabitants. 10.2 Proportion of households with telephone, by type of network. 10.3 Proportion of individuals using a mobile cellular telephone. 10.4 Proportion of individuals using the Internet. 10.5 Proportion of households with Internet access, by type of access.</p>

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