United Nations
Economic Commission for Africa

Manual for measuring e-Government

PARTNERSHIP ON MEASURING ICT FOR DEVELOPMENT

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United Nations
Economic Commission for Africa

Manual for measuring e-government

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Preface

Globally, comparative e-government indicators provide users with a valuable understanding of the status of e-government, both nationally and internationally.

The *Manual for measuring e-government* builds on the earlier publication – *Framework for a set of e-government core indicators* – published in 2012 by the Partnership on Measuring ICT for Development and the United Nations Economic Commission for Africa (ECA).

Both the Manual, and the Framework that preceded it, reflect the importance that was placed on e-government by the World Summit on the Information Society, and reinforced by the suggestion from the United Nations Statistical Commission (UNSC) that the *Partnership* should extend its core list of information and communications technology (ICT) indicators to include indicators on ICT use in government (UNSC, 2007).

The main objective of the Manual is to support the efforts of countries to compile the core e-government indicators defined in the Framework. The Manual details data sources, data collection and processing methods, and dissemination schemas for the core indicators. A useful feature is an annex containing a number of examples of country e-government surveys.

Acknowledgements

The *Manual for measuring e-government* was prepared by Sheridan Roberts of InfoSocietyStats.com, a consultant to the United Nations Economic Commission for Africa (ECA).

The project was initiated by the former ICT, Science and Technology Division (ISTD) of UNECA headed by Ms. Aida Opoku-Mensah as Director. Until the ECA restructuring of ECA in early 2013, under the general guidance of the Director, the project was coordinated by Mr. Makane Faye, Senior Regional Advisor and Officer-in-Charge of the e-Application and ICT Policy and Development Sections, with support from ISTD staff, including Matti Sinko, Abebe Chekol and Afework Temtime. Following the ECA restructuring in 2013, the project was inherited by the New Technologies and Innovation Section (NTIS) of the Special Initiatives Division. Mr Kasirim Nwuke, Chief of NTIS led the finalization of the report under the general guidance of Ms Fatima Denton, Director of the Division.

Various references were consulted in the preparation of this manual, especially publications from the Partnership on Measuring ICT for Development, the United Nations Department of Economic and Social Affairs (UNDESA), the United Nations Conference on Trade and Development (UNCTAD), the International Telecommunication Union (ITU), the Organisation for Economic Co-operation and Development (OECD), the International Monetary Fund (IMF), Eurostat, the US Office of Management and Budget (OMB), the Australian Bureau of Statistics and Statistics Canada.

Special acknowledgement is made to countries that provided information about their e-government surveys.

Thanks are also extended to members of the Task Group on e-Government (TGEG) for their input to the drafts of this manual. The Task Group is led by UNECA and comes under the auspices of the Partnership on Measuring ICT for Development. Participants in the 2013 meeting of the ECA Committee on Development Information, Science and Technology (CODIST) reviewed an early draft and provided useful comments. Thanks are also extended to participants in CODIST and an ECA-organized training workshop in Algiers, Algeria, who provided very useful comments on the early draft. We also thank the Government of Algeria for co-organizing the Workshop with ECA.

Acronyms and abbreviations

ECA	United Nations Economic Commission for Africa
ECLAC	United Nations Economic Commission for Latin America and the Caribbean
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
ESCWA	United Nations Economic and Social Commission for Western Asia
Eurostat	Statistical Office of the European Union
ICT	Information and communication technology
ISIC	International Standard Industrial Classification of All Economic Activities
ITU	International Telecommunication Union
LAN	Local area network
NPI	Non-profit institution
NSO	National statistical office
OECD	Organisation for Economic Co-operation and Development
OSILAC	Observatory for the Information Society in Latin America and the Caribbean
PDA	Personal digital assistant
SNA	System of National Accounts
TGEG	Task Group on e-Government
UIS	UNESCO Institute for Statistics
UNCTAD	United Nations Conference on Trade and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNSC	United Nations Statistical Commission
URL	Uniform resource locator
WSIS	World Summit on the Information Society

Chapter 1. Introduction

Background

1. Information and communication technology and its applications offer many opportunities for economic and human development. Within the framework of the World Summit on the Information Society (WSIS), national governments and other stakeholders are engaged in conceptualizing and deploying ICT applications in support of development.

2. The Geneva phase of WSIS established a set of targets for development of the information society, which included a target to: "Connect all local and central government departments and establish websites and e-mail addresses". A 2011 publication by the *Partnership* (2011) suggested a set of e-government indicators to measure this target. Many of the standards developed for those indicators have been adapted for this manual.

3. The UNSC, at its 2007 meeting, asked the Partnership on Measuring ICT for Development to extend the core list of ICT indicators to include indicators on ICT use in government (UNSC, 2007). The *Partnership*, through its Task Group on e-Government (box 1), has been actively engaged in the development of internationally comparable e-government indicators since 2006. This has proved to be a challenging task because of a number of difficulties associated with e-government measurement; these are discussed in several publications (for example, Partnership, 2011; OECD, 2009) and throughout this manual.

4. More historical information on the development of e-government indicators can be found in *Framework for a set of e-government core indicators* (Partnership and ECA, 2012).

Box 1: Task Group on e-Government

A Task Group for the development of e-government indicators was established by the Partnership on Measuring ICT for Development in 2006. The members of the Task Group are ECA (coordinator), United Nations Economic Commission for Latin America and the Caribbean (ECLAC), United Nations Economic Commission for Asia and the Pacific (ESCAP), United Nations Economic Commission for Western Asia (ESCWA), Eurostat, ITU, OECD, UNCTAD, UNDESA and the World Bank. TGEG has been responsible for developing perspectives on e-government measurement in order to arrive at a conceptually clear, methodologically feasible, and statistically sound set of e-government indicators, which also focus on essential features of e-government in the context of development.

A background description of the e-government activities of TGEG in the context of WSIS is available in the 2010 World Telecommunication/ICT Development Report (ITU, 2010).

The objectives of the Manual

5. The *Manual for measuring e-government* follows and builds on the earlier publication, *Framework for a set of e-government core indicators*, which provides definitions and statistical standards for a set of globally comparative e-government indicators. The Manual expands on the Framework by providing guidance on data sources, data collection and processing methods, and dissemination schemas for the core indicators.

6. The primary objective of the Manual is to provide countries with the statistical knowledge necessary to compile the core e-government indicators in a way that ensures their international comparability.

Annex 1 contains information about a number of country e-government surveys; this is expected to be helpful in providing ideas for countries considering the collection of e-government data.

What is e-government?

7. E-government potentially enhances the social and economic development of countries by enabling improved access to government services. Examples range from better access to information on available services to complete online processing of requests for permits, certificates, payments, etc. Effective use of e-government can also improve the efficiency and effectiveness of the public sector and linkages between government agencies. Examples include the use of computers and networks to improve the personal productivity of government workers, and changes to more efficient business processes associated with a transition to electronic government services. In this context, an emerging imperative is to rethink e-government policies and programmes to exploit these capacities.

8. There are several definitions of e-government presently in use worldwide and a selection of these is presented in box 2. While differing in emphasis, most of these definitions focus on the use of ICT to improve the delivery of government services. The OECD definition is broader and refers to the use of ICT to transform all the operations of government. The set of indicators presented in this manual addresses both service delivery and efficiency of operations, which are seen as complementary and reinforcing objectives.

Box 2: Definitions of e-government

Definition	Source
Use of ICT and its application by the government for the provision of information and public services to the people. The aim of e-government therefore is to provide efficient government management of information to the citizen; better service delivery to citizens; and empowerment of the people through access to information and participation in public policy decision-making.	UNDESA (2005)
Use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses and other arms of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth and cost reductions.	World Bank (2011)
Use of new information and communication technologies (ICTs) by governments as applied to the full range of government functions. In particular, the networking potential offered by the Internet and related technologies has the potential to transform the structures and operation of government.	OECD (2012)[a]
Uses digital tools and systems to provide better public services to citizens and businesses. Effective e-Government can provide a wide variety of benefits including more efficiency and savings for governments and businesses, increased transparency, and greater participation of citizens in political life. ICTs are already widely used by government bodies, as it happens in enterprises, but e-Government involves much more than just the tools. It also involves rethinking organisations and processes, and changing behaviour so that public services are delivered more efficiently to people. Implemented well, e-Government enables citizens, enterprises and organisations to carry out their business with government more easily, more quickly and at lower cost.	European Commission (EC, 2014)

a Original source: Organisation for Economic Co-operation and Development, E-government: Analysis Framework and Methodology (OECD Public Management Service, Public Management Committee, 2001).

Why measure e-government?

9. There is a growing recognition worldwide that effective public sector governance requires the use of ICT to achieve more efficiency in the functioning of government and to improve the delivery of government services to organizations and individuals.

10. In order to monitor and compare the status of e-government, a set of feasible, relevant and internationally comparable indicators is required. Such indicators are useful inputs to the formulation of policies and strategies for effective e-government.

11. E-government development is at varying stages in countries. Developed economies are relatively advanced in their use of ICT for improving the functioning of public sector and service delivery. Most developing countries are less advanced and in order to improve e-government in these countries, a comparable measurement framework is important. While data from website surveys are available for most countries, through the efforts of UNDESA (2003, 2004, 2005, 2008b, 2010, 2012, 2014) and the European Union (Capgemini, 2006, 2010), comparable e-government indicators from other surveys are very limited.

Challenges in e-government measurement

12. Collection of e-government statistical information faces several measurement challenges, including statistical feasibility, relevance, data collection costs, and the burden on respondents.

13. In relation to statistical feasibility, there are particular methodological and conceptual challenges applying to e-government measurement at the international level and, to a lesser extent, the national level. The challenges are addressed throughout the Manual and are outlined as follows:

- **Comparable statistical units**. For indicators of the form 'proportion of government organizations with ICT', it is clear that the ratio will only be comparable across countries if government organization units are fairly similar across countries. As an example, if country A lists 10 central government organizations in its e-government survey and country B lists 100, it is very likely that ratios for central government in country A will be higher because larger entities are more likely to have ICT than smaller ones.
- **Structural differences in the functions of government organizations across countries.** For instance, in one country, all rail transport might be a function of general government, and in another country it might be a responsibility of business (public or private sector). Government organizations in one country might outsource a client service function, such as employment agency work, to the private sector, while another country retains it as a government function. Most countries have more than one level of government (for example, central, provincial, regional and/or local) and the functions of each level can differ across countries. To the extent that these various structural differences are linked to ICT uptake, country differences will occur.
- **Identifying and defining government units at a country level**. As surveys of government units are not very common, countries will differ in the quality and consistency of their lists of units (used as a basis for a survey). While there are internationally agreed definitions for government units, they are not always helpful for indicators of the type 'proportion of government organizations with ICT'.

14. In relation to continuing relevance, the evolution of ICT has seen a series of revolutions (from mainframes to personal computers, from centralized databases to distributed computing, from star topologies to networks, and from fixed to mobile access). Such rapid advances in technology present a chal-

lenge for statisticians, who must balance continuing relevance of their output against a need to produce comparable data over time.

15. In order to simplify the data collection task, only central government organizations are included in scope for most of the indicators presented in this manual. It is hoped that countries will extend data collection to other levels of government as knowledge improves and resources permit.

Partnership on Measuring ICT for Development

16. The TGEG comes under the auspices of the Partnership on Measuring ICT for Development. The set of e-government indicators defined in the Framework is the most recent in a list of core ICT indicators developed and promulgated by the *Partnership*, which is described in box 3.

Box 3: The Partnership on Measuring ICT for Development

Stemming from the mandate of the WSIS, the Partnership on Measuring ICT for Development is the collaborative initiative of a number of international organizations. Its members are: Eurostat; ITU; OECD; UNCTAD; UNDESA; United Nations Environment Programme/Secretariat of the Basel Convention (UNEP/SBC); UNESCO Institute for Statistics (UIS); World Bank; United Nations University Institute for Sustainability and Peace (UNU-ISP); and four United Nations Regional Commissions: ECA, ECLAC, ESCAP and ESCWA.

Launched in 2004, the key goal of the *Partnership* is to develop internationally comparable, relevant and reliable ICT statistics for measuring the information society. Development and maintenance of a core list of ICT indicators is one of its activities, and the development of e-government indicators is undertaken specifically in this context (ITU, 2010).

In 2005, the *Partnership* launched the first edition of *Core ICT Indicators* followed by the latest edition published in 2010 (Partnership 2005, 2010). Both publications focused on the feasibility and relevance of these ICT core indicators. The objective was to provide a reliable and accurate understanding of the indicators and the associated statistical standards.

A comprehensive report on the *Partnership*'s activities was presented to the UNSC at its 2012 meeting (see Partnership, 2012).

Partnership core information and communication technology indicators

17. The complete list of core ICT indicators, including those on e-government, is presented in annex 2. The list was endorsed by the UNSC at its 2012 meeting (UNSC, 2012) and covers the following topics:

- ICT infrastructure and access
- Access to, and use of, ICT by households and individuals (updated in 2013)
- Use of ICT by businesses
- The ICT (producing) sector
- International trade in ICT goods
- ICT in education
- E-government.

Scope and structure of the Manual

18. The remainder of the Manual covers the following broad areas:

- Chapter 2. *International and national stakeholders*: describes the role of international organizations and national stakeholders in the preparation of the e-government core indicators.
- Chapter 3. *Planning and preparation*: provides a general outline of the stages leading up to the commencement of the data collection phase. It covers survey planning, budget and management issues, and staff training and selection.
- Chapter 4. *Statistical standards*: presents the core e-government indicators, EG1 to EG7, and places them in a conceptual framework that includes the statistical standards that apply to the indicators. The standards include scope, statistical units, classifications, weighting and time-related factors, such as reference dates and frequency. The chapter describes some of the measurement challenges involved in this field of statistics and suggests solutions to those challenges. A set of supplementary e-government indicators already included in the *Partnership* list of core ICT indicators is also presented.
- Chapter 5. *Data sources and collection methods*: looks at potential data sources and data collection methods for the e-government core indicators. An overview of current approaches to e-government measurement is also included in the discussion.
- Chapter 6. *Question and questionnaire design and content*: takes a general look at the principles of question and questionnaire design and provides model questions for the core e-government indicators. The chapter also discusses presentation of the model questions in a questionnaire, reference dates, respondents, supplementary data requirements, concepts that may be difficult to understand, and measurement topics apart from the core e-government indicators.
- Chapter 7. *Survey design*: looks at survey design issues that are relevant to measuring e-government, including statistical units, scope and target populations, survey frames, and sample design and selection. The main focus of the chapter is sample surveys and censuses of government organizations, with a brief outline of website surveys.
- Chapter 8. *Data processing*: discusses the range of operations that are applied to data collected via sample surveys or censuses of government organizations. The chapter outlines the stages in data processing (such as data entry, data editing and estimation) as applied to the e-government core indicators.
- Chapter 9. *Data quality*: examines the important subject of statistical data quality. It describes sampling and non-sampling error, assessment of data quality, and looks at particular data quality issues for the core indicators.
- Chapter 10, *Dissemination*: presents example tabulation plans for the core indicators. It also discusses metadata reporting and dissemination, data collection and dissemination by international organizations, and reporting core indicator data to international organizations.
- Chapter 11. *Conclusion*: provides some final suggestions and hopes for the future of e-government measurement.
- Annex 1 provides details of existing e-government surveys from a number of countries.
- Annex 2 presents all of the *Partnership*'s core ICT indicators, as at 2013.
- Annex 3 provides tabulations of data and metadata for core indicator EG7, using Australia as a case study.
- *References* includes details of works referred to in the Manual and other useful sources.

Chapter 2. International and national stakeholders

19. This chapter provides an overview of the role of international and national stakeholders in the preparation of the e-government core indicators. Information is drawn from several sources, including relevant material presented in other core ICT indicator manuals: *Manual for the Production of Statistics on the Information Economy, Revised Edition* (UNCTAD, 2009) and *Manual for Measuring ICT Access and Use by Households and Individuals* (ITU, 2009, 2014).

The work of international organizations

20. This manual is produced under the auspices of the Partnership on Measuring ICT for Development, whose members are all international or regional organizations (see box 3 for details). Several *Partnership* members are involved in the development, collection, compilation and dissemination of the core ICT indicators listed in annex 2.

21. Various members of the *Partnership* also have an important role in capacity-building for ICT statistics, in which this manual assists.

22. The *Partnership*'s report, presented at the 2012 UNSC meeting, provides additional information on its activities (Partnership, 2012).

Development of relevant statistical standards

23. The standards for ICT statistics have a relatively short history, reflecting the recentness of the ICT phenomenon. The OECD, through its Working Party on Indicators for the Information Society (WPIIS), has been developing standards covering a number of aspects of information society measurement since the late 1990s, including development of concepts and model surveys (OECD, 2011a). Eurostat has also been very active in this field for the last decade or so, through its annual community surveys on ICT usage. The Eurostat and OECD model surveys on ICT use include questions on the use of e-government services (by individuals and businesses).

24. The Partnership on Measuring ICT for Development has an important role in several areas of internationally comparable ICT measurement. As described in chapter 1, the *Partnership* develops and promulgates a list of internationally comparable core ICT indicators, including the e-government indicators. All the core indicators have associated statistical standards; for the e-government core indicators, these have been published (in Partnership and ECA, 2012) and are expanded on in this manual. Standards for the other indicators were most recently published in *Partnership* (2010) and ITU (2014).

25. Many of the concepts and technical definitions in the core e-government indicators come from the *Partnership*'s other core ICT indicators[1] – for example, the definition of a computer and *routinely* in EG1, and the definitions of type of Internet access in EG5.

26. In broader terms, the Manual relies on standards for government statistical units found in the *System of National Accounts 2008* (European Commission and others, 2009) and the *Government Finance Statistics Manual 2001* (IMF, 2001). Other internationally agreed standards for government surveys can be found in the *Frascati Manual* (OECD, 2002) for measurement of research and experimental development (R&D), which was also consulted during the preparation of this manual. Those existing standards for measuring characteristics of government focus on volume measures, such as expenditure, revenue and

1 Some of these, in turn, are derived from existing international standards.

R&D staff. Compared with the standards in this manual, they are less reliant on the definition of government organizations as statistical units.

Collection and compilation of core information and communication technology indicator data

27. Members of the *Partnership* collect, compile and distribute core ICT indicators (see annex 2) as follows:

- ITU collects the core indicators on ICT infrastructure and access (A1 to A10) and access to, and use of, ICT by households and individuals (HH1 to HH16). Results are made available through the World Telecommunication/ICT Indicators Database, printed and online publications, and through the ITU ICT Statistics home page.[2]
- UNCTAD collects the core indicators on use of ICT by businesses (B1 to B12), indicators on the ICT (producing) sector (ICT1 and ICT2), and on international trade in ICT goods (ICT3 and ICT4). Results are made available through the Statistical Portal of UNCTAD (UNCTADSTAT).[3]
- UIS collects the core indicators on ICT in education (ED1 to ED8 and EDR1). Results are made available through the UIS online Data Centre[4] as well as through publications based on the UIS regional data collection strategy.
- ECA, in collaboration with members of the *Partnership* and national statistical offices (NSOs), will collect the core indicators on e-government (EG1 to EG7). Results will be made available through a publication and the ECA website (www.uneca.org/publications/).

Capacity-building

28. Capacity-building can be specific to a topic, such as ICT, or more general. In the latter category, several areas are described in UNCTAD (2009) for business surveys, including legal frameworks, business register development and business survey development. Similar programmes exist for household surveys, including the International Household Survey Network[5] and the World Bank's Living Standards Measurement Study (LSMS) Surveys[6] (ITU, 2009).

29. *Partnership* members are engaged in capacity-building in their respective fields. Other manuals on ICT core indicators (UNCTAD, 2009; ITU, 2009, 2014) are integral to these activities. There is a close link between this manual and those manuals, in terms of links between the indicators, use of common standards and definitions, and the existing partnership between international organizations that have developed and collect the indicators. Like the other manuals, this one will be an important component of capacity-building in the field of ICT statistics.

30. As well as preparing manuals and standards, members of the *Partnership* provide technical assistance and training directly to individual countries. In its report to the UNSC of 2012, the *Partnership* noted that some regions and countries had not yet benefited from capacity-building and that there is an unmet demand for distance-learning activities and training of trainers at the regional level (Partnership, 2012). Following the completion of this manual, capacity-building workshops are planned (subject to available funding) with the aim of training statisticians and other stakeholders, and refining the Manual's contents.

2 Available from http://www.itu.int/ITU-D/ict [accessed 31 January 2014].
3 Available from http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx [accessed 31 January 2014].
4 Available from http://stats.uis.unesco.org/ [accessed 31 January 2014].
5 Available from http://www.surveynetwork.org/home/ [accessed 31 January 2014].
6 Available from http://www.worldbank.org/LSMS/ [accessed 31 January 2014].

Stakeholders in the national statistical system

31. There are three main stakeholder groups involved in the national statistical system. They are:

- Data producers, including NSOs[7] (the main audience for this manual)
- Policymakers, especially ministries and regulatory authorities dealing with ICT and telecommunications, and other data users (including international organizations)
- Data providers (including government agencies for core e-government indicators EG1 to EG6 and national experts for indicator EG7 and possibly other indicators).

32. It is very important that coordination mechanisms between (and sometimes within) these groups are established. The *Partnership* (2012) discussed coordination at the national level, observing that:

> The coordination of data collection at the national level needs strengthening. Among the institutional challenges to producing ICT statistics and indicators, the most relevant is the establishment of coordination mechanisms between relevant institutions, including national statistical offices, telecommunication regulatory authorities and ministries responsible for ICT policies. Since survey-based ICT statistics is still a relatively new field in many developing countries, the initiative to produce ICT data often originates from a demand by policymakers. Traditionally, telecommunication statistics have been collected by national telecommunication regulators or ministries, based on administrative sources and therefore, it is not always obvious to turn to national statistical offices for the collection of survey data on ICT access and use.

33. In some countries, there may be more than one data collection agency involved in the production of e-government statistics. Where this is the case, it is important that those agencies cooperate to share expertise and avoid duplication.

34. While it is fairly obvious that policymakers should work closely with data collection agencies to ensure the relevance of ICT statistics programmes, other users (for example, from business, the non-profit sector and academia) will also have a valid interest and may be able to make useful contributions based on their expert knowledge and experience. There are numerous benefits of user input, including:

- Production of more relevant data (especially for policy purposes)
- Ongoing support for statistical activities (possibly including funding)
- Availability of information from existing research and studies (for example, by academia or the private sector)
- Incorporation of the subject matter expertise of data users, which may improve concepts and definitions.

35. Data providers are integral to the statistical system. Without their cooperation, data would be inadequate in terms of either, or both, quality and quantity. It is important that NSOs recognize the contribution of providers and put the necessary effort into gaining their trust and cooperation. At the most obvious level, this entails making the respondents'[8] jobs easier for them by providing coherent and understandable survey material, including well-tested questionnaires and instructions (this is further discussed in chapter 6).

36. To the extent possible, small respondents should be periodically relieved of their reporting obligation, by use of rotating and non-overlapping samples.[9] As a general rule, it is important to minimize the

7 The term NSO as used in this manual is taken to include all government agencies that collect official statistics. Where a national statistical system is decentralized, there may be several official statistical agencies in a country. NSOs are usually government-funded and are responsible for providing high quality, standardized statistical data to government, industry and the public. They may also be responsible for coordinating the national statistical system.

8 For the purposes of this manual, respondents are the organizational representatives completing survey material.

9 This is not always possible, for example, if the core indicator data are collected by a census of government organizations.

burden on respondents providing data for statistical surveys. The potential benefits to NSOs of doing this include higher response rates and better data quality. This issue is addressed in chapter 9.

37. While many NSOs work in a legal framework that makes provision of statistical data mandatory,[10] cooperation may be enhanced if such legislation is used carefully. The legal framework of NSOs will also generally ensure the confidentiality of data provided by individual organizations. It is very important that protection of such statistical data is assured and is communicated to respondents. At a more advanced level, public relations efforts may be needed to ensure cooperation.

10 The legal basis of a large number of NSOs is available from http://unstats.un.org/unsd/dnss/kf/LegislationCountryPractices.aspx [accessed 31 January 2014].

Chapter 3. Planning and preparation

38. This chapter presents a general outline of planning and preparation for statistical surveys. The major references used in the preparation of this chapter are: *Manual for Measuring ICT Access and Use by Households and Individuals* (ITU, 2009, 2014); *Survey Methods and Practices* (Statistics Canada, 2010); *Handbook* (Australian Bureau of Statistics (ABS), 2012a); and *Standards and Guidelines for Statistical Surveys* (Office of Management and Budget (United States), 2006).

39. While most of the principles presented in this chapter also apply to planning and preparation for collections of administrative data or website surveys, the focus is on the conduct of statistical surveys as they will generally be the most complex and expensive option for data collection.

40. It is assumed that surveys of government units will generally be conducted by NSOs. Where this is not the case, it is suggested that the data collection agency work with the NSO in order to optimize inputs and maximize the quality of output.

Survey planning

41. Careful planning and preparation is an obvious prerequisite to survey success and optimal use of resources. As discussed in chapter 2, good consultation with policymakers and other stakeholders will help ensure that the final product is of optimum relevance to their needs. It will also help to build support for the project, which may ultimately assist with fund-raising or publicity.

42. A statistical survey is generally a complex and costly undertaking. Good planning will almost certainly lead to a better result – in terms of data quality, cost and timeliness. Planning will tend to be progressive, with early planning being broad in scope and becoming more detailed over time. Areas to consider in planning a survey are:

- **Establish a management and planning structure for the survey project**. An example is using an interdisciplinary survey team. Team members may include external representatives from consultative bodies or equivalent (see *Mechanisms for cooperating...*, below).
- **Formulate the objectives of the survey**. It is important to always have the objectives of the survey in mind and to review them as necessary. They will include how the results will be used and what types of public policy or other decisions rely on the results. It is assumed that the objectives of the survey will be formulated with the input of policymakers and other major users, and will be centred on the most important and measurable needs of policymakers. The objectives will usually determine various aspects of the survey, such as concepts, topics, scope and level of accuracy. Objectives need to be clear – and clearly understood – by the statisticians and data users involved in the survey. They may also be communicated to respondents in some form in order to gain their cooperation – for example, on a questionnaire or in publicity material. Information on how to formulate a *statement of objectives* can be found in Statistics Canada (2010).[11]
- **Mechanisms for cooperating with policymakers and other data users**. As discussed in chapter 2, close cooperation with policymakers and other data users is strongly recommended in order to improve the relevance of the survey results and to optimize survey questions. Consultative bodies (such as a working group on ICT statistics) may already exist in the area of ICT statistics. If they do not, then they should be considered at the planning stage. Meetings should be held as required and are likely to be more frequent during the establishment of the project.

11 This publication has a complete chapter on survey planning and management, including a planning checklist.

- **Relevance of existing data sources, including those held by the agency undertaking the survey**. A review of available data and its usefulness should be undertaken before a new survey is contemplated. For example, some of the information required for the core e-government indicators may be available from the statistical office, administrative sources or national experts. This is further explored in chapter 5.
- **Adherence to the statistical standards in this manual as detailed in chapter 4**. While this may require some compromise on the part of policymakers, it is of ultimate benefit for several reasons, the main one being the possibility for international benchmarking. Establishing definitions and lists of statistical units may be an activity undertaken in cooperation with external experts.
- **Available budget and other resources**. The budget available to conduct a survey may be a constraining factor that needs to be considered at the planning stage. The possibility of obtaining additional funding from users interested in particular topics should be ascertained early in the process as it might affect the development of the survey. For example, particular states might be prepared to provide funding to extend the survey scope to state government.
- **Time frame and timetable**. The release of data should generally occur as quickly as possible after the reference date (without compromising data quality), particularly given rapid developments in the area of ICT. Statistical resources, such as staff, may only be available for a limited time and will have costs associated with the time they are employed on the survey. For these reasons, it is very important that the planning stage includes a detailed and realistic timetable of activities involved in the survey cycle.
- **Legal and related issues**. There could be a range of legal and related issues that need to be considered. These include: legal obligations of the data collection agency (which may include confidentiality constraints on data release – for example, a prohibition on release of data identifying individual organizations); responding organizations' legal obligations (for example, to complete and return a questionnaire); and practices that may not be prescribed in law but are policy of the data collection agency (for example, minimization of respondent burden).
- **Survey vehicle**. An early decision needs to be taken on the survey vehicle to be used as the choice will affect cost. It is likely that, in most cases, a new stand-alone survey of government units will be the only option for collection of most of the core indicators. This is because surveys of government units are less common than household or business surveys and so the possibility for using existing surveys as a vehicle is less likely. Even where surveys of government already exist, it is quite likely that they will not have the appropriate scope or statistical units. This issue is further explored in chapter 5.
- **Survey development**. Planning for survey development entails making decisions on all aspects of the survey, including statistical standards, data sources, collection methods, questionnaire design and testing, survey design, data processing systems and output data specifications. Of particular importance at this stage are questionnaire design and testing, and survey design. Results of questionnaire testing may provide information useful for planning and budgeting, for example, a low response rate in a pilot test will provide an indication of the effort required to follow up non-response. These issues are further explored in chapters 4 to 8 and chapter 10. The survey design will determine aspects of reliability such as the level of sampling error. If users require detailed breakdowns by particular characteristics, then this needs to be established at the planning stage as it may have implications for sample size and design (and therefore cost).
- **Survey implementation**. Planning for conduct of the survey should include plans to develop and test computer and manual systems for all stages of the survey cycle, and consideration of the skills and training required. As this stage is expensive and possibly time-consuming, careful planning and timetabling is likely to be a good investment. The survey implementation stage is further explored in chapters 5 and 8.

- **Post survey processes**. These include data tabulation, analysis and dissemination, metadata dissemination, preservation of survey material, and evaluation. They are very important elements of the survey process, especially as they are the most visible to users. Post survey processes are further explored in chapters 9 and 10.
- **Follow-up data collection**. As it is common for the release of statistics to trigger further demand for data, planners need to contemplate whether, and when, they are prepared to undertake follow-up data collection. Given the rapid change in the state of ICT, there is likely to be a demand for regular surveys, though the nature of that demand will vary depending on the policy imperatives of individual countries.

43. A likely outcome of the planning phase is that priorities will be reassessed and changes made to aspects of the survey, such as its purpose and objectives, and subsequent stages such as survey design.

Budget and management issues

44. It is rarely possible to achieve good results without significant cost, but it is certainly possible to incur significant project costs and yet obtain poor quality results. Having an experienced and knowledgeable project manager, and paying careful attention to planning for every phase before commencing the operational phase, will generally be very cost effective.

45. Costs include wages and salaries, ICT costs and administrative costs. Depending on the costing policy of the organization carrying out the survey, overhead costs (fixed and/or variable) may need to be added on.

46. At the outset, it is necessary to itemize and estimate costs associated with the survey. Budgeting needs to be carried out carefully in order to avoid the most common difficulties, which include:

- Underestimating known costs (for instance, failing to take salary increases into account, the cost of time overruns)
- Omitting unknown costs (for example, costs associated with constructing a survey frame, legal costs)
- Ignoring or underestimating overhead costs (these can be significant and will include direct and indirect overhead costs).

47. Given the likelihood of delays, it is useful to include some extra budget (and other resources, such as staff time) for unforeseen events or delays. Mechanisms to reduce costs should be considered and include using technology to reduce costs, for instance, use of call centres and computer assisted telephone interviewing (CATI) for data collection. In this case, careful consideration of other factors is necessary, for instance, the costs of computer system development and maintenance.

48. In some cases, resources such as skilled staff may be difficult to obtain, even if the budget is sufficient. This should be factored in at the planning stage.

49. Often trade-offs are required to fit the survey to the available financial and other resources. Trade-offs could include a reduction in sample size (usually resulting in larger sampling error), removal of some level of detail, or removal of some questions or topics. Ideally, such decisions would be made together with policymakers and other major data users to ensure that their data needs are still adequately addressed.

Staff training and selection

50. Staff with diverse skills will be required for different aspects of the survey. Skills relevant to the following areas will be required: survey management, survey design, computer systems development, data

entry, data editing, data imputation and estimation, data analysis, and publication writing. Depending on the data collection technique employed, interviewers may also be required. In many statistical agencies, some of these skills will be centralized, for example, computer programmers and data entry staff may work in distinct departments within the organization.

51. Staff selection and training will run parallel with survey planning, questionnaire design and sample selection. It will often be a phased activity, for instance, staff involved in establishing the survey are likely to be employed first. While specialized staff may be available in an organization, they will usually need to be trained on the specifics of the survey.

52. While many staff involved in a particular survey will already be skilled and will require minimal training, others may need significant training. Of particular importance is the training of interviewers, if they are to be used. An important cause of bias is the poor handling of respondents by interviewers, for instance, asking leading questions or suggesting some judgement of responses (by their tone of voice or facial expression). A focus of training, briefings and survey material, should be the avoidance of bias. Elements of training may include classroom training, interviewer manuals, and field work in the presence of experienced interviewers or supervisory staff.

53. Given that some questions on ICT access and use are somewhat technical, it could be advantageous to employ people who are more attuned to ICT, for instance, young adults and people with proven ICT skills. Clearly, it is also important to provide training in the ICT concepts and terms used in questionnaires.

54. The ability to manage and motivate staff is a very valuable skill. Motivated staff members are likely to be more productive, to contribute to the survey knowledge base, and to remain longer with the project. Some actions that may improve motivation include:[12]

- Provide staff with a sense of ownership of the project, for instance, staff may have valuable ideas for the operational phases of the survey and will be more committed to a quality result if they have had some involvement in documentation and the setting of procedures.
- Communicate with staff about all aspects of the operation that are relevant to them; mechanisms for communication are likely to be facilitated by ICT – for example, setting up electronic notice boards (though, by themselves, these are likely to be insufficient).
- Acknowledge good work, even if only in very simple ways, such as timely praise.
- Delegate authority to staff as appropriate.

55. The performance of all staff should be monitored closely, especially in the early stages of the survey. Any instances of underperformance, or behaviours that might introduce statistical bias, need to be addressed promptly.

56. A most important prerequisite for training is the availability of training or procedure manuals for each broad class of staff – for example, interviewers (if used), data entry staff and data editors. Such manuals should be prepared before the survey commences and may continue to be useful references during the survey. Training manuals should clearly explain the purpose of the survey and be explicit about the tasks to be performed by staff.

12 Adapted from PARIS 21 Document Series # 4, National Strategies for the Development of Statistics (NSDS): Some Issues in Design and Implementation Planning. Available from http://www.paris21.org/sites/default/files/p21implementguide-en.pdf [accessed 1 February 2014].

Chapter 4. Statistical standards

57. This chapter presents the core e-government indicators, EG1 to EG7, and places them in a measurement framework that includes the statistical standards associated with the indicators. It describes some of the measurement challenges involved in this field of statistics and suggests solutions to those challenges.

58. The chapter also presents a set of four supplementary *demand-side* e-government indicators that are part of the *Partnership*'s list of core ICT indicators (Partnership, 2010; ITU, 2014). The indicators are measures of use of government services by individuals and businesses.

E-government core indicators

59. E-government indicators and associated statistical standards should have a number of characteristics, including:

- Statistical feasibility
- Designed to enable international comparability
- Substantively relevant
- Consistent, thereby enabling reliable evidence of change over time
- Understandable and accessible to policymakers and other data users.

60. Perhaps the most challenging of these characteristics are international comparability and relevance. The first is a question of standards and methodology and is directly addressed in this manual. The second relates to the alignment of long-term development objectives of e-government measurement with technological change and societal needs. A trade-off between relevance and consistency may need to be made by data collection agencies and their main users.

61. The e-government core indicators are listed in table 1. For the purposes of this manual, they are classified into four broad areas:

- **Use of ICT by persons employed in government organizations**. Indicators EG1 and EG2 are presented as the proportion of persons employed in government organizations using technology.
- **Availability of ICT to government organizations**. Indicators EG3 to EG5 are presented as the proportion of central government organizations with (or using) technology. Employment-weighted versions of EG3 to EG5 are also defined and recommended.
- **Use of ICT by government organizations**. Indicator EG6 is presented as the proportion of central government organizations with a web presence. An employment-weighted version of EG6 is also defined and recommended.
- **Supply of e-government services to citizens** (via publicly accessible websites). Indicator EG7 deals with selected Internet-based services offered by central and state government organizations.

Table 1: List of the e-government core indicators

Code	Name of the e-government indicator
EG1	Proportion of persons employed in central government organizations routinely using computers
EG2	Proportion of persons employed in central government organizations routinely using the Internet
EG3	Proportion of central government organizations with a local area network (LAN)
EG4	Proportion of central government organizations with an intranet
EG5	Proportion of central government organizations with Internet access, by type of access
EG6	Proportion of central government organizations with a web presence
EG7	Selected Internet-based services available to citizens, by level of sophistication of service

62. Subindicators for the core indicators can be constructed using the classificatory variables, 'type of government organization' and 'organization size'. For example, a subindicator of EG4 is the proportion of central government organizations with 250 or more employees, with an intranet. In particular, it is strongly suggested that the size classification presented in this chapter be applied by countries.

63. It should be noted that the list of core indicators is not exhaustive – it is a starting point for countries to measure e-government using internationally agreed and comparable indicators.

64. Detailed information about each indicator is presented below. Included are: its definition; data requirements for its compilation; disaggregations by applicable classifications; formulae for calculating the indicator; definitions of units and terms; and statistical issues.

EG1: Proportion of persons employed in central government organizations routinely using computers

Definition of indicator:

The *proportion of persons employed in central government organizations routinely using computers* is calculated by dividing the number of persons employed in central government organizations, who routinely use computers, by the total number of persons employed in central government organizations. The result is then multiplied by 100 to be expressed as a percentage.

An optional indicator may be calculated separately for male and female persons employed (or other individual characteristics).

Data requirements:	**Disaggregations**:
TEUC: Total number of persons employed in government organizations, routinely using computers. TE: Total number of persons employed in government organizations.	The indicator is preferably disaggregated by size of central government organization in ranges of persons employed: 1–9, 10–49, 50–249, 250 and above. The indicator may be extended to a disaggregation by gender, or other individual characteristics, where that information is available. The model questions below show a disaggregation by gender.

EG1: Proportion of persons employed in central government organizations routinely using computers

Formula:

$$EG1_S = \left[\frac{TEUC_S}{TE_S} \right] * 100$$

For each S in ['1','2','3']

Gender is defined by the letter S and values are between 1 and 3, as follows:

S = 1→Male persons employed

S = 2→Female persons employed

S = 3→Total number of persons employed

Definitions of units and terms:

Central government organizations are defined according to the 2008 System of National Accounts (SNA) (European Commission and others, 2009), which describes the *central government subsector* as "generally composed of a central group of departments or ministries that make up a single institutional unit plus, in many countries, other institutional units."

Where the institutional unit comprises all (or most) of the entities that comprise central government, the highest level below the institutional unit should be selected as the appropriate statistical unit. Such units would include portfolio departments (e.g. education, health, 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. An example of the latter might be a national museum or national archives. In some cases, an institutional unit may be appropriate, for instance, where it is an agency of central government with a separate legal identity.

Excluded establishments of central government such as individual schools, hospitals, health centres, police stations and post offices are not statistical units, for the purposes of this indicator.

A *computer* refers to 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 (Partnership, 2010).

Persons employed refers to all persons working for the specified government organization, not only those working in clerical jobs. They include part-time, short-term and casual employees (Partnership, 2010). They exclude workers supplied to the organization by other organizations (Eurostat, 2011).

Routinely refers to at least once a week (Partnership, 2010).

Use can be at the organization's premises or elsewhere but refers to use for work purposes.

Statistical issues:

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 employing labourers, 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.

EG2: Proportion of persons employed in central government organizations routinely using the

Definition of indicator:

The *proportion of persons employed in central government organizations routinely using the Internet* is calculated by dividing the number of persons employed in central government organizations, who routinely use the Internet, by the number of persons employed in central government organizations. The result is then multiplied by 100 to be expressed as a percentage.

An optional indicator may be calculated separately for male and female persons employed (or other individual characteristics).

Data requirements:	**Disaggregations**:
TEUI: Total number of persons employed in central government organizations routinely using the Internet. TE: Total number of persons employed in central government organizations.	The indicator is preferably disaggregated by size of central government organization in ranges of persons employed: 1–9, 10–49, 50–249, 250 and above. The indicator may be extended to a disaggregation by gender, or other individual characteristics, where that information is available. The model questions below show a disaggregation by gender.
Formula: $EG2_s = \left[\frac{TEUI_s}{TE_s} \right] * 100$ For each S in ['1','2','3'].	Gender is defined by the letter S and values are between 1 and 3, as follows: S = 1→Male persons employed S = 2→Female persons employed S = 3→Total number of persons employed

Definitions of units and terms:

Central government organizations are defined according to the 2008 SNA (European Commission and others, 2009), which describes the *central government subsector* as "generally composed of a central group of departments or ministries that make up a single institutional unit plus, in many countries, other institutional units."

Where the institutional unit comprises all (or most) of the entities that comprise central government, the highest level below the institutional unit should be selected as the appropriate statistical unit. Such units would include portfolio departments (e.g. education, health, 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. An example of the latter might be a national museum or national archives. In some cases, an institutional unit may be appropriate, for instance, where it is an agency of central government with a separate legal identity.

Excluded establishments of central government such as individual schools, hospitals, health centres, police stations and post offices are not statistical units, for the purposes of this indicator.

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, irrespective of the device used (not assumed to be only via a computer – it may also be by mobile phone, PDA, game machine, digital TV or other device). Internet access can be via a fixed or wireless network (Partnership, 2010).

EG2: Proportion of persons employed in central government organizations routinely using the

Persons employed refers to all persons working for the specified government organization, not only those working in clerical jobs. They include part-time, short-term and casual employees (Partnership, 2010). They exclude workers supplied to the organization by other organizations (Eurostat, 2011).

Routinely refers to at least once a week (Partnership, 2010).

Use can be at the organization's premises or elsewhere but refers to use for work purposes.

Statistical issues:

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 employing labourers, 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.

EG3: Proportion of central government organizations with a local area network (LAN)

Definition of basic indicator:

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

Definition of employment-weighted indicator:

An *employment-weighted* version of the indicator is calculated by weighting responses by the number of employees in responding central government organizations. The resulting indicator is expressed as follows: *central government organizations with a LAN account for x per cent of the total number of persons employed in government organizations*. Note that this is different from the employment weighting used in EG1 and EG2. However, like those indicators, it requires that total employment be collected in surveys of central government organizations.

Data requirements:

TGLAN: Total number of central government organizations with a LAN.

TGO: Total number of central government organizations.

TEGLAN: Total number of persons employed in central government organizations with a LAN.

TE: Total number of persons employed in central government organizations.

Disaggregations:

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

Formulae:

$$EG3 = \left[\frac{TGLAN}{TGO}\right] * 100$$

The employment-weighted estimate is:

$$EG3_{ew} = \left[\frac{TEGLAN}{TE}\right] * 100$$

EG3: Proportion of central government organizations with a local area network (LAN)

Definitions of units and terms:

Central government organizations are defined according to the 2008 SNA (European Commission and others, 2009), which describes the *central government subsector* as "generally composed of a central group of departments or ministries that make up a single institutional unit plus, in many countries, other institutional units."

Where the institutional unit comprises all (or most) of the entities that comprise central government, the highest level below the institutional unit should be selected as the appropriate statistical unit. Such units would include portfolio departments (e.g. education, health, 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. An example of the latter might be a national museum or national archives. In some cases, an institutional unit may be appropriate, for instance, where it is an agency of central government with a separate legal identity.

Excluded establishments of central government such as individual schools, hospitals, health centres, police stations and post offices are not statistical units, for the purposes of this indicator.

Where the ICT characteristics of subunits vary (e.g. between a head office and regional offices), either all units should be surveyed (apart from excluded establishments), or the response should reflect the situation applying to the majority of persons employed.

A *LAN* refers to a network connecting computers within a localized area such as a single building, department or site; it may be wireless (Partnership, 2010).

Statistical issues:

A major statistical issue with this indicator is the *units comparability issue* discussed in this chapter. The impact of this issue can be reduced by adherence to the standards described in this manual, including tabulation of output by size of organization and employment weighting.

EG4: Proportion of central government organizations with an intranet

Definition of basic indicator:

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

Definition of employment-weighted indicator:

An *employment-weighted* version of the indicator is calculated by weighting responses by the number of persons employed in responding central government organizations. The resulting indicator is expressed as follows: *central government organizations with an intranet account for x per cent of the total number of persons employed in central government organizations*. Note that this is different from the employment weighting used in EG1 and EG2. However, like those indicators, it requires that total employment be collected in surveys of central government organizations.

EG4: Proportion of central government organizations with an intranet

Data requirements:

TGINTR: Total number of central government organizations with an intranet.

TGO: Total number of central government organizations.

TEGINTR: Total number of persons employed in central government organizations with an intranet.

TE: Total number of persons employed in central government organizations.

Disaggregations:

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

Formulae:

$$EG4 = \left[\frac{TGINTR}{TGO}\right] * 100$$

The employment-weighted estimate is:

$$EG4_{ew} = \left[\frac{TEGINTR}{TE}\right] * 100$$

Definitions of units and terms:

Central government organizations are defined according to the 2008 SNA (European Commission and others, 2009), which describes the *central government subsector* as "generally composed of a central group of departments or ministries that make up a single institutional unit plus, in many countries, other institutional units."

Where the institutional unit comprises all (or most) of the entities that comprise central government, the highest level below the institutional unit should be selected as the appropriate statistical unit. Such units would include portfolio departments (e.g. education, health, 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. An example of the latter might be a national museum or national archives. In some cases, an institutional unit may be appropriate, for instance, where it is an agency of central government with a separate legal identity.

Excluded establishments of central government such as individual schools, hospitals, health centres, police stations and post offices are not statistical units, for the purposes of this indicator.

Where the ICT characteristics of subunits vary (e.g. between a head office and regional offices), either all units should be surveyed (apart from excluded establishments), or the response should reflect the situation applying to the majority of persons employed.

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 (Partnership, 2010).

Statistical issues:

A major statistical issue with this indicator is the *units comparability issue* discussed in this chapter. The impact of this issue can be reduced by adherence to the standards described in this manual, including tabulation of output by size of organization and employment weighting.

EG5: Proportion of central government organizations with Internet access, by type of access

Definition of basic indicator:

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

Note that the sum of percentages of each type of access is likely to exceed 100, as many central government organizations will have more than one type of access service.

Definition of employment-weighted indicator:

An *employment-weighted* version of the indicator for *any Internet access* is calculated by weighting responses by the number of persons employed in responding central government organizations. The resulting indicator is expressed as follows: *central government organizations with Internet access account for x per cent of the total number of persons employed in central government organizations*. Note that this is different from the employment weighting used in EG1 and EG2. However, like those indicators, it requires that total employment be collected in surveys of central government organizations.

Data requirements:

TGINT: Total number of central government organizations with Internet access (by type).

TGO: Total number of central government organizations.

TEGINT: Total number of persons employed in central government organizations with any Internet access.

TE: Total number of persons employed in central government organizations.

Disaggregations:

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

Formulae:

$$EG5_A = \left[\frac{TGINT_A}{TGO} \right] * 100$$

Type of Internet access is defined by the letter A, with values as follows: A = 1→Narrowband; A = 2→Fixed (wired) broadband; A = 3→Wireless broadband; A = 4→Any Internet access.

The employment-weighted estimate refers to organizations with any form of Internet access and is:

$$EG5_{ew} = \left[\frac{TEGINT}{TE} \right] * 100$$

Definitions of units and terms:

Central government organizations are defined according to the 2008 SNA (European Commission and others, 2009), which describes the *central government subsector* as "generally composed of a central group of departments or ministries that make up a single institutional unit plus, in many countries, other institutional units."

Where the institutional unit comprises all (or most) of the entities that comprise central government, the highest level below the institutional unit should be selected as the appropriate statistical unit. Such units would include portfolio departments (e.g. education, health, 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. An example of the latter might be

EG5: Proportion of central government organizations with Internet access, by type of access
a national museum or national archives. In some cases, an institutional unit may be appropriate, for instance, where it is an agency of central government with a separate legal identity. *Excluded establishments* of central government such as individual schools, hospitals, health centres, police stations and post offices are not statistical units, for the purposes of this indicator. Where the ICT characteristics of subunits vary (e.g. between a head office and regional offices), either all units should be surveyed (apart from excluded establishments), or the response should reflect the situation applying to the majority of persons employed. 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 (Partnership, 2010). *Narrowband* includes analogue modem (dial-up via standard phone line), ISDN (integrated services digital network), DSL (digital subscriber line) at advertised download speeds below 256 kbit/s, and mobile phone and other forms of access with an advertised download speed of less than 256 kbit/s. Narrowband mobile phone access services include CDMA 1x (Release 0), GPRS, WAP and i-mode (ITU, 2011).
Fixed (wired) broadband refers to fixed (wired) technologies at advertised download speeds of at least 256 kbit/s, such as DSL, cable modem, high speed leased lines, fibre-to-the-home/building, powerline and other fixed (wired) broadband. It excludes wireless broadband services as defined below (ITU, 2011). *Wireless broadband* refers to wireless technologies at advertised download speeds of at least 256 kbit/s, such as satellite broadband, terrestrial fixed wireless (including WiMax) and broadband access via mobile broadband networks (ITU, 2011). *Internet access* can be via any device (mobile cellular phone, laptop, PDA, etc.). The Internet connection(s) should be functional, that is, any equipment, software or services needed should be in working condition. Access can be via a fixed or wireless network (Partnership, 2010).
Statistical issues: A major statistical issue with this indicator is the *units comparability issue* discussed in this chapter. The impact of this issue can be reduced by adherence to the standards described in this manual, including tabulation of output by size of organization and employment weighting. 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.

65. Countries may wish to extend EG5 to collect data on the reliability of Internet access. Where Internet access is limited and unpredictable (as in some African countries), the benefit of having access is reduced. Countries in this situation could collect additional information on the reliability of the organization's Internet access service. The information could be in the form of the number of hours typically available each working day and whether the time(s) of access is (are) generally predictable.

EG6: Proportion of central government organizations with a web presence

Definition of basic indicator:

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 number of central government organizations. The result is then multiplied by 100 to be expressed as a percentage.

Definition of employment-weighted indicator:

An *employment-weighted* version of the indicator is calculated by weighting responses by the number of persons employed in responding central government organizations. The resulting indicator is expressed as follows: *central government organizations with a web presence account for x per cent of the total number of persons employed in central government organizations*. Note that this is different from the employment weighting used in EG1 and EG2. However, like those indicators, it requires that total employment be collected in surveys of central government organizations.

Data requirements:

TGWEB: Total number of central government organizations with a web presence.

TGO: Total number of central government organizations.

TEGWEB: Total number of persons employed in central government organizations with a web presence.

TE: Total number of persons employed in central government organizations.

Disaggregations:

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

Formulae:

$$EG6 = \left[\frac{TGWEB}{TGO} \right] * 100$$

The employment-weighted estimate is:

$$EG6_{ew} = \left[\frac{TEGWEB}{TE} \right] * 100$$

Definitions of units and terms:

Central government organizations are defined according to the 2008 SNA (European Commission and others, 2009), which describes the central government subsector as "generally composed of a central group of departments or ministries that make up a single institutional unit plus, in many countries, other institutional units."

Where the institutional unit comprises all (or most) of the entities that comprise central government, the highest level below the institutional unit should be selected as the appropriate statistical unit. Such units would include portfolio departments (e.g. education, health, 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. An example of the latter might be a national museum or national archives. In some cases, an institutional unit may be appropriate, for instance, where it is an agency of central government with a separate legal identity.

EG6: Proportion of central government organizations with a web presence

Excluded establishments of central government such as individual schools, hospitals, health centres, police stations and post offices are not statistical units, for the purposes of this indicator.

Where the ICT characteristics of subunits vary (e.g. between a head office and regional offices), either all units should be surveyed (apart from excluded establishments), or the response should reflect the situation applying to the majority of persons employed.

A *web presence* includes a website, homepage or presence on another entity's website (including a related organization). It excludes inclusion in an online directory and any other web pages where the organization does not have control over the content of the page (Partnership, 2010). A web presence includes social media pages and accounts (e.g. Facebook, YouTube and Twitter) if the organization has control over content.

Statistical issues:

A major statistical issue with this indicator is the *units comparability issue* discussed in this chapter. The impact of this issue can be reduced by adherence to the standards described in this manual, including tabulation of output by size of organization and employment weighting.

EG7: Selected Internet-based services available to citizens, by level of sophistication of service

Definition of indicator:

Unlike indicators EG1 to EG6, this indicator refers to both central and state/provincial levels of government. This is necessary to ensure international comparability as the services selected may be offered by different levels of government across countries. As the approach taken to measuring Internet-based services is relatively untested and because responses may be somewhat subjective, the indicator is initially considered to be *experimental*.

The main indicator is weighted by population in order to show the significance of government Internet-based services at the national level. It is expressed in terms of the percentage of a country's citizens who are theoretically able to access each Internet-based service. Note that this does not refer to whether a citizen has the equipment or knowledge necessary to access those services, whether he or she needs to access those services nor whether he or she directly benefits (e.g. most of the services are not relevant to children but they are assumed to indirectly benefit if their parent or guardian accesses services electronically). The ability to access each service will usually be linked to the relevant jurisdiction. For example, a citizen residing in a particular state will theoretically be able to access Internet-based services offered by that state government, though may not need to, wish to, or be technically capable of doing so.

A supplementary indicator presented by jurisdiction is also provided. A Yes-No-Not relevant tick box is completed for each jurisdiction, service and level. This presentation may also be used as an input to the computation of the main indicator, where countries have a state/provincial level of government.

The Internet-based services are classified by level of sophistication, as follows:

Level 1 – obtain the necessary information from publicly accessible websites
Level 2 – request the necessary printed forms or download forms (e.g. in pdf format) from publicly accessible websites
Level 3 – fill in the necessary forms online on (or via) publicly accessible websites
Level 4 – undertake the complete process, via publicly accessible websites.

EG7: Selected Internet-based services available to citizens, by level of sophistication of service

The Internet-based services for which information is sought are:[b]

Enrol to vote for the first time in government elections.
Complete and lodge personal income tax return, least complex situation.
Obtain unemployment income benefits, least complex situation.
Obtain child support allowance, least complex situation.
Renew an international passport, least complex situation.
Renew a driver's licence, least complex situation.
Make an official declaration of theft of personal goods (excluding motor vehicle and burglary) to the relevant police.
Obtain a copy of a birth certificate for self.
Obtain a copy of a marriage certificate for self.
Renew registration for a motor vehicle, least complex situation.

Data requirements:	**Disaggregations:**
Availability of selected Internet-based services. Total populations governed, for each jurisdiction (e.g. one national and several state governments).	By central/federal and state/provincial levels of government.

Definitions of units and terms:

Central government units are described by the 2008 SNA as "institutional unit or units making up the central government plus non-market NPIs that are controlled by central government. The political authority of central government extends over the entire territory of the country."

State government units are described by the 2008 SNA as "institutional units whose fiscal, legislative and executive authority extends only over the individual *states* into which the country as a whole may be divided. Such states may be described by different terms in different countries. In some countries, especially small countries, individual states and state governments may not exist. However, in large countries, especially those that have federal constitutions, considerable powers and responsibilities may be assigned to state governments." Where more than one level of government exists between central and state/provincial government, these should be included with the level of government with which they are most closely associated.

Where listed Internet-based services have been outsourced by general government to non-government providers, they should be attributed to the level of government (central or state/provincial) that outsourced the service. Where they are undertaken by public corporations, they should be attributed to the level of government that controls the corporation. Where services are offered by non-government providers (but not as an outsourced service), they are excluded from scope and should be marked as *Not relevant*.

Internet-based services, for the purposes of this indicator, refer to services that are accessible via a publicly available website. They include situations where an application is downloaded from a website and used on an individual's computer. Such a process may also involve lodgement via the Internet.

Publicly accessible websites may require an individual to register as a user and obtain a logon ID, a password and (or) other forms of security. This includes providing a reference or account number (or equivalent) in order to access the service.

b This list is a minimal list of services for comparison purposes. Countries may wish to add other services to the list.

EG7: Selected Internet-based services available to citizens, by level of sophistication of service

Percentage of citizens refers to the percentage of the population theoretically able to access each Internet-based service. The population data are used to weight responses and thus ascertain the significance of each service at a national level. As an example, if three state governments in a country offer information on their website on how to enrol to vote in state government elections but two others do not, then the *Percentage of citizens* under *State/provincial government* at Level 1 *Enrol to vote for the first time in government elections* would refer to the percentage of the country's citizens who reside in those three states.

For central government, it is expected that the *percentage of citizens* will usually be either 100 per cent or zero. However, there will be situations where a central government service is not theoretically available to all citizens of the jurisdiction, for example, where services are regionally based. This situation may also apply to state/provincial governments. For more information, see the model question in chapter 6.

Least complex situation refers to the simplest standard procedure in the country. For example, for motor vehicle registration renewal, the simplest procedure might be renewal of a relatively new, privately registered vehicle already located in the jurisdiction. For some countries, it might be easier to identify Internet-based services for a common, but not necessarily simple, situation than for the least complex situation. In this case, countries could report on the common situation and describe it in accompanying metadata.

Statistical issues:

The results of this indicator show the level of sophistication of Internet-based e-government for the selected services. Sophistication levels are defined according to the following model:

Level 1 – involves no interaction and is limited to obtaining relevant information from publicly available websites.

Level 2 – one-way interaction, involving simple requests from the user to send printed forms or allowing users to download forms (e.g. in pdf format) to be printed by the user and completed offline.

Level 3 – reflects more complex website facilities, for example, a facility enabling users to fill in forms online or an application downloadable from a website. Information from the form may be processed automatically, thus potentially providing efficiency benefits for the government agency.

Level 4 – reflects relatively complex website facilities and information processing applications, and enables a complete process (e.g. an application and its outcome) to be carried out via a publicly available website. This could include downloading of applications, completion, delivery and payment (from, or to, the user). This level may also be described as *full electronic case handling*.

The main statistical issue with this indicator is that the model question is relatively untested. Internet-based services are difficult to define in a consistent way, so the approach taken with this indicator is to ask information about a selection of services, chosen for their specificity, usefulness and understandability.

Countries may wish to extend the scope and services listed in this indicator; see table 2.

66. Countries may wish to complement EG7 with data from government departments showing the actual demand for Internet-based services offered, for example, the number of downloads of relevant forms or the number of citizens completing a particular form online.

Other e-government indicators included in the Partnership's list of core ICT indicators

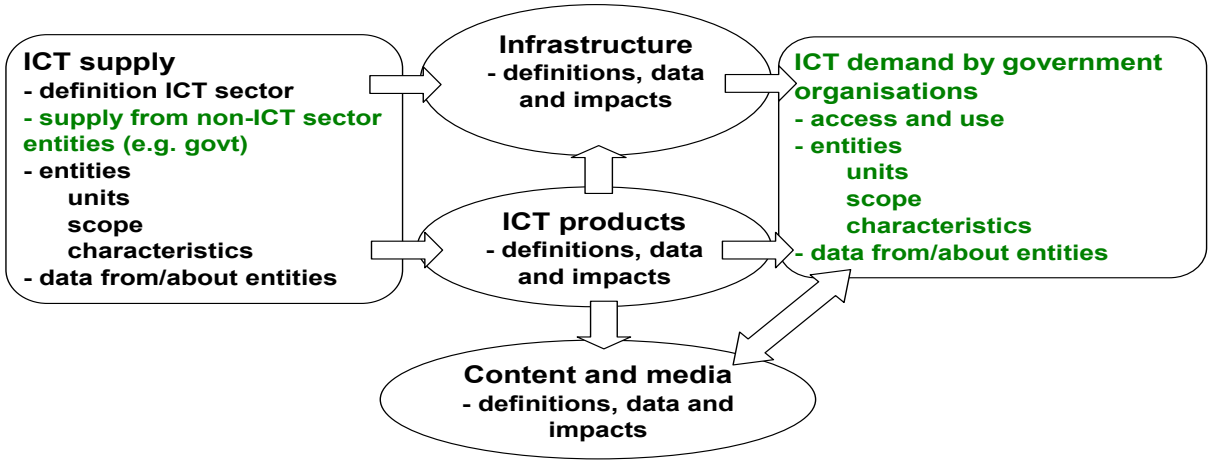
67. Indicators addressing the use of the Internet for various activities by individuals and businesses are part of the *Partnership*'s list of core ICT indicators (Partnership, 2010; ITU, 2014). Those relevant to government should be considered as supplementary indicators to the seven presented in this manual. They are:

- HH9 Internet activities undertaken by individuals in the last 12 months
  - Getting information from general government organizations
  - Interacting with general government organizations (downloading/requesting forms, completing/lodging forms online, making online payments and purchasing from government organizations etc.).
- B12 Proportion of businesses using the Internet by type of activity[13]
  - Getting information from general government organizations
  - Interacting with general government organizations.

Conceptual framework for measuring e-government

68. With reference to the OECD information society statistics conceptual model (figure 1.1, OECD, 2011a), e-government core indicators EG1 to EG5 are demand-side indicators (users and uses of ICT), reflecting use of ICT by government organizations and their employees. Indicator EG6 is arguably both a supply and demand indicator, reflecting use of websites by government organizations and supply of services offered by having a web presence. Indicator EG7 is a supply-side indicator (producers and production) as it measures supply of Internet-based services to consumers. The supplementary core indicators are all demand-side indicators (reflecting demand from individuals and businesses). Example 1 shows an interpretation of the place of e-government in a supply-demand conceptual model.

Example 1: The information society – an e-government perspective



Adapted from OECD Guide to Measuring the Information Society (2011).

69. The statistical standards addressed as part of the conceptual framework are scope, statistical units, classifications, weighting and time-related factors (reference dates and frequency). These are explained

13 Eurostat's 2011 Enterprise Survey devoted a special module to the use of e-government by businesses in order to shed light on the services they use, at what degree of sophistication, and in relation to the main barriers to usage (Eurostat, 2011).

below. Indicator definitions and model questions (including definitions of terms) may also be regarded as statistical standards and are included in the Manual.

Scope

70. For the purposes of this chapter, scope refers to the types of units referred to by the indicators. In a broader context, scope may include other factors such as geography and time frame. For business ICT use surveys, in particular, unit scope will also include size and industry of activity of the organization. These are not specified for the e-government indicators. In particular, it is not recommended that scope be limited by organization size or industry (though note the use of an industry classification to improve coverage as discussed below and in chapter 7).

Indicators EG1 to EG6

71. Indicators EG1 to EG6 refer to central government organizations, which constitute a subsector of the general government sector. The latter is defined in SNA 2008 (European Commission and others, 2009) 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.[14] 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.

72. According to the 2008 SNA, 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. The SNA 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. It also defines the concept of control in respect of NPIs 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 (for example, a constitution), contractual agreements, degree of funding, 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 judgemental in nature.

73. In terms of residency, government units are always considered resident by the SNA. This includes territorial enclaves in the rest of the world, used by the government for diplomatic or other purposes, normally with the formal agreement of the government of the country in which they are physically located.

74. General government also includes social security funds. These may constitute a separate subsector or be included with the level of government (central, state or local) where they operate. The choice of classification of a social security fund depends on whether it is independent of the level of government where it operates.

75. Central banks are usually categorized by the SNA to a subsector of the financial corporations sector. However, in cases where they are not separate institutional units and their functions are carried out by agencies within the central government that are not separate institutional units, they will be included in general government.

14 According to the 2008 SNA, a quasi-corporation is an unincorporated enterprise belonging to a household or government unit that behaves like a corporation and has a complete set of accounts.

76. The 2008 SNA describes a number of borderline cases, including quasi-corporations, restructuring agencies, special purpose entities, joint ventures and supranational authorities. The likely treatment is as follows:

- Quasi-corporations are unincorporated enterprises that function as if they are corporations; if they are owned by government, they are treated as public corporations and are therefore out of scope of general government.
- Restructuring agencies controlled by government may be general government entities or public corporations depending on the nature of their operations.
- Special purpose entities can be resident or non-resident. In the latter case, they are not part of the general government sector. Resident special purpose entities may be a general government entity or a public corporation depending on the nature of their operations.
- Joint ventures involve the establishment of a corporation, partnership or other institutional unit in which each party legally has joint control over the activities of the unit. If a joint venture operates as a non-market producer, government is in effective control and it is classified as part of general government. Conversely, if the joint venture is a market producer, it is treated as a public or private corporation according to whether or not it is controlled by a government unit.
- Supranational authorities. Some countries may be part of an institutional agreement that involves monetary transfers from the member countries to the associated supranational authority and vice versa. The supranational authority also engages in non-market production. As the authority is a non-resident, it is out of scope for the purposes of this manual.

77. The *International Standard Industrial Classification of All Economic Activities* (ISIC) (UNDESA 2002, 2008a) is the international standard for classifying entities according to their economic activity. NSOs will generally classify units on their business register by ISIC or an equivalent national industrial classification. Where data for the e-government indicators 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). As ISIC refers to activities, not types of units, it cannot be used alone to define scope (because some of the activities of government will be outside the ISIC section, *Public administration and defence; compulsory social security*, 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 (or *provincial*) government will likely have more limited central government functions).

78. For practical reasons, scope for the e-government indicators EG1 to EG6 does not extend to *excluded establishments* of government. These are individual establishments such as schools, hospitals, health centres, police stations and post offices. Therefore, such establishments are not included as statistical units for indicators EG1 to EG6. They are also not included in the responses of higher-level units. For example, a central government department of education would be included in a survey of e-government as a statistical unit. However, the schools administered by that department would not be included in the survey, nor is their activity taken into account for indicators EG1 to EG6. These issues are further explored in *Statistical units* below.

Indicator EG7

79. Indicator EG7 refers to government more generally and the scope includes both central and state/provincial levels of government. This is necessary because the level of government responsible for the services included in EG7 will vary between countries. Where any of the listed Internet-based services have been outsourced by general government to non-government providers, they should be attributed to the level of government (central or state/provincial) that outsourced the service. Where they are undertaken

by public corporations, they should be attributed to the level of government that controls the corporation. Where services are offered by non-government providers, they are excluded from scope and should be marked as *Not relevant*.

Expansions of scope

80. Table 2 shows how countries may expand the scope of the indicators.

Table 2: Scope expansion possibilities for e-government core indicators

Indicator	Minimal scope	Expansions of scope to include:	Comments
EG1–EG6	General government – central/federal government.	General government – state (or provincial). General government – local. Public corporations – central, state and local, consistent with the general government scope.[c]	See this chapter for definitions of levels of government.
EG7	General government – central/federal government and state/provincial government (including non-government providers where services have been outsourced by government, and public corporations).	General government – local (with additional services typical of local government). Additional Internet-based services offered to citizens. Internet-based services offered to businesses, with no weighting by population numbers.	See this chapter for definitions of levels of government. Selected services offered to businesses could be added to the jurisdiction level question and a separate compilation at national level would show the availability (Yes-No-Not relevant) for each level (1 to 4) of each service, for each jurisdiction. See Capgemini (2006) for possible business services.

c Note that the inclusion of public sector business entities overlaps the Partnership's recommended scope for business surveys of ICT use, the scope of which includes public (trading) corporations.

81. As per table 2, a possible scope extension for indicators EG1 to EG6 includes the other generally recognized levels of government, state (or provincial) and local. According to the 2008 SNA:

- State government units are described as "institutional units whose fiscal, legislative and executive authority extends only over the individual 'states' into which the country as a whole may be divided. Such 'states' may be described by different terms in different countries. In some countries, especially small countries, individual states and state governments may not exist. However, in large countries, especially those that have federal constitutions, considerable powers and responsibilities may be assigned to state governments."
- Local government units are described as "institutional units whose fiscal, legislative and executive authority extends over the smallest geographical areas distinguished for administrative and political purposes."

82. Following the 2008 SNA, where more than one level of government exists between central and local government, these should be included with the level of government (state or local) with which they are most closely associated.

83. Another possible scope extension is to consider the whole public sector, not only general government. The 2008 SNA defines the *public sector* as including general government plus public corporations. A public corporation is one that is both controlled by another public unit and is a market producer.[15]

15 Control is defined by the 2008 SNA as the ability to determine the general policy or programme of an institutional unit; a market producer is one that provides all or most of its output to others at prices that are economically significant (prices that have a significant effect

84. Public corporations can be further classified according to the level of government (central, state or local) and type of entity:

- Non-financial
- Financial public corporations other than the central bank
- The central bank.[16]

85. The *Frascati Manual* (OECD, 2002) includes standards for research and experimental development statistics, including the definition of the government sector and government units. It broadly follows the 1993 SNA, with the difference that higher education is established as a separate sector. Note that public enterprises are included in the business sector. The *Frascati Manual* defines the government sector as follows:

- "All departments, offices and other bodies which furnish, but normally do not sell to the community, those common services, other than higher education, which cannot otherwise be conveniently and economically provided, as well as those that administer the state and the economic and social policy of the community. (Public enterprises are included in the business enterprise sector.)
- NPIs controlled and mainly financed by government, but not administered by the higher education sector."
- "Units associated with the higher education sector which mainly serve the government sector should also be included in the government sector."

Statistical units

86. A statistical unit is the entity in respect of which statistics are compiled. There are several challenges in defining and identifying statistical units for surveys of government organizations, especially in a way that enables international comparability (that is, achieving comparable output across countries). In this manual, those challenges have been collectively referred to as the *units comparability issue*.

87. Issues relating to government organizations as statistical units are also discussed in chapter 7 – Survey design.

The units comparability issue

88. Indicators of the type 'proportion of government organizations with ICT' (indicators EG3 to EG6) are affected by difficulties with comparison of units.[17] For such indicators, it can be very challenging to provide internationally comparable statistics, 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.
- The defined entities need to be identified and accurately listed by countries according to those agreed definitions.
- Even with consistent definition and good identification, indicators of the form 'proportion of government organizations with ICT' may not be comparable across countries because of different structures and functions of country systems. For example, country A may have identified a small number of large entities of central government, whereas country B might have mainly small entities of this type. In this example, country A is likely to rate more highly on 'propor-

on the amounts that producers are willing to supply and on the amounts purchasers wish to buy).

16 More information may be found in chapter 22 of the 2008 System of National Accounts (European Commission and others, 2009).

17 This is true of any indicator of the form 'proportion of entities with <a characteristic>' if units are not comparable across countries. At the national level, the problem can affect regional and time series comparisons.

tion of units with ICT' indicators (because the prevalence of ICT tends to be greater in larger organizations), simply through structural differences in the population.

89. Unfortunately, there are particular difficulties for central government units due to both their heterogeneity and the international concepts used to define them.

- At a national level, government structure can be complex and units difficult to identify.
- The international concepts used to define government units are designed for volume indicators.

90. The challenges posed by the units comparability issue are significant and may not be able to be overcome simply by establishing definitions of units and by classifying output by size of organization. The most useful solution to the challenges is likely to be the use of indicators weighted according to a size variable (employment size is recommended in this manual).

Statistical unit for central government

91. The statistical unit for measuring e-government is consistent with the scope described above. The definition used for the central government statistical unit is sourced from the 2008 SNA (European Commission and others, 2009), the *Government Finance Statistics Manual 2001* (IMF, 2001) and *Government Finance Statistics: Compilation Guide for Developing Countries* (IMF, 2011). Boxes 4 to 7 show the progression from the starting point, the *institutional unit*, to the recommended statistical unit for central government organizations.

Box 4: Institutional unit

"An institutional unit is defined as an economic entity capable in its own right, of owning assets, incurring liabilities, and engaging in economic activities and in transactions with other entities. Very importantly for statistical purposes, an institutional unit should have a complete set of accounts (including a balance sheet), or it must be possible and meaningful to compile such accounts … Entities that do not meet the criteria to be an institutional unit are always part of another entity that is an institutional unit."

"The 2008 SNA divides the economy of a country into five mutually exclusive institutional sectors. These five sectors are: the nonfinancial corporations sector, the financial corporations sector, the general government sector, the nonprofit institutions (NPIs) serving households sector, and the households sector. All resident institutional units of a country belong to one of these five sectors."

Source: International Monetary Fund (2011).

92. The 2008 SNA defines government units as follows:

> … 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.

Box 5: General government institutional unit

"A key characteristic of all general government units is that they are nonmarket producers. In other words, the goods and services they produce are provided free of charge or at prices that are not economically significant. Although there is no prescriptive numerical relationship between the value of output and the production costs to determine whether an entity charges economically significant prices or not, one would normally expect the value of goods and services sold to average at least half of the production costs over a sustained multiyear period, for an entity to be considered a market producer. A public corporation that does not meet this test is classified as a general government unit, while an unincorporated government unit that meets the test and functions as a corporation, is considered to be a quasi-corporation, and is classified as a corporation (non-financial or financial). A government entity that is not an institutional unit and sells most or all of its output at market prices may be a market establishment within a general government unit. For example, a municipal swimming pool that charges entrance fees or a government publishing office that sells its publications might be market establishments."

Source: International Monetary Fund (2011).

93. According to the 2008 SNA, central government 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.

Box 6: Central government institutional unit

"Central government is a subsector of the general government sector. It consists of the institutional unit or units making up the central government plus those non-market NPIs that are controlled by central government.

The political authority of central government extends over the entire territory of the country. Central government has therefore the authority to impose taxes on all resident and non-resident units engaged in economic activities within the country. Its political responsibilities include national defence, the maintenance of law and order and relations with foreign governments. It also seeks to ensure the efficient working of the social and economic system by means of appropriate legislation and regulation. It is responsible for providing collective services for the benefit of the community as a whole, and for this purpose incurs expenditures on defence and public administration. In addition, it may incur expenditures on the provision of services, such as education or health, primarily for the benefit of individual households. Finally, it may make transfers to other institutional units, namely to households, NPIs, corporations and other levels of government.

Central government is a large and complex subsector 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. The departments may be responsible for considerable amounts of expenditure within the framework of the government's overall budget, but often they are not separate institutional units capable of owning assets, incurring liabilities, engaging in transactions, etc., independently of central government as a whole."

Source: *System of National Accounts 2008* (European Commission and others, 2009).

94. For indicators of the type 'proportion of central government organizations with ICT', use of the institutional unit presents difficulties for those countries where a single institutional unit comprises all (or many) central government departments or ministries. In such cases, the institutional unit will consist of a number of subunits (for example, 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.

95. In cases where the institutional unit comprises all (or most) of central government, a partial solution to this problem is to use a unit that is at a lower level than the institutional unit. The 2008 SNA discusses a number of government units that may be part of a single institutional unit or are 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
- 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.

96. In some cases, these types of units will be equivalent to sites or establishments ("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"). 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 excluded establishments would include individual schools, hospitals, health centres, police stations and post offices.

97. It is therefore suggested that, where a single institutional unit comprises all (or much) of central government, the highest level below the institutional unit should be selected as the appropriate statistical unit of central government. Such units would include portfolio departments (for example, education, health, education, culture, justice) and could include 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. A possible example of this could be a national institution in a single location, such as a national library, national museum or national archives. In some cases, a whole institutional unit may be an appropriate statistical unit, for instance, where it is an agency of central government with a separate legal identity.

98. The suggested unit may be analogous to the kind-of-activity units (KAU) defined by the 2008 SNA: "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." A KAU is a higher-level unit than the establishment level, which is location-based and is defined above.

99. Where the selected unit has one or more subunits that are not excluded 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. In situations like this, it could be preferable to survey the unit and its subunits.

Box 7: Central government statistical unit used by this manual

Characteristics of the statistical unit to be used for measuring the e-government indicators are:

- Central government units that are themselves an institutional unit, for example, agencies of central government that maintain full sets of accounts, and have a separate legal identity and substantial autonomy.
- Central government units that are the next level down from the (whole-of-government) single institutional unit, for example, departments or ministries of central government, branch offices or agencies of central government.
- The statistical unit may be analogous to the kind-of-activity units (KAU) defined by the 2008 SNA: "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."
- The KAU 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"). However, sometimes the appropriate unit will be a site or establishment, where this is the next level down from the parent institutional unit.
- Excluded establishments include individual establishments (unless the next level down from the parent institutional unit) such as schools, hospitals, health centres, police stations and post offices.

100. It is obvious that central government statistical units are very heterogeneous and are not able to be readily defined in a way that can be applied uniformly across countries. In addition, the functions of central government will vary across countries, thus compounding comparability problems. In this situation, a classification of organizations by size is particularly important in creating some level of homogeneity of central government units across countries. A size classification is presented below.

101. It was mentioned above that the *Frascati Manual* (OECD, 2002) includes standards for R&D statistics, including the definition of the government sector and government units. While it broadly follows the 1993 SNA in respect of scope, it does not offer advice on government organizations as statistical units except to note that "ISIC Rev. 3, paragraph 51, recommends that when data are combined with those collected from legal business entities, the statistical unit should be similar to the legal business entity." This is consistent with the suggestion made above that, in many cases, the suggested statistical unit will be analogous to the kind-of-activity units defined by the 2008 SNA.

102. Countries using a business register to conduct surveys to measure any of the indicators EG1 to EG6 should ensure that they have included 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*. Note that, units that are not central government entities may be classified to ISIC Section O; these should be excluded from scope.

Classifications

103. For indicators EG1 and EG2, *persons employed* could be classified by characteristics applying to individuals, for example, occupation or gender.

104. As discussed above, the units comparability issue is a major challenge for government units. It is strongly recommended that output for at least indicators EG3 to EG6 be classified by the size of central

government organization, thus enabling comparison of similarly sized units across countries.[18] The size variable proposed is the number of persons employed by head count 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. Head count refers to the number of persons employed, whether full-time, part-time or casual.

105. Where data for indicators EG1 to EG6 are collected by surveys, employment head count data should be collected in the same survey unless highly reliable data on employment by head count are available on countries' business registers (or other survey frames).

106. A number of classifications applying to government can be found in the *Government Finance Statistics Manual 2001* (IMF, 2001). They are classifications of revenue, expenses (economic and functional), assets and liabilities (financial and non-financial), transactions and economic flows. However, none of these are classifications applying to whole units so are not useful for the purposes of the core e-government indicators. The *Frascati Manual* (OECD, 2002), which also contains international standards for measuring government (in this case R&D), does not recommend any particular classification of units, apart from those recommended by the 1993 SNA.

107. If the scope of indicators EG1 to EG6 is extended, output would be classified by jurisdiction and size (for at least EG3 to EG6) and jurisdiction and gender for EG1 and EG2 (if gender information is collected).

Weighting

108. Because of the heterogeneity of central government units, it is strongly suggested that indicators be weighted. This removes the effect of unit non-comparability, although it does introduce a weighting effect. The weighting for each indicator has been chosen to be reasonably aligned with the nature of the indicator in order to reduce any weighting effects. The following weightings are recommended:

- For EG1 and EG2, the weighting is a component of the indicator, that is, the proportion of persons employed who routinely use a computer/the Internet. When aggregated to the total population of persons employed, these indicators provide information on the proportion of all persons employed in central government who routinely use computers/the Internet.
- For EG3 to EG6, it is recommended that indicators be weighted according to the number of persons employed; this should be reasonably unbiased for indicators reflecting ICT use by persons employed (that is, EG3, EG4 and EG5). For EG6, employment weighting is less related to whether an organization has a website, though arguably, larger organizations are more likely to have websites. The algebraic depiction of employment-weighted estimates is shown in the indicator boxes for EG3 to EG6.
- For EG7, the weighting of the main indicator (population proforma) is a component of the indicator, being the proportion of the relevant population with the theoretical ability to access selected Internet-based government services.

18 Note that the issue does not apply to EG7 and is less critical for EG1 and EG2.

Time-related factors

Reference date

109. The indicators refer to the situation at a particular reference date. While it is obviously useful if countries harmonize this date in their data collections, it is considered impractical to recommend that. Therefore, no advice is offered on the selection of a particular reference date. For international reporting of the indicators, countries should include the reference date in a statistical standards statement.

110. Reference dates are referred to in all of the indicators. The dates are left up to countries to determine. They could be at the end of a calendar year or quarter. It could also be the day the survey was completed and therefore could differ slightly between organizations.

Frequency

111. Frequency refers to how frequently the indicators are produced by a country. This will be a function of several factors, including resources and the speed of change in the implementation of e-government. While no particular recommendations are made, it is considered that once every two years would be a suitable starting point.

Chapter 5. Data sources and collection methods

112. This chapter considers data sources and collection methods for the core e-government indicators, starting with a look at current approaches. The major sources used in the preparation of this chapter are ITU (2009), UNCTAD (2009) and metadata for existing e-government surveys (annex 1).

Current approaches to measuring e-government

113. Various individual and composite indicators have been developed for assessing the status of e-government. The scope of interest includes single countries, regions and global measurement. Some studies assess the use of ICT alone; others measure customer services through services offered via government websites. The latter range from simple services to more sophisticated issues of privacy and electronic voting.

114. Methodologies range from country-level surveys of government organizations, such as those shown in annex 1, to highly complex web-based surveys. The most comprehensive example of the latter is the United Nations e-Government Survey. It covers all United Nations member states and is carried out by UNDESA's Division for Public Administration and Development Management.

115. Capgemini, on behalf of the European Commission, has published results of e-government benchmarking of European Union member states for a number of years (for example, Capgemini 2006, 2010). The main element of the study is an extensive website survey of organizations' URLs that tracks services offered by government.

116. Several individual countries collect (or have collected) information on e-government, generally based on statistical surveys of government organizations. The content and standards are diverse. Countries that have conducted e-government surveys (or plan to) include Australia, Brazil, Canada, the Czech Republic, Denmark, Egypt, Finland, Lebanon, Morocco, New Zealand, Nigeria, Norway, Oman, the Russian Federation and Sri Lanka. Annex 1 presents information about these surveys.

Data sources

117. For the indicators proposed, different government agencies and different strategies may be used to collect data. For most countries, the most important method is likely to be the use of traditional questionnaire-based surveys of government organizations. Some data may also be available from administrative sources or collectible from country-level website surveys (this is especially true of indicator EG7). A comparison of survey types can be found in table 3.

Sample surveys and censuses of government organizations

118. Statistical surveys of government units, like business surveys, may be sample surveys or censuses. For many countries, censuses will be chosen because of the small number of government units in a country (compared to businesses, for example) and the difficulty of obtaining information about the whole population on which to base a sample design. If the minimal recommended scope (that is, central government) is used, a census is likely to be particularly beneficial and might be based on two-stage data collection whereby forms are sent to major government portfolio departments, which may then collect information from lower-level statistical units.

119. Where a wider scope is chosen, sample surveys may be necessary, depending on the size and characteristics of the population. For example, some countries have a large number of local government entities that are reasonably homogeneous and are therefore able to be sampled efficiently.

120. The question of whether to conduct a sample survey or a census is also explored in chapter 7 – Survey design.

A particular case: survey modules in existing surveys

121. Where existing surveys of government exist, then the core indicator questions could be added to those surveys. However, because surveys of government units are less common than household or business surveys, generally an existing survey vehicle will not be available. Even where surveys of government organizations do exist, data collected via a module will reflect the statistical characteristics of the survey vehicle (particularly the population frame and statistical units) and is unlikely to comply with the standards in this manual.

122. There may be cost and other advantages to using a suitable survey vehicle where one already exists. In particular, the cost of collecting ICT data via a module in an existing survey is generally marginal to the costs associated with the survey vehicle. For example, staff involved in data processing are already trained and will require only complementary training on ICT questions. A potentially important advantage is that existing data items and classificatory variables can be cross-tabulated against ICT data to produce a richer dataset.

123. A review of country surveys (see annex 1) revealed only one instance of indicators being collected by a survey module in an existing survey.[19]

Administrative data

124. Some countries may have administrative data collections of government that also collect data on ICT usage and Internet-based services. Data from such collections could be used where they comply with the standards in this manual. The great advantage of administrative data is that they are already available, possibly in respect of several years. However, the review of country surveys (see annex 1) revealed no instances of administrative data being used to collect core ICT indicator or similar data.

National experts

125. For some countries, the core e-government indicators might be able to be compiled by experts who are knowledgeable in the ICT status of government in their country. This is particularly true of EG7, where it is suggested that data be compiled by website research. For the other indicators, compilation by experts may also be effective, although the standards applying to the indicators need to be understood – especially those pertaining to statistical units.

Website surveys

126. The Web can be used to conduct traditional surveys of government organizations. In this case, it is a method of data collection and is dealt with in table 4. This section considers surveys of government websites aimed at measuring the level and availability of e-government services in a country.

19 The Czech Statistical Office Survey of ICT Usage in Public Administration.

127. It should be noted that the information obtainable from surveys of websites is quite different from that available from surveys of government units. The first are suitable for collecting information about the services available via government websites. The second are suitable for ascertaining information on the proportion of government units with particular characteristics and volume information, such as government expenditure on ICT. Notwithstanding these differences, it may be possible to use both methods in a single survey.[20]

128. Notable examples of website surveys are the UNDESA surveys of member countries (2003, 2004, 2005, 2008b, 2010, 2012, 2014) and the European Union surveys (Capgemini, 2006, 2010). At least one individual country (the Czech Republic) also conducts website surveys (see details in annex 1).

129. The most comprehensive website survey is the e-Government Survey which is carried out by the Division for Public Administration and Development Management of UNDESA and covers all United Nations member states. Its e-Government Development Index presents a composite index based on a direct assessment of the state of national online services, telecommunications infrastructure and human capital. UNDESA has led the effort in international e-government benchmarking since 2003. In 2014, it published results of the seventh survey – *United Nations E-Government Survey 2014: E-Government for the Future We Want*.

130. Capgemini, on behalf of the European Commission, has published results of e-government benchmarking of European Union member states for a number of years (for example, Capgemini 2006, 2010). The benchmark has proved to be a policy-informing tool at both European and member state level since its inception in 2001. The main element of the study is an extensive website survey of organizations' URLs that tracks 20 services offered by government (12 are aimed at citizens and 8 at businesses). The set of services used in indicator EG7 is based on a subset of the Capgemini services.

Table 3: Comparison of survey types

Survey type	Main advantages	Main disadvantages
Survey module in existing survey (survey of government organizations where e-government is one of several topics)	Lower cost – cost of collecting module data is generally marginal to the costs associated with the survey vehicle. Existing data items and classificatory variables can be cross-tabulated against ICT data to potentially produce a more useful dataset. Procedures and staff are already in place.	An existing survey vehicle is unlikely to be available. Data collected via a module in an existing survey will reflect the statistical characteristics of the survey vehicle, in particular the population frame and statistical units. The resulting data are therefore unlikely to comply with the standards in this manual. A multitopic questionnaire may be too long and discourage response. Multiple topics may require more than one respondent, which could complicate form completion and return.
Census of government organizations designed to collect e-government core indicator data	The survey design is relatively simple. Inaccuracies in the population frame may not be such a problem as long as all units are present. There is no sampling error in a census, therefore detailed data and cross-tabulations should be possible and limitations easier to explain to users.	If the population is large, the collection and processing costs may be prohibitive. There is a response burden on all respondents, therefore no possibility of resting respondents. It may take more time to collect, process, and release data because of a larger survey size. Problems of non-sampling error still exist and need to be explained to users.

20 For example, a survey of government organizations might include supplementary information gained from websites of surveyed organizations.

Survey type	Main advantages	Main disadvantages
Stand-alone sample survey of government organizations designed to collect e-government core indicator data	A sample survey is likely to be less expensive to conduct than a census. Since it is a smaller size, there will be reduced overall burden on respondents. It is likely to take less time to collect, process, and release data.	The survey design is relatively complex compared to a census. The design potentially relies more on the accuracy of the population frame. Because estimates are subject to sampling error, more detailed data may not be available or reliable. Limitations on the precision of data may be difficult to communicate to users.
Survey of websites to measure the sophistication of e-government in a country (as distinct from use of the Internet to collect data – see table 4) Indicator EG7 illustrates this type of website survey.	This is a relatively simple method of collecting information about particular services available via government websites. The method is expected to be inexpensive compared to traditional surveys.	The survey requires a model of sophistication as services may be offered at different levels (see EG7, which uses a four-level model). It may be difficult finding whether particular services are offered because parts of websites may only be accessible to account holders or subscribers. This type of survey will not provide information about the proportion of government organizations with a particular ICT characteristic (e.g. percentage of organizations with a website).

Methods of data collection

131. As we have seen, surveys of e-government are likely to be surveys of government units. Such surveys are more similar to business than household surveys and involve a variety of different forms of data collection. The main ones are:

- Personal interview, face-to-face, possibly computer-assisted (CAPI)
- Personal interview, telephone, possibly computer-assisted (CATI)
- Self-completed questionnaire, mail
- Self-completed questionnaire, Internet-based (a web survey or e-mailed form).

132. Table 4 shows the available data collection methods, with their main advantages and disadvantages.

Table 4: Comparison of data collection methods[21]

Data collection method	Details	Main advantages	Main disadvantages
Personal interview, face-to-face	This involves a trained interviewer asking questions of a respondent in a face-to-face situation.	This is the most direct method of collecting information and facilitates direct interaction between the interviewer and the interviewee, allowing checking and follow-up questions. An interviewer can also assist respondents to answer complex questions and can clarify concepts such as definitions of particular ICTs.	Interviewers can introduce bias if they have not received suitable training. High personnel costs may be incurred (for hiring and training interviewers). In developing economies with poor quality transport infrastructure, reaching organizations located in some country areas may prove difficult.
With computer assisted personal interviewing software (CAPI)	This involves a trained interviewer asking questions of a respondent in a face-to-face situation, with computer assistance.	Data collection in a face-to-face interview situation can be managed efficiently with CAPI. CAPI systems can eliminate errors of flow and data consistency, and can thus improve input data quality and reduce the time for data capture and validation.	May be an overly complex solution, which is expensive to implement. CAPI techniques require interviewers with some technical skills and skilled staff to adapt the software to the questionnaire. CAPI requires that interviewers carry costly IT equipment, which can be damaged or stolen during field operations.
Personal interview – telephone	This involves a trained interviewer asking questions of a respondent over the telephone, possibly in a call centre situation.	Although to a lesser extent than the face-to-face personal interview, telephone interviewing allows direct interaction between the interviewer and interviewee. It is a fast and relatively inexpensive way to collect information, since a small number of interviewers from a single call centre can carry out a relatively high number of interviews.	Correct and comprehensive telephone numbers may not be available. Interviews must be relatively short, since a long telephone conversation can be perceived as an annoyance or intrusive. Telephone interviews are not suitable for questionnaires asking for many quantitative variables for which the interviewed person may have to check records.
With computer assisted telephoning interviewing software (CATI)	This involves a trained interviewer asking questions of a respondent over the telephone, with computer assistance.	Data collection in a telephone interview situation can be managed efficiently with CATI. CATI systems can eliminate errors of flow and data consistency, and can thus improve input data quality and reduce the time for data capture and validation.	May be an overly complex solution, which is expensive to implement. CATI techniques require interviewers with some technical skills and skilled staff to adapt the software to the questionnaire.

21 Adapted from table 10 of the Manual for the Production of Statistics on the Information Economy (UNCTAD, 2009).

Data collection method	Details	Main advantages	Main disadvantages
Self-completed questionnaire – mail	The questionnaire is posted to the respondent organization.	The method is relatively inexpensive and allows the respondent to complete the questionnaire at his or her convenience. It eliminates the problem of interviewer bias, though note that interviewer follow-up (e.g. for non-response or inconsistent answers) can potentially introduce bias if not managed properly.	If questionnaires are not properly designed and tested, they can introduce bias to the survey results, which may be difficult to detect. The lack of help from an interviewer can produce information of low quality. It therefore requires clear questions and instructions. Requires separate data entry unless advanced optical character recognition (OCR) tools are available. It usually suffers from relatively high non-response rates, especially where follow-up is limited. Correct and comprehensive addresses may not be available. Delays in mailing back questionnaires can introduce delays in the survey. In developing economies with a low quality postal system, such delays may be prohibitive.
Self-completed questionnaire – Internet-based	This data collection technique will usually involve either: a respondent completing a questionnaire (e.g. a spreadsheet form) and e-mailing it back to the data collection agency, or a respondent completing and submitting a web form on a website. It is likely to be used in conjunction with another method (e.g. mail out questionnaires). For example, forms may be posted and respondents given the option of returning the hardcopy form or going to a website to download or complete an electronic version.	The method may be quick and inexpensive and, as with a postal form, allows the respondent to complete the questionnaire at his or her convenience. Forms may have inbuilt edits, so that potential errors can be addressed by respondents directly. No data entry is required as this is performed by the respondent. For convenience and interest reasons, respondents may be more inclined to complete the questionnaire in an online environment.	Contact needs to be made with the respondent in order to direct them to a website or send them an electronic questionnaire. Therefore, problems with incorrect or incomplete contact details may still exist. Organizations without Internet or e-mail access will not be able to complete the form this way, necessitating at least one other method. Requires skilled staff to develop electronic applications. The security issues inherent to an online environment need to be addressed.

Chapter 6: Question and questionnaire design and content

133. This chapter provides general information on question and questionnaire design. It presents model questions for the core indicators, EG1 to EG7, and related information – such as how questions might be included in a questionnaire, reference dates, notes on respondents, supplementary data requirements and difficult concepts. Finally, the chapter looks at e-government measurement topics apart from the core e-government indicators.

134. There is no known authority on questionnaire design for government units, therefore the information in this chapter is based on broad principles applying to all types of questionnaires, in particular those applying to questionnaires designed for businesses.

General principles of question and questionnaire design

135. Surveys of government units will generally be fairly similar to business surveys in terms of questionnaire design. Information in this section has been taken from several sources, including UNCTAD (2009) and ITU (2009). References are also made to general information on design and testing of business survey questionnaires, including from the United States Census Bureau (2008), the Australian Bureau of Statistics (2010) and chapter 5 of Statistics Canada (2010).

136. It can be very difficult to design a questionnaire that collects high quality data efficiently, whilst encouraging respondent participation. The results of poor questionnaire design can be significant in terms of cost and time, as well as data quality. It is therefore very important that design is undertaken carefully and that sufficient time is allowed for thorough testing of draft questions and questionnaires.

137. The format of questionnaires will vary according to the method of data collection. However, most of the general principles presented here apply to both surveys administered by interviewers and self-enumerated questionnaires. There will be differences of detail between paper-based and electronic surveys. For example, web-based forms:

- Can use links and therefore provide more information while appearing less cluttered
- Enable navigation based on responses
- May differ in font and style.

138. Issues that need to be taken into consideration when designing questionnaires include:

- Maintain respondents' interest and motivation to complete the form by:
  - explaining clearly the objectives of the survey
  - assuring the confidentiality of responses
  - providing sufficient time for respondents to receive, complete and return the questionnaire (if mail-based)
  - avoiding complicated questions.
- Use appropriate language:
  - provide definitions and explanations of technical terms
  - prevent bias due to poor wording of questions
  - avoid the use of acronyms and abbreviations unless they are defined and well understood
  - cater for different official languages to avoid misunderstanding of the language used.
- Have a clear logical flow:

    - use filter questions to lead a respondent to relevant questions and allow respondents to skip irrelevant questions
    - order questions coherently to assist respondents' understanding (for example, by grouping into topics).[22]
- Pay attention to the layout and size of the questionnaire:
    - use separate sections to distinguish topics
    - optimize visual display to aid understanding and usability
    - maintain respondents' cooperation by having a relatively short questionnaire.
- Include good instructions and prompts to interviewers (where used).

139. A vital element of questionnaire design is testing whether questions work in practice. Individual questions and whole questionnaires should be thoroughly tested before use in a survey. Testing should be done with potential respondents to find out whether the questions can be understood and answered accurately and whether respondents have a common understanding of the meaning of the questions.

140. Question and questionnaire testing can be done in up to three stages:

- Pre-testing individual questions or modules of the questionnaire on a small number of respondents (this may occur a number of times). Such testing would generally be qualitative and involve individual potential respondents or focus groups. It might involve asking survey questions and then probing the respondent to ascertain how he or she interpreted the questions and whether the information is readily available for their organization.
- A pilot test of the complete questionnaire involves a larger number of respondents, who are preferably selected to be reasonably representative of the population under investigation. Results of pilot testing can provide information useful for a number of purposes, including planning and budgeting, question effectiveness and the flow of questions.
- A large survey may also involve a final *dress rehearsal* (or *field test*) that tests all aspects of the survey, including procedures. As well as further testing questions and the questionnaire structure, a dress rehearsal can provide valuable information on costs, the adequacy of training and documentation, and the need for fine-tuning of timetables. It is considered unlikely that surveys of government organizations would require a dress rehearsal.

141. Testing of a set of draft questions at an early stage can also assist planning and budgeting as described in chapter 3. For example, testing might indicate that a poor understanding of ICT concepts would require more follow-up and query action to be undertaken by the data collection agency.

142. The question elements of a questionnaire include:

- Actual questions
- Boxes of appropriate size to record responses (for instance, *Yes* and *No* tick boxes)
- Sufficient space to enter numerical data and text information (for example, number of employed persons, URL of main web presence)
- Instructions and definitions relating to each question or group of questions (for example, definitions of terms, instructions on what to include and exclude).

143. A questionnaire also has a number of essential non-question elements. They may include:

- A front page containing information, such as the name and reference period of the survey, the name of the collection agency, a due date for provision of information, how the questionnaire should be submitted (for example, posted back, completed via a web form), information on the purpose of the survey, how respondents can obtain results of the survey, how to obtain assistance with completing the form, space to provide details of the person completing the form

22 As explained below, these may be conflicting and it may not be possible to achieve both.

(for example, phone number, e-mail address, signature) and legal obligations (applying to both the collection agency and respondent agencies). While such information can also be provided on a separate document, such as a covering letter or instruction sheet, it is recommended that as much basic information as possible be included on the questionnaire itself. A covering letter may be useful in conveying information such as requests from the agency head or another authoritative figure to support the survey.

- An identifier for each variant of a questionnaire (for example one for central government and one for state government if the questionnaires differ) may be relevant.
- Information about responding organizations would possibly be printed on each form. This could include unique identifiers and name and address information.
- *Office use only* space might be useful for interviewers, data entry and processing staff to record information.
- General instructions to respondents. These may include instructions on marking boxes (for example, with a tick), type of marking (for example, use black ballpoint pen), how to correct errors (for example, "strikethrough and write the correct answer above the box").
- Feedback information designed to measure respondent burden (for example, by asking how much time it took to complete the form) and capture information on data provided and problems encountered.
- If optical character recognition (OCR), intelligent character recognition (ICR) or optical mark reading (OMR) software are used to convert responses on a paper questionnaire to a computer record, there may be need for additional information on the form (such as a page identifier) or a particular style of layout.

Model questions

144. The boxes below show each of the core indicators with its model question(s), definitions of terms used in the question, reference date and method of data collection. The model questions should be translated into local languages and adapted for other conditions, such as cultural norms. However, in order to respect international comparability, care must be taken that translations do not alter the meaning of the questions or inherent logic of questionnaires used.

145. Countries may wish to vary aspects of the questions, for example, splitting size categories. This is acceptable if data can be re-aggregated to conform to the standards in this manual.

EG1: Proportion of persons employed in central government organizations routinely using computers

Suggested model questions:

How many persons were employed in this organization at <reference date>? ____

Optional extension:

How many of these were female? ____

How many of these were male? ____

How many persons employed in this organization routinely used a computer at work (for work purposes) as at <reference date>? ____

Optional extension:

How many of these were female? ____

How many of these were male? ____

Definitions of terms:

A *computer* refers to a desktop or a laptop computer. It does not include equipment with some embedded computing abilities such as mobile cellular phones, PDAs or TV sets (Partnership, 2010).

Persons employed refer to all persons working for the specified government organization, not only those working in clerical jobs. They include part-time, short-term and casual employees (Partnership, 2010). They exclude workers supplied to the organization by other organizations (Eurostat, 2011).

Routinely refers to at least once a week (Partnership, 2010).

Use can be at the organization's premises or elsewhere (e.g. home) but refers to use for work purposes.

Reference date:

The *reference date* for these questions could be at the end of a calendar year or quarter. It could also be the day the survey was completed and therefore could differ slightly between organizations.

Method of data collection:

Data may be collected by statistical surveys of central government organizations, or other methods, such as compilation from ministries' administrative records, where these are suitable.

EG2: Proportion of persons employed in central government organizations routinely using the Internet

Suggested model questions:

How many persons were employed in this organization at <reference date>? ____

Optional extension:

How many of these were female? ____

How many of these were male? ____

How many persons employed in this organization routinely used the Internet at work (for work purposes) as at <reference date>? ____

Optional extension:

How many of these were female? ____

How many of these were male? ____

Definitions of terms:

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, irrespective of the device used (not assumed to be only via a computer – it may also be by mobile phone, PDA, game machine, digital TV or other device). Internet access can be via a fixed or wireless network (Partnership, 2010).

Persons employed refer to all persons working for the specified government organization, not only those working in clerical jobs. They include part-time, short-term and casual employees (Partnership, 2010). They exclude workers supplied to the organization by other organizations (Eurostat, 2011).

Routinely refers to at least once a week (Partnership, 2010).

Use can be at the organization's premises or elsewhere (e.g. home) but refers to use for work purposes.

Reference date:

The *reference date* for these questions could be at the end of a calendar year or quarter. It could also be the day the survey was completed and therefore could differ slightly between organizations.

Method of data collection:

Data may be collected by statistical surveys of central government organizations, or other methods, such as compilation from ministries' administrative records, where these are suitable.

EG3: Proportion of central government organizations with a local area network (LAN)

Suggested model question:

Did this organization have a local area network (LAN) as at <reference date>? Yes ☐ No ☐

Definitions of terms:

A *LAN* refers to a network connecting computers within a localized area such as a single building, department or site; it may be wireless (Partnership, 2010).

Reference date:

The *reference date* for these questions could be at the end of a calendar year or quarter. It could also be the day the survey was completed and therefore could differ slightly between organizations.

Method of data collection:

Data may be collected by statistical surveys of central government organizations, or other methods, such as compilation from ministries' administrative records, where these are suitable.

EG4: Proportion of central government organizations with an intranet

Suggested model question:

Did this organization have an intranet as at <reference date>? Yes ☐ No ☐

Definitions of terms:

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 (Partnership, 2010).

Reference date:

The *reference date* for these questions could be at the end of a calendar year or quarter. It could also be the day the survey was completed and therefore could differ slightly between organizations.

Method of data collection:

Data may be collected by statistical surveys of central government organizations, or other methods, such as compilation from ministries' administrative records, where these are suitable.

EG5: Proportion of central government organizations with Internet access, by type of access

Suggested model question:

Did this organization have Internet access as at <reference date>? Yes ☐ No ☐

If *Yes*:

Did this organization have narrowband Internet access as at <reference date>? Yes ☐ No ☐

Did this organization have fixed (wired) broadband Internet access as at <reference date>? Yes ☐ No ☐

Did this organization have wireless broadband Internet access as at <reference date>? Yes ☐ No ☐

Definitions of terms:

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 (Partnership, 2010).

Narrowband includes analogue modem (dial-up via standard phone line), ISDN, DSL at advertised download speeds below 256 kbit/s, and mobile phone and other forms of access with an advertised download speed of less than 256 kbit/s. Narrowband mobile phone access services include CDMA 1x (Release 0), GPRS, WAP and i-mode (ITU, 2011).

Fixed (wired) broadband refers to fixed (wired) technologies at advertised download speeds of at least 256 kbit/s, such as DSL, cable modem, high speed leased lines, fibre-to-the-home/building, powerline and other fixed (wired) broadband. It excludes wireless broadband services as defined below (ITU, 2011).

Wireless broadband refers to wireless technologies at advertised download speeds of at least 256 kbit/s, such as satellite broadband, terrestrial fixed wireless (including WiMax) and broadband access via mobile broadband networks (ITU, 2011).

Internet access can be via any device (mobile cellular phone, laptop, PDA, etc.). The Internet connection(s) should be functional, that is, any equipment, software or services needed should be in working condition. Access can be via a fixed or wireless network (Partnership, 2010).

Reference date:

The *reference date* for these questions could be at the end of a calendar year or quarter. It could also be the day the survey was completed and therefore could differ slightly between organizations.

Method of data collection:

Data may be collected by statistical surveys of central government organizations, or other methods, such as compilation from ministries' administrative records, where these are suitable. In a survey, the questionnaire should include an instruction for the respondent to consult their information technology area (or equivalent) if unsure about the meaning of the definitions.

EG6: Proportion of central government organizations with a web presence

Suggested model question:

Did this organization have a web presence as at <reference date>?

Yes ☐ Provide the web address (URL) of this organization's main web presence: _____

No ☐

Definitions of terms:

A *web presence* includes a website, homepage or presence on another entity's website (including a related organization). It excludes inclusion in an online directory and any other web pages where the organization does not have control over the content of the page (Partnership, 2010). A web presence includes social media pages and accounts (e.g. Facebook, YouTube and Twitter) if the organization has control over content.

Reference date:

The *reference date* for these questions could be at the end of a calendar year or quarter. It could also be the day the survey was completed and therefore could differ slightly between organizations.

Method of data collection:

Data may be collected by statistical surveys of central government organizations, or other methods, such as compilation from ministries' administrative records, where these are suitable.

EG7: Selected Internet-based services available to citizens, by level of sophistication of service

Model question for EG7 (population proforma for main indicator):

Indicate below the percentage of citizens theoretically able to access the following Internet-based services offered by each level of government in your country as at <reference date>. The indicator is expressed in terms of the percentage of a country's citizens who are theoretically able to access each Internet-based service. Note that this does not refer to whether a citizen has the equipment or knowledge necessary to access those services, whether he or she needs to access those services nor whether he or she directly benefits (e.g. most of the services are not relevant to children but they are assumed to indirectly benefit if their parent or guardian accesses services electronically).

Internet-based services for citizens (Note that this list is a minimal list of services for comparison purposes. Countries may wish to add other services to the list.)	**Central/federal government, percentage of citizens**		**State/provincial governments, percentage of citizens** ☐ Tick if this level of government does not exist		**All central and state governments, percentage of citizens**	
	Who can (in theory)	For whom not relevant	Who can (in theory)	For whom not relevant	Who can (in theory)	For whom not relevant
Level 1: Obtain information from publicly accessible websites necessary to:						
Enrol to vote for the first time in government elections.	____%	____%	____%	____%	____%	____%
Complete and lodge personal income tax return, least complex situation.	____%	____%	____%	____%	____%	____%
Obtain unemployment income benefits, least complex situation.	____%	____%	____%	____%	____%	____%
Obtain child support allowance, least complex situation.	____%	____%	____%	____%	____%	____%
Renew an international passport, least complex situation.	____%	____%	____%	____%	____%	____%
Renew a driver's licence, least complex situation.	____%	____%	____%	____%	____%	____%
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.	____%	____%	____%	____%	____%	____%
Obtain a copy of a birth certificate for self.	____%	____%	____%	____%	____%	____%
Obtain a copy of a marriage certificate for self.	____%	____%	____%	____%	____%	____%
Renew registration for a motor vehicle, least complex situation.	____%	____%	____%	____%	____%	____%

EG7: Selected Internet-based services available to citizens, by level of sophistication of service

Internet-based services for citizens	**Central/federal government, percentage of citizens**		**State/provincial governments, percentage of citizens** ☐ Tick if this level of government does not exist		**All central and state governments, percentage of citizens**	
	Who can (in theory)	For whom not relevant	Who can (in theory)	For whom not relevant	Who can (in theory)	For whom not relevant
Level 2: Request printed forms or download forms (e.g. in pdf format) from publicly accessible websites necessary to:						
Enrol to vote for the first time in government elections.	____%	____%	____%	____%	____%	____%
Complete and lodge personal income tax return, least complex situation.	____%	____%	____%	____%	____%	____%
Obtain unemployment income benefits, least complex situation.	____%	____%	____%	____%	____%	____%
Obtain child support allowance, least complex situation.	____%	____%	____%	____%	____%	____%
Renew an international passport, least complex situation.	____%	____%	____%	____%	____%	____%
Renew a driver's licence, least complex situation.	____%	____%	____%	____%	____%	____%
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.	____%	____%	____%	____%	____%	____%
Obtain a copy of a birth certificate for self.	____%	____%	____%	____%	____%	____%
Obtain a copy of a marriage certificate for self.	____%	____%	____%	____%	____%	____%
Renew registration for a motor vehicle, least complex situation.	____%	____%	____%	____%	____%	____%
Level 3: Fill in online forms available on (or via) publicly accessible websites necessary to:						
Enrol to vote for the first time in government elections.	____%	____%	____%	____%	____%	____%
Complete and lodge personal income tax return, least complex situation.	____%	____%	____%	____%	____%	____%
Obtain unemployment income benefits, least complex situation.	____%	____%	____%	____%	____%	____%
Obtain child support allowance, least complex situation.	____%	____%	____%	____%	____%	____%

EG7: Selected Internet-based services available to citizens, by level of sophistication of service

Renew an international passport, least complex situation.	____%	____%	____%	____%	____%	____%
Renew a driver's licence, least complex situation.	____%	____%	____%	____%	____%	____%
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.	____%	____%	____%	____%	____%	____%
Obtain a copy of a birth certificate for self.	____%	____%	____%	____%	____%	____%
Obtain a copy of a marriage certificate for self.	____%	____%	____%	____%	____%	____%
Renew registration for a motor vehicle, least complex situation.	____%	____%	____%	____%	____%	____%

Internet-based services for citizens	**Central/federal government, percentage of citizens**		**State/provincial governments, percentage of citizens** ☐ Tick if this level of government does not exist		**All central and state governments, percentage of citizens**	
	Who can (in theory)	For whom not relevant	Who can (in theory)	For whom not relevant	Who can (in theory)	For whom not relevant
Level 4: Undertake the complete process, via publicly accessible websites, to:						
Enrol to vote for the first time in government elections.	____%	____%	____%	____%	____%	____%
Complete and lodge personal income tax return, least complex situation.	____%	____%	____%	____%	____%	____%
Obtain unemployment income benefits, least complex situation.	____%	____%	____%	____%	____%	____%
Obtain child support allowance, least complex situation.	____%	____%	____%	____%	____%	____%
Renew a driver's licence, least complex situation.	____%	____%	____%	____%	____%	____%
Renew registration for a motor vehicle, least complex situation.	____%	____%	____%	____%	____%	____%

EG7: Selected Internet-based services available to citizens, by level of sophistication of service

Model question for EG7 (jurisdiction proforma for supplementary indicator):

For each central and state government jurisdiction, indicate whether citizens were theoretically able to access the following Internet-based government services as at <reference date>. Note that this does not refer to whether a citizen has the equipment or knowledge necessary to access those services, whether he or she needs to access those services nor whether he or she directly benefits (e.g. most of the services are not relevant to children but they are assumed to indirectly benefit if their parent or guardian accesses services electronically).

For space reasons, only two jurisdictions are shown in the question. Please append additional columns for extra jurisdictions.

Internet-based services for citizens	**Name of jurisdiction 1** _____	**Name of jurisdiction 2** _____
Population (million)		
Level 1: Can citizens obtain information from publicly accessible websites necessary to:		
Enrol to vote for the first time in government elections.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Complete and lodge personal income tax return, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Obtain unemployment income benefits, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Obtain child support allowance, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Renew an international passport, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Renew a driver's licence, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Obtain a copy of a birth certificate for self.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Obtain a copy of a marriage certificate for self.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Renew registration for a motor vehicle, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐

EG7: Selected Internet-based services available to citizens, by level of sophistication of service

Internet-based services for citizens	Jurisdiction 1	Jurisdiction 2
Population (million)		
Level 2: Can citizens request printed forms or download forms (e.g. in pdf format) from publicly accessible websites necessary to:		
Enrol to vote for the first time in government elections.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Complete and lodge personal income tax return, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Obtain unemployment income benefits, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Obtain child support allowance, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Renew an international passport, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Renew a driver's licence, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Obtain a copy of a birth certificate for self.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Obtain a copy of a marriage certificate for self.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Renew registration for a motor vehicle, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Level 3: Can citizens fill in online forms available on (or via) publicly accessible websites necessary to:		
Enrol to vote for the first time in government elections.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Complete and lodge personal income tax return, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Obtain unemployment income benefits, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Obtain child support allowance, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Renew an international passport, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Renew a driver's licence, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Obtain a copy of a birth certificate for self.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Obtain a copy of a marriage certificate for self.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Renew registration for a motor vehicle, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐

EG7: Selected Internet-based services available to citizens, by level of sophistication of service

Level 4:Can citizens undertake the complete process, via publicly accessible websites, to:		
Enrol to vote for the first time in government elections.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Complete and lodge personal income tax return, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Obtain unemployment income benefits, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Obtain child support allowance, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Renew a driver's licence, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐
Renew registration for a motor vehicle, least complex situation.	Yes ☐ No ☐ Not relevant ☐	Yes ☐ No ☐ Not relevant ☐

Definitions of terms:

Internet-based services, for the purposes of this indicator, refer to services that are accessible via a publicly available website. They include situations where an application is downloaded from a website and used on an individual's computer. Such a process may also involve lodgement via the Internet. Where listed Internet-based services have been outsourced by general government to non-government providers, they should be attributed to the level of government (central or state/provincial) that outsourced the service. Where they are undertaken by public corporations, they should be attributed to the level of government that controls the corporation. Where services are offered by non-government providers (but not as an outsourced service), they are excluded from scope and should be marked as *Not relevant*.

Publicly accessible websites may require an individual to register as a user and obtain a logon ID, a password and (or) other forms of security. This includes providing a reference or account number (or equivalent) in order to access the service.

Percentage of citizens refers to the percentage of the population theoretically able to access each Internet-based service. The population data are used to weight responses and thus ascertain the significance of each service at a national level. As an example, if three state governments in a country offer information on their website on how to enrol to vote in state government elections but two others do not, then the *Percentage of citizens* under *State/provincial government* at Level 1 *Enrol to vote for the first time in government elections* would refer to the percentage of the country's citizens who reside in those three states.

For central government, it is expected that the *percentage of citizens* will usually be either 100 per cent or zero. However, there will be situations where a central government service is not theoretically available to all citizens of the jurisdiction, for example, where services are regionally based. This situation may also apply to state/provincial governments. While the population proforma caters for this situation (by showing *Percentage of citizens for whom not relevant*), countries may wish to amend the jurisdiction proforma question to indicate the percentage of citizens in jurisdictions for which the service is *Not relevant*. This can also be done by creating appropriately labelled *dummy* jurisdictions. If the situation only affects a relatively small number of citizens, it is probably simpler to ignore the regional service and describe the situation in the statistical standards statement.

Not relevant means that the service (whether undertaken online or offline) is not relevant for that particular level of government. For example, where the central government has no involvement in motor vehicle registration, *Not relevant,* under *Central/federal government* is the appropriate response for all service levels (1 to 4) involving registering a motor vehicle. For some countries and some services, *Not relevant* may be an appropriate response for both levels of government.

EG7: Selected Internet-based services available to citizens, by level of sophistication of service

The distinction between *Not relevant* and *No* may be difficult to make and some examples might help. If none of a country's jurisdictions provides unemployment benefits to its citizens, then *Not relevant* applies to both levels of government and 100 per cent of citizens for all services at all levels. However, if all of the country's state/provincial governments provide unemployment benefits, but none offer Internet-based services for obtaining unemployment benefits, then the appropriate response for state/provincial governments is 0 per cent (population proforma) and *No* (jurisdiction proforma). If a country only posts forms for driver licence renewal to citizens, then the absence of downloadable versions of those forms on the website would score *Not relevant*, rather than *No*. If a form can only be completed online, then the absence of a downloadable version is *Not relevant* rather than *No* because a separate hardcopy version does not exist.

Least complex situation refers to the simplest standard procedure in the country. For example, for motor vehicle registration renewal, the simplest procedure might be renewal of a relatively new, privately registered vehicle already located in the jurisdiction. For some countries, it might be easier to identify Internet-based services for a common, but not necessarily simple, situation than for the least complex situation. In this case, countries could report on the common situation and describe it in accompanying metadata.

The results of this indicator show the level of sophistication of Internet-based e-government for the selected services. Sophistication levels are defined according to the following model:

Level 1 – involves no interaction and is limited to obtaining relevant information from publicly available websites.

Level 2 – one-way interaction, involving simple requests from the user to send printed forms or allowing users to download forms (e.g. in pdf format) to be printed by the user and completed offline.

Level 3 – reflects more complex website facilities, for example, a facility enabling users to fill in forms online or an application downloadable from a website. Information from the form may be processed automatically, thus potentially providing efficiency benefits for the government agency.

Level 4 – reflects relatively complex website facilities and information processing applications, and enables a complete process (e.g. an application and its outcome) to be carried out via a publicly available website. This could include downloading of applications, completion, delivery and payment (from, or to, the user). Level 4 may be described as *full electronic case handling*.

Reference date:

The *reference date* for these questions could be at the end of a calendar year or quarter, though it is more likely to be the date the research was carried out (e.g. a period as shown in example 7 in annex 3).

Method of data collection:

Data are likely to be collected by countries using available information and (or) by searches of relevant websites for each jurisdiction. Two data collection approaches are possible. The first provides a model question as a *population proforma* to be completed at the country level, for example, by a national expert. It is not like the model questions for EG1 to EG6, which are suitable for inclusion on surveys of individual government organizations.

Some countries may prefer to complete the questionnaire for jurisdictions (e.g. state governments) or send it to those jurisdictions to complete. In this case, information for each jurisdiction is included in the second version of the model question (*jurisdiction proforma*). The national expert or compiling agency would then aggregate the information, using jurisdiction-level total population data, and complete the question. Example 6 in annex 3 illustrates completion at the jurisdiction level, showing the population data needed for compiling the main indicator.

Presentation of the model questions in a questionnaire

146. It is possible to order the model questions for EG1 to EG6 in various ways. Two possible orderings are presented here but they are not mutually exclusive. For example, where a large number of questions is included in the survey, a topic ordering may be used, with filter questions at the start of each topic to determine whether that topic is relevant to the responding organization.

By topic

147. Questions necessary to compile the core indicators EG1 to EG6 could be ordered by broad topic as follows:

- Routine use of ICT (computers and the Internet) by persons employed – corresponding to core indicators EG1 and EG2
- Availability of ICT (LAN, intranet, Internet access) to government organizations – corresponding to core indicators EG3, EG4 and EG5
- Web presence by government organizations – corresponding to core indicator EG6
- Additional information required to compile the indicators – employment (preferably split by gender).

Logical order using filter questions to stream responses

148. An alternative to a topic ordering of the questions for EG1 to EG6 is a logical order using a filter question as shown in box 8.

149. The model questions are reasonably independent and therefore the opportunity to use filter questions is limited. For example, while EG1 and EG2 are likely to be related, Internet use without computer access is becoming increasingly common, therefore, respondents should be given the opportunity to answer both of the model questions relating to these indicators. However, EG2 is linked to EG5 (Internet access), so countries may decide that organizations without Internet access do not need to answer the question on employees' use of the Internet. Responses to model questions for EG3, EG4 and EG5 are also likely to be related but it is recommended that respondents should be asked all the model questions relating to these indicators, with no filtering.

150. Box 8 shows the model questions in a logical order, with a filter question for Internet access.

Box 8: Logical sequence of model questions

Question 1: How many persons were employed in this organization at <reference date>? ____
Question 2: How many persons employed in this organization routinely used a computer at work (for work purposes) as at <reference date>? ____
Question 3: Did this organization have Internet access as at <reference date>?
Yes ☐ Go to question 4
No ☐ Go to question 8
Question 4: Did this organization have narrowband Internet access as at <reference date>?
Yes ☐ No ☐
Question 5: Did this organization have fixed (wired) broadband Internet access as at <reference date>?
Yes ☐ No ☐
Question 6: Did this organization have wireless broadband Internet access as at <reference date>?
Yes ☐ No ☐
Question 7: How many persons employed in this organization routinely used the Internet at work (for work purposes) as at <reference date>? ____
Question 8: Did this organization have a web presence as at <reference date>?
Yes ☐ Please give the web address (URL) of this organization's main web presence: _____
No ☐
Question 9: Did this organization have a local area network (LAN) as at <reference date>?
Yes ☐ No ☐
Question 10: Did this organization have an intranet as at <reference date>?
Yes ☐ No ☐

Notes:

Question 1. The optional extension questions on gender are not included in this example. See model questions for EG1 and EG2 for the wording of the extension questions.

Question 3 is a filter question. It enables respondents without Internet access to skip questions 4 to 7. Countries may not wish to skip question 7 where it is common for employees to use the Internet at home or elsewhere for work purposes, in the absence of their employer organization having Internet access.

Question 7. In a topic-related approach to ordering, the placement of this question would follow question 2 because the questions on persons employed are related. The placement in this example illustrates the use of question 3 as a filter question.

Question 8. While organizations without Internet access are less likely to have a web presence, the definition of the latter is sufficiently broad to warrant asking them the question on web presence.

Reference dates

151. All the model questions are asked in respect of a reference date. Ideally, countries would use the same reference date to enhance comparability but this is not generally likely to be feasible. Therefore, reference dates are left up to countries to determine. They could be at the end of a calendar year or quarter. A convenient reference date is the day the survey is completed, though for dissemination purposes a single date or period would be identified. Small differences in reference dates between organizations in the same survey are unlikely to cause bias.

Who are the respondents?

152. The term *respondent*s in this manual refers to the person (or persons) responsible for completing questionnaires or otherwise assembling information. This manual does not specify a particular type of respondent (for example, chief information officer) as such roles will differ between countries. However, the person completing the form should have sufficient knowledge of the ICT environment of the organization to provide a correct response.

153. Respondents should be encouraged to seek information from others in the organization where this is necessary.

Supplementary data requirements

154. Where data are collected by a survey, that survey should also collect data on the number of persons employed (on a head count basis by gender, if possible) at the reference date. This is required for size classification, to derive indicators EG1 and EG2, and to derive employment-weighted indicators for EG3 to EG6. *Persons employed* refers to all persons working for the government organization, not only those working in clerical jobs. They include part-time, short-term and casual employees but exclude workers supplied to the organization by other organizations. Suitable questions have been included in the model questions for EG1 and EG2; these are:

How many persons were employed in this organization at <reference date>? ____
How many of these were female? ____
How many of these were male? ____

Concepts that may be difficult to understand

155. It is generally considered that ICT concepts may be difficult for respondents (and some data users) to understand. The model questions include quite detailed definitions and explanations and these must be included on survey material (for example, on questionnaires or separate instructions). While there are benefits of including definitions with the questions they relate to, this can lead to a cluttered questionnaire that may deter respondents.

156. For indicator EG5, *Proportion of central government organizations with Internet access, by type of access*, it might be helpful to include the names of commonly used access services in the instructions.

157. Understanding of difficult concepts and methods of presenting definitions etc. should be tested during the form design process.

Measurement topics apart from the core e-government indicators

158. Questions additional to those required to construct the core indicators are likely to be included in country surveys. These will be determined by national priorities, including commonality with other countries, including those of the region.

159. A glance at annex 1 shows a lot of diversity (and some commonality) in the topics collected in countries' e-government surveys. The publication, *Regional Proposal for Core Indicators on e-Government: Methodological Guidelines*, prepared by the Observatory for the Information Society in Latin America and the Caribbean (OSILAC, 2010), also includes a number of additional e-government indicators that could be collected.[23]

160. Table 5 presents a list of selected additional topics, with some examples and comments on statistical issues. For more detail, readers are referred to documentation on individual surveys (shown in annex 1) and OSILAC (2010).

23 Note that the Observatory for the Information Society in Latin America and the Caribbean list is based on an earlier version of the e-government core indicators.

Table 5: E-government topics apart from the core indicators

Topic	Examples	Statistical issues
ICT expenditure (operating or capital – or both).	OSILAC extended core indicator EEG11 is Percentage of expenditure on ICT per total expenditure of government institutions. Country examples (see annex 1): Australia, Brazil, Denmark, Finland, New Zealand, Nigeria, Norway and Sri Lanka.	Definition of ICT and the distinction between operating and capital expenditure. For capital expenditure, whether own account software development is included as an ICT asset.
ICT employees.	OSILAC extended core indicator EEG12 is Percentage of ICT persons employed or subcontracted ICT personnel in government institutions. Country examples (see annex 1): Australia, Finland, Morocco, New Zealand, Nigeria and Sri Lanka.	Definition of ICT employees and distinction between ICT employees and contract staff. If information is sought about ICT employees, it should also be collected in respect of ICT contract staff.
ICT qualifications and skills of employees.	OSILAC extended core indicator EEG13 is Percentage of persons employed in government institutions with computer skills, EEG14 is Percentage of persons employed in government institutions with abilities in the Internet use. Associated with EEG13 is a list of ICT activities e.g. can use a mouse. EEG14 also has a list of activities e.g. Can send e-mail with attachments. Country examples (see annex 1): Norway, Oman and Sri Lanka.	One difficulty with this indicator is that the information on employee qualifications and skills is unlikely to be available to the respondent completing the form. A survey of staff is likely to be useful.
ICT training offered to, employees or personnel handling.	OSILAC extended core indicator EEG15 is Percentage of government institutions that offer ICT training to their persons employed and EEG16 is Percentage of the ICT budget spent on institutional ICT training. Country examples (see annex 1): Brazil, New Zealand and Sri Lanka.	ICT training would need to be scoped and defined, for instance, whether it includes on-the-job training, which is very difficult to measure.
Organizational use of ICTs not included in the core indicators, including extranets, bar-coding, electronic business processes, VoIP,[d] RFID,[e] video conferencing, mobile phones, open source software, servers.	OSILAC extended core indicator EEG17 is Percentage of government institutions using open source software as an operative system. Country examples (see annex 1): Australia, Brazil, Canada, the Czech Republic, Denmark, Egypt, Morocco, New Zealand, Norway and Oman.	Definitions of technologies.
Website features e.g. online payment, FAQ.	Country examples (see annex 1): Brazil, Canada, the Czech Republic, Denmark and Norway.	Definitions of features.
Use of the Internet for operations, for example, purchasing and selling, communicating.	Country examples (see annex 1): Australia, Canada, the Czech Republic, Denmark, Egypt, Nigeria, Norway and the Russian Federation.	Definitions of activities and applications. Distinguishing Internet from non-Internet, for example, in e-commerce.
ICT security incidents, precautions or plans.	Country examples (see annex 1): Brazil, the Czech Republic, Denmark, Morocco, New Zealand, Nigeria, Norway, Finland and Sri Lanka.	Technical definitions of security incidents and precautions. Given how numerous security incidents have become, a measure of intensity (e.g. the impact of incidents) is more useful than simply whether incidents of certain types occurred.

d VoIP: voice over Internet protocol.
e RFID: radio frequency identification.

Chapter 7. Survey design

161. This chapter explores survey design, with a focus on sample surveys of government units, as these are likely to be the most complex option for a data source. As mentioned earlier, surveys of government organizations are likely to be similar to business surveys in most respects. In fact, at least one country – Canada – uses the same survey questionnaire to measure ICT usage by businesses and government organizations.

162. For this reason, information on business survey design is referred to in the chapter, with inputs from the Australian Bureau of Statistics (ABS) (2012b), Eurostat (2011), Statistics Canada (2010) and UNCTAD (2009). However, specific issues relating to government organizations are also explored, with statistical units and construction of survey frames predominant amongst these.

Statistical units

163. In order to conduct a survey[24] of government organizations, statistical units need to be defined. A statistical unit is the entity in respect of which statistics are compiled and a *reporting unit* is the entity from which the statistics are collected. The statistical unit and the reporting unit are often the same unit, but where they are different, one reporting unit may provide information for several statistical units. A statistical unit may also be an artefact that is constructed by a statistical agency on some basis (for example, homogeneity of functions).

164. Government statistical units were defined in chapter 4 – Statistical standards. To recap, the central government statistical unit specified in this manual has the following characteristics:

- It may be a single institutional unit, for example, an agency of central government that maintains full sets of accounts, and has a separate legal identity and substantial autonomy. However, this level will often be too broad to be useful for our purposes.
- It may be at the next level down from the single (whole-of-government) institutional unit, for example, a department or ministry of central government, a branch office or an agency of central government. This may provide the level of detail necessary to collect data on 'proportion of government organizations with ICT'.
- The unit chosen may be analogous to the kind-of-activity units (KAU) defined by the 2008 SNA: "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."
- While the KAU 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"), the appropriate unit may be a site or establishment, in cases where this is the next level down from the parent institutional unit.
- *Excluded establishments* include individual establishments (unless the next level down from the parent institutional unit) such as schools, hospitals, health centres, police stations and post offices.

165. Statistical units also need to be defined for the other levels of government – state and local – where the scope of a country's survey extends to these levels of government for EG1 to EG6.

24 Noting that a survey may be a sample or a census or a combination of the two (where part of the population is sampled and the rest is completely enumerated).

166. According to the 2008 SNA, the state government subsector consists of state governments that are separate institutional units plus those non-market NPIs that are controlled by state governments. State government units are defined as follows:

> … institutional units whose fiscal, legislative and executive authority extends only over the individual 'states' into which the country as a whole may be divided. Such 'states' may be described by different terms in different countries. In some countries, especially small countries, individual states and state governments may not exist. However, in large countries, especially those that have federal constitutions, considerable powers and responsibilities may be assigned to state governments.

167. The 2008 SNA defines the local government subsector as consisting of local governments that are separate institutional units plus those non-market NPIs that are controlled by local governments. Local government units are defined by the 2008 SNA as "institutional units whose fiscal, legislative and executive authority extends over the smallest geographical areas distinguished for administrative and political purposes."

168. Where more than one level of government exists between central and local government, the 2008 SNA specifies that these should be included with the level of government (state or local) with which they are most closely associated.

169. Where state government is in scope for indicators EG1 to EG6, units can be defined using similar principles applying to central government units. Local government units, if in scope, are likely to be simpler to define as they tend to be more homogeneous (and more numerous) than state and central government units.

The units comparability issue

170. Indicators of the type 'proportion of government organizations with ICT' are affected by difficulties with comparison of units.[25] In this manual, those challenges have been labelled as the *units comparability issue*, which is discussed in chapter 4.

171. The statistical unit recommended in this manual has been contrived to reduce the units comparability issue and thereby maximize comparability. However, the definition may be difficult to apply in practice for several reasons, including its interpretation and the identification of units complying with the definition.

172. The uncertainty around the definition makes it even more important that output for EG3 to EG6 is weighted and classified by employment size. This is discussed in more detail in chapter 4.

Scope and target population

173. The scope of government units for the purposes of the core indicators was discussed in chapter 4. However, scope is mentioned again here because of its role in survey design and its relationship to target populations, survey frames and coverage. Scope is a broader concept than units and may cover factors such as time frame and geography. However, neither of these is likely to be a major issue for the e-government indicators and so will not be considered further.

174. The survey scope defines the target population. Both refer to the statistical units that are ideally represented by the survey and for which data are to be collected and tabulated.

25 This is true of any indicator of the form 'proportion of entities with <a characteristic>' if units are not comparable across countries. At the national level, the problem can affect regional and time series comparisons.

Survey frames

175. The survey frame (also known as a *population frame* or a *sampling frame*) is a list from which statistical units (or possibly reporting units) of a survey are selected. The survey frame should represent the target population as closely as possible and should have the following characteristics:

- Completeness – it should be as complete as possible with respect to coverage of the target population.
- Currency – it should be as up-to-date as possible.
- Accuracy – information on the frame records should be as accurate as possible.
- Supplementary data – the frame records should include data that will assist in sample design if needed, for example, number of employees.
- Contact information – such as a physical or e-mail address – so that a respondent can be identified and contacted.

176. Sources for survey frame information for surveys of government organizations include:

- A country's business register. Business registers are generally established and maintained by NSOs and are based on information sources such as tax registers, the results of ongoing *unit surveys* or feedback from sector censuses. Business registers are often organized by industry (ISIC or an equivalent national industrial classification).
- Other registers. These may include listings of government units such as government directories (see example 2 for possible sources).
- A combination of sources. For example, information from the business register might be refined using government directories, and possibly unit surveys.

Business registers as a source

177. Unfortunately, it is usually difficult and costly for a country to maintain a reliable business register. Deficiencies often include: missing entries; duplicate entries; out of date entries (for example, inclusion of entities that no longer exist); missing or incorrect information on size and industry; and inadequate institutional sector information (for example, distinguishing general government entities from public corporations).

178. ISIC, and its country equivalents, refer to activities, not types of units, and therefore cannot be used alone to determine government units. Some of the activities of government will be outside the ISIC section, *Public administration and defence; compulsory social security*, 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 (or provincial) government will likely have more limited central government functions).

179. Nevertheless, countries using a business register (or other survey frame) with industry information as a frame for surveys of government organizations, should ensure that they have covered all the central government units classified to ISIC Section O: *Public administration and defence; compulsory social security*. It will be useful also to check entities classified to other likely 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*.

180. Where countries' business registers (or equivalent registers of government units) have only institutional government units and where these are very high-level 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 its subunits (for example, departments or ministries, branch offices and

agencies, but not excluded establishments such as schools, hospitals, health centres, police stations and post offices).

Coverage

181. Coverage is the degree to which the target population units exist on the survey frame (and are therefore able to be represented in the survey). Once the required scope is determined, alternative survey frames can be investigated to identify sources that provide the best (most complete, up-to-date and accurate) coverage of the government organizations that are within the scope of the survey.

182. Undercoverage occurs where in-scope units are missing from the frame and are therefore not able to be included in the survey (whether it is a census or sample survey). Undercoverage can be a major source of bias in survey results. Overcoverage, for instance, arising from duplication of entities or the inclusion of entities that no longer exist, may also be a problem for surveys of government organizations. Both undercoverage and overcoverage can also affect expansion factors in the case of samples of units, as the factors are based on information on the frame.

Example 2: Central government organizations in Australia

The broad structure of central government in Australia includes the Governor-General, parliamentary bodies, courts and portfolio bodies. The 2009 *List of Australian Government Bodies and Governance Relationships* lists 932 Australian Government (i.e. central government) bodies.

The *A–Z list of Australian Government Departments and Agencies* and the *A-Z List of Australian Government Councils, Committees & Boards* show the great diversity of central government organizations in Australia. They include advisory groups, agencies, authorities, boards, bureaus, commissions, committees, corporations, councils, courts, departments, facilities, foundations, institutes, offices, panels, reference groups, research centres, secretariats, services, tribunals, trusts, as well as a number that have no particular title. Public corporations are also included in the list.

Each organization is subsidiary to an Australian government portfolio, which has an Australian government department and associated portfolio bodies (including committees, boards and councils). As an example, in 2009, the Portfolio of Education, Employment and Workplace Relations had 47 portfolio bodies, including the Department of Education, Employment and Workplace Relations, three ministerial councils, five joint bodies with state governments, seven advisory bodies, 10 departmental bodies recognized in legislation (e.g. statutory authorities), seven prescribed agencies under the *Financial Management and Accountability* (FMA) *Act*, four Commonwealth authorities under the *Commonwealth Authorities and Companies* (CAC) *Act*, two Commonwealth companies under the *CAC Act*, seven other companies and one other entity.

Source: *Australian Government Directory*, see http://www.directory.gov.au/directory (2012) and Department of Finance and Deregulation (2009 and 2011).

Sample design and selection

Sample survey or census of government organizations?

183. While this chapter focuses on sample surveys[26] of government organizations, it should be noted that the agencies surveying central government appear to mainly collect data from all units, that is, they conduct a census (or *complete enumeration*) of government organizations. Annex 1 and table 6 illustrate

26 Sampling is described by Statistics Canada (2010) as "a means of selecting a subset of units from a population for the purpose of collecting information for those units to draw inferences about the population as a whole."

this trend. Where the scope is extended to state government, a census may also be appropriate (for example, see Australia in annex 1). However, where local government is included in the scope, it is likely that sampling of local government units would be involved, as these tend to be more numerous (see example 3 for an illustration).

Example 3: The structure of government in the United States of America

The United States of America conducts a census of government every five years. The results for 2002 showed that the vast majority of governments were local. At 30 June 2002, there were 87,900 government units in the United States. These included the federal government (1 unit), 50 state governments and 87,849 units of local governments.

Of the local government units, 38,971 were general purpose local governments, 3,034 county governments and 35,937 subcounty governments, including 19,431 municipal governments and 16,506 township governments. The remainder, which comprised over one-half of the total, were special purpose local governments, including 13,522 school district governments and 35,356 special district governments.

In 2007, there were 89,476 local governments and public school systems.

Source: Federal, State & Local Governments homepage (United States Census Bureau, 2012). Available from http://www.census.gov/govs/.

184. Where the population of in-scope government organizations is large, for reasons of both cost and respondent burden, countries may decide to select a representative sample of at least part of the population rather than conduct a census of all organizations.

185. There are advantages of using a sample rather than taking a census, with the main advantages being:

- Reduced cost for the collection agency
- Reduced burden on respondents
- Reduced time required to collect, process and release data
- The possibility of trading off the number of units with more detail in the questionnaire.

186. However, there are also disadvantages of sampling compared with taking a census, as follows:

- Survey design is far more complex for a sample and potentially relies more on the accuracy of the population frame.
- Since estimates are subject to sampling error, more detailed data (for example, by geographic region or by employment size) may not be reliable.
- In particular, detailed cross-tabulations (for example, by geographic region and employment size) may not be feasible.
- Limitations on the precision of data may be difficult to communicate to users.

187. Where a sample is taken, so that the representativeness of the sampled portion of the population can be guaranteed, units must be selected at random. Only random sampling allows calculation of estimates of sampling error, that is, the deviation from the true value attributable to the fact that only a sample of the population was included in the survey. Such sampling is known as *probability sampling* (as opposed to *non-probability sampling*) and every unit in the population has a known and non-zero probability of selection.

188. Non-probability sampling has advantages in terms of time and cost but relies on the assumption that the sample selection is representative. For this reason, it is not recommended for surveys of government organizations and will not be further discussed in this manual. ABS (2012b) and Statistics Canada (2010) explain the differences between probability and non-probability sampling.

189. Forms of probability sampling that are likely to be suitable for government units are simple random sampling, stratified random sampling, systematic random sampling, multistage sampling and longitudinal surveys.

Simple random sampling

190. A simple random sample is the most basic form of probability sampling and consists of a random selection of **n** units from the survey frame (generally without replacing them), where there are **N** units in the target population. With simple random sampling, every unit has equal probability of selection in the sample (n/N).

Stratification

191. Random samples of businesses and government units are generally based on the structure of the population of entities (termed *stratification*). Stratification is the technique of dividing the population into mutually exclusive and relatively homogeneous groups termed *strata*. The grouping is based on values of *stratification variables*, such as employment size, that maximize both homogeneity of units within strata and heterogeneity of units between strata (with respect to survey variables). More simply stated, strata consist of units that are as similar as possible to each other and as different as possible from units in other strata. Stratification will generally minimize sampling error associated with estimates for a given sample size.

192. Units may be selected in various ways within strata. However, for business (and government) surveys, they will usually be selected at random, with the technique referred to as *stratified random sampling*. Other forms of selection, such as systematic sampling, within strata are possible.

193. Optimal stratification is based on stratification variables as closely related as possible to the variables being measured. Based on experience with business surveys, it is presumed that size (in terms of number of persons employed), is likely to be related to ICT use by government organizations.[27] We can expect that use of size as a stratification variable will both reduce the overall sampling error as well as the error associated with data disaggregated by size. Information on size should therefore be included on the survey frame.[28] This manual recommends that data on number of employees also be collected from respondents. This will often prove to be more reliable than frame data on employment.

194. It is expected that some strata will be completely enumerated (that is, all units in those strata are selected). These will generally be strata containing large units, though some strata with a small number of units may also be completely enumerated.

195. More information on stratification can be found in ABS (2012b) and Statistics Canada (2010).

Systematic random sampling

196. In systematic random sampling, units are selected from the population at a predefined *sampling interval*. A sampling interval and a random start are required. Each unit has an equal probability of selection n/N. Systematic random sampling is relatively simple. More information on systematic random sampling can be found in ABS (2012b) and Statistics Canada (2010).

27 For business ICT use surveys, Eurostat (2011) specifies that 'average number of persons employed' (in terms of size classes) should be used for the stratification of the sample.

28 As noted earlier, information on industry can be used to ensure that the industries that governments are likely to be classified to, should be included. Therefore, the frame should also include industry, though this will probably not need to be included as a stratification variable for surveys of government organizations.

Multistage sampling

197. For surveys where a reporting unit is selected from the survey frame and is then asked to collect information from its subsidiary units, some form of sampling may be needed to select those units (which will generally be statistical units). The agency conducting the survey may or may not have a list of the statistical units. If it does, it may specify which units are to be surveyed by the reporting unit. If not, it may specify a simple form of selection, such as systematic random sampling, for the reporting unit to undertake.

Sampling for time series

198. There will often be an interest in measuring changes in e-government status over time. An example for the e-government core indicators is the change in access to broadband Internet access over several periods. The forms of selection discussed above will enable this measure at each point in time but may not measure change over time particularly well. An alternative form of surveying for time series results is a longitudinal survey, where a panel is initially selected and its members are surveyed for each iteration of the survey. Such samples reduce the variability around the estimate of change and may offer other advantages such as respondent familiarity with the survey. On the negative side, representativeness is likely to decline over time unless the population is updated for new and ceased units. Respondents may also tire of the survey and cease to respond, or make errors in response.

199. A design that is intermediate between a series of independent samples and a longitudinal survey is one where part of the sample is replaced (*rotated out*) for each survey. This provides some overlap of respondents between surveys.

Survey design in practice for information and communication technology use surveys

200. Table 6 shows the survey design used for various business and government use of ICT surveys. It can be seen that, for business surveys, stratified random sampling dominates.[29] Government ICT use surveys are mainly censuses of government organizations. For those that use sampling, the main technique is also stratified random sampling.

29 Note that Eurostat (2011) recommends use of stratified random sampling by activity (industry) and employment size for its Community Survey on ICT Usage and e-Commerce in Enterprises.

Table 6: Survey design for surveys of business and government use of ICT

Survey	Country/countries	Sample design
Surveys of business ICT use[f]		
Eurostat – 2010 Community Survey on ICT Usage and e-Commerce in Enterprises.	Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Lithuania, the former Yugoslav Republic of Macedonia, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Turkey, the United Kingdom of Great Britain and Northern Ireland.	Stratified random sample, most stratified by both economic activity (industry) and number of persons employed. Larger countries also generally stratified by location. Most of the countries identified a completely enumerated (census) sector for larger enterprises, though the size varied. Some countries mentioned that they controlled selection to minimize or reduce overlap with other surveys in the same period or previous community surveys on ICT usage. At least one country (Poland) designed the sample to include previous year's units that existed in 2008 and were not present in the 2007 year sample. One country (Portugal) also stratified by turnover.
	Luxembourg	Census of all in-scope units.
	Slovenia	Stratified systematic sample, with activity group (industry) and size class used as stratification variables.
Surveys of government ICT use		
Australian Bureau of Statistics – Government Technology, Australia, 2002/03, 1999/2000.	Australia	Census of federal and state (or territory) government, stratified sample of local government.
Australian Bureau of Statistics – Government use of Information Technology, Australia, 1997/98, 1993/94.	Australia	Stratified random sample, with a census of all units with 500 or more persons employed.
Department of Finance and Deregulation – ICT benchmarking data collection exercise.	Australia	Census of in-scope Australian government agencies.
Center of Studies on Information and Communication Technologies – ICT Electronic Government Survey 2013.	Brazil	Census of federal government organizations, stratified sample of state government organizations and municipalities.
Statistics Canada – Survey of Electronic Commerce and Technology.	Canada	Sample was stratified based on industry and size (which, for the public sector, is number of employees). All large units are selected.
Czech Statistical Office – ICT Usage in Public Administration.	the Czech Republic	Census of in-scope government organizations.
Statistics Denmark – Use of ICT in the Public Sector.	Denmark	Census of in-scope government organizations.
Statistics Denmark – ICT expenditures in public authorities.	Denmark	Census of in-scope government organizations.
MCIT and CAPMAS – Measuring ICT access and use by governmental and public sector enterprises.	Egypt	Census of in-scope government organizations.
Ministry of Finance – Finnish Government ICT Review.	Finland	Appears to be a census of in-scope government organizations.
Ministère de la fonction publique et de la modernisation de l'Administration – Cartographie de l'utilisation des Technologies de l'Information et de la Communication (TIC) dans les secteurs publics.	Morocco	Census of in-scope government organizations.

f The European surveys have been provided as examples of business ICT use surveys. Non-European surveys tend to use similar methodologies.

Survey	Country/countries	Sample design
Statistics New Zealand – Government Use of Information and Communication Technologies Survey.	New Zealand	Census of in-scope government organizations.
State Services Commission – Government Use of ICT Survey.	New Zealand	Census of in-scope government organizations.
National Bureau of Statistics (NBS) and National Information Technology Development Agency (NITDA) – Scan-ICT.	Nigeria	Random sample within each state of Nigeria.
Statistics Norway – Use of information and communication technology in public administration.	Norway	Census of in-scope government organizations.
Statistics Norway – ICT usage in municipalities and county municipalities.	Norway	Census of in-scope government organizations.
Information Technology Authority – ICT Usage in Government Survey.	Oman	Census of in-scope government organizations.
Information & Communication Technology Agency of Sri Lanka (ICTA) – Government Organizations Employees Survey.	Sri Lanka	Stratified random sample of government organizations (Colombo-based offices and provincial/regional organizations) and government employees (strata were executive officers and non-executive officers).
Information & Communication Technology Agency of Sri Lanka (ICTA) – Survey on ICT Usage in the Government Sector.	Sri Lanka	Stratified sample, by type of entity.

Source: Eurostat (2011) and metadata from annex 1.

Sample size

201. The sample size is the number of statistical units from (or about) which information is to be collected. Determination of the sample size for the sampled portion of the population of government units is based on factors such as sample design used, variability of the characteristic of interest, level of detail required for the estimates, acceptable sampling error associated with the estimates, available resources, and respondent burden constraints.

202. In general, a larger sample size will result in smaller sampling error. However, the larger the sample, the greater the survey costs and level of respondent burden. Some sample designs are more efficient than others, that is, they will produce lower sampling error for the same sample size. An example is a comparison between simple random sampling and stratified random sampling. The latter should produce lower sampling error for the same sample size, presuming that there is a high level of homogeneity within strata with respect to the variable of interest and that strata are as different as possible, again, with respect to the variable of interest.

203. The precision of an estimate reflects the sampling error. It can be expressed in several ways as described in chapter 9. For a given sample design, precision will improve as the sample size increases. The relationship is not linear, that is, the gain in precision is not directly proportional to the increase in sample size. Statistics Canada (2010) lists a number of factors to consider when determining the required precision.

204. In order to determine the sample size, the required precision and an estimate of the variability of the characteristic of interest are required.[30] There is usually more than one characteristic of interest and

30 Statistics Canada (2010) suggests that where the variability of the characteristic to be measured in the survey is unknown, the greatest variability should be assumed. In the case of a variable with only two possible values, this is a 50-50 split in the population.

the sample size should be based on the characteristic with the highest variability or the one that is most important (Statistics Canada, 2010). While population size is an important factor in determining sample size for small populations, it becomes less important as the population increases.

205. This manual recommends a classification by size, with categories being ranges of persons employed as follows: 1–9, 10–49, 50–249, 250 and above. The sample design needs to support this level of dissemination, with appropriate sample size and stratification. Eurostat (2011) specifies the level of stratification by industry and size in order to achieve the desired precision.

206. Calculations of sample size should take non-response into account, by selecting a larger sample that accounts for non-response. For example, if the response rate is estimated to be 80 per cent and the sample size for the required level of precision is 500, then the sample size should be increased to 625 (noting that 80 per cent of 625 is 500). However, where the characteristics of responding and non-responding entities differ, this strategy may result in a form of bias called *non-response bias*. Where resources allow, a better strategy for dealing with non-response is to follow-up those respondents who have not replied and encourage them to cooperate, thus increasing the response rate.

207. Statistics Canada (2010) provides sample size formulae for different types of estimates. For a simple random sample (not adjusted for non-response or population size), the sample size required to estimate a proportion, P^, is: $n = \frac{z^2 \hat{P}(1-\hat{P})}{e^2}$, where z is the desired level of confidence and e is the desired margin of error.

208. The margin of error is equal to **z** multiplied by the standard error of the estimate. Where the confidence interval around the estimate is 95 per cent, the value of **z** is 1.96.

209. This formula could be adjusted to reflect population size, a different sample design and non-response, as illustrated above. The adjustment for population size is only necessary for small populations and increases the value of n by a factor of $\frac{N}{N+n}$.

210. An adjustment for sample design is calculated relative to the efficiency of a simple random sample and is expressed as *deff* (the design effect), which for a simple random sample is equal to 1. For a stratified random sample, *deff* is generally less than one (and therefore reduces the value of **n**). An example of sample size calculation for a stratified random sample with three strata is shown in example 9.2 of Statistics Canada (2010).

211. For a stratified random sample, the sample size **n** must be distributed across the strata. This can be done either by distributing **n** across strata to minimize the variability or by determining the sample size required in each stratum to conform to the desired precision.

212. Regarding the first method, Eurostat (2011) suggests that an efficient way to spread n over strata in the sample sector is to use the Neyman allocation, which allocates a number of organizations to strata inversely proportional with the estimated standard deviation (SD) of the target variable in these strata. The formula for the sample size, nh, of stratum h is: $n_h = n \times \frac{N_h \times S_h}{\sum N_h \times S_h}$, where Nh is the number of units in stratum h, Sh is the true SD for the target variable in stratum h. In practice, the value of Sh will be an estimate, often based on previous surveys.

213. ABS (2012b) and Statistics Canada (2010) provide information on several methods of allocating sample size, including Neyman allocation.

Website surveys

214. It should be reiterated that the kind of information obtainable from surveys of websites is quite different from that available from surveys of government units. While the first are suitable for collecting information about the services available via government websites, the second are suitable for ascertaining information on the proportion of government units with particular characteristics.

215. Website surveys were discussed in chapter 5 – Data sources and collection methods. One of the methods of collecting data for EG7 is to search government websites for information on services offered. It is likely that the approach taken will differ between countries and no particular methodology is proposed. However, readers may be interested in examining the approach taken by the Czech Republic (annex 1) and the case study in this manual of the research exercise undertaken to compile EG7 for Australia (annex 3).

Chapter 8. Data processing

216. This chapter provides information on the processing of collected survey data. It covers despatch and collection control, data entry, data editing and estimation. Chapter 10 covers dissemination, including tabulation of the core indicator data.

217. References are made in this chapter to ABS (2012b), Eurostat (2011), ITU (2009), Statistics Canada (2010) and UNCTAD (2009).

Despatch and collection control

218. Despatch and collection control refers to the processes involved in despatching (sending out) and receiving survey forms. Processes include recording the status of forms (for example, despatched, outstanding, received), generating reminder action for non-respondents, and producing management information on survey progress. These tasks may be manual or automated, and functionality varies with the type of survey.

219. This part of the data processing cycle includes action to increase survey response rates. As we have seen in earlier chapters, low response rates are likely to increase the level of both sampling and non-sampling survey error. Follow-up action directed to respondents who have not responded to the survey can be a very good investment of time and resources. Follow-up procedures include:

- Sending reminder letters and/or e-mails (these can be increasingly demanding, especially if backed up by legislation)
- Telephoning respondents
- Meeting respondents in person.[31]

220. If time permits, respondents should be offered additional time to return their questionnaires if they request it. Such extensions, as well as other communications, need to be recorded and tracked in despatch and collection control systems.

Data entry

221. For surveys, data entry may occur at the time of a personal interview, particularly where CAPI or CATI programs are used. It may be performed by the respondent in cases of electronic form completion. Where completed forms are scanned, there is no need for data entry (except to correct scanning errors and codes etc.). Table 4 in chapter 5 provides information on data collection techniques.

222. Data entry commonly occurs as a distinct process (typically from completed self-enumerated forms mailed back to the data collection agency), undertaken by either a specialized data entry unit of the agency or the team conducting the survey.

223. Data entry also includes coding, for example, converting written questions to codes, assigning a classification code (for example, for employment size) and completing *office use only* fields. These activities are most likely to be performed by the survey processing team.

31 Such procedures are in addition to good questionnaire design and campaigns to encourage response, such as use of covering letters signed by high-profile advocates of the survey (e.g. a Minister of State) and other public relations techniques.

224. As with other aspects of survey implementation, it is important to minimize non-sampling error from data entry – by good training, ongoing quality control and effective data entry procedures. Keying accuracy can be enhanced by using techniques such as check digits[32] and real-time edits.[33]

225. Some data entry errors may also be discovered during data editing as described below.

Data editing

226. Statistical information provided by respondents can contain various types of errors. They include incorrect data, missing data, incorrect classifications and inconsistent responses between questions. As we saw in chapter 6, good question and questionnaire design should reduce error on self-enumerated and interviewer-administered forms.

227. Errors can also arise through data processing occurring after the questionnaire has been completed by the respondent. Such errors include keying or coding errors, as discussed above, scanning errors and changes applied incorrectly by the collection agency (for example, in responding to an error found during editing). In order to minimize such introduced errors, procedures should be comprehensive and well-tested, and quality control ongoing.

228. Despite good survey instruments and data processing procedures, data editing will still be required. There are two broad types of edits, microedits and macroedits. These may be known by other names, such as input and output editing respectively.

Microedits

229. Microedits are those edits applied to individual questionnaires. They range from preliminary checks for completeness to responses to computer-generated edit failure messages. Microedits can be classified and described (ITU, 2009), as follows:

- Validity and range edits, for instance, only numbers can be entered in a numerical field, categorical variables can only have a predefined value (for example, gender can be coded only as 1 or 2) or reported value is consistent with external data (such as a reasonable organization size range).
- Skip edits verify that the logic of the questionnaire has been followed, for instance, that the correct populations respond to each question. In a CAPI or CATI environment, the program will usually determine the skips, so errors should not occur if the programming has been done correctly.
- Consistency checks determine whether the information in the questionnaire is internally consistent, for instance, organizations with Internet access should report a non-zero value for the number of persons employed using the Internet.
- Typographical checks (to find keying errors by the interviewer or data entry operator); these may be difficult to find and may be discovered as a result of other edits or through check-add (or *control*) totals or check digits.

230. Edit failures can be categorized as *fatal* or *non-fatal*, with the former being a definite error and the latter being a likely error. Fatal data errors are those that are logically impossible and will include data components not adding to a total.[34] A large number of fatal errors in a set of records should be investi-

32 A check digit is a number or letter in a keyed sequence, the value of which is derived from a function involving the other digits in the sequence. If a data entry error is made, the derived version of the check digit will differ from the actual check digit, thus signalling that a keying error has been made. Check digits are typically used for record identifiers and codes.

33 For example, a check-add of components against total of numerical data as data are entered.

34 Apart from rounding differences, a mismatch between a total and the sum of its components indicates an error in the total or at least one of the components.

gated as it may indicate an error in the editing program or an illogical sequence in a questionnaire. Fatal errors need to be resolved before compromised data records are incorporated into any final tabulation of results.[35] The resolution could be to amend the values causing the failures or to omit the records in error. Both solutions have implications for the final calculation of estimates.

231. The process of microediting should be optimized to produce good results for reasonable effort. It will often not be feasible to perform and query every non-fatal error. In fact, Statistics Canada (2010) deals with this subject at some length[36] and makes the point that excessive editing and data amendment may actually introduce bias, because the assumptions of the editor can take precedence over the trends in actual responses.

232. To resolve an edit failure, editors can:

- Query the respondent – this will often be impractical and will be expensive if done on a large scale.
- Ignore the apparent error – while this may introduce bias, for non-fatal error failures with a very low impact, this may be a reasonable strategy.
- Remove the incorrect data – again, this may introduce bias and, on a large scale, increase sampling error.[37]
- Change the data either using judgement or some form of objective imputation (this is examined later in this chapter) – in either case, this should be done carefully in order not to bias the results.

233. Table 7 presents a number of suggested microlevel edits for e-government data for indicators EG1 to EG6. They could be applied during an interview (either as prompts to the interviewer using a paper form or as part of CATI/CAPI programs), during data entry or following data entry (or both) as a separate editing process. Fatal errors are annotated with (F).

35 Logically, the error will carry through to tabulated data, even though the effect might be very small if the number of fatal errors is small.

36 The process is referred to as selective editing.

37 This is because it has the effect of reducing sample size.

Table 7: Microedits for e-government indicators EG1 to EG6

Indicator		Model question	Possible microedits and probes (applied to individual records)
EG1	Proportion of persons employed in central government organizations routinely using computers.	How many persons were employed in this organization at <reference date>? ____ Optional extension: How many of these were female? ____ How many of these were male? ____	Check value for total employment against employment values on the frame if they exist. Follow up large differences. Investigate validity of particularly small or particularly large values for total employment. (F) Females plus males must add to total persons. Query if they do not add.
		How many persons employed in this organization routinely used a computer at work (for work purposes) as at <reference date>? ____ Optional extension: How many of these were female? ____ How many of these were male? ____	(F) Values for total, female and male persons must each be less than or equal to the corresponding figures for the number of persons employed. Query if they are not. If the response to the EG2 question on routine use of the Internet is non-zero (i.e. at least some persons employed routinely use the Internet), the response to this question is expected to be non-zero. Note that an inconsistency may be correct, as computers are not the only way to access the Internet. If any of the responses to the questions for EG3 to EG6 are yes, then the response to this question is expected to be non-zero.
EG2	Proportion of persons employed in central government organizations routinely using the Internet.	How many persons were employed in this organization at <reference date>? ____ Optional extension: How many of these were female? ____ How many of these were male? ____	Check value for total employment against employment values on the frame if they exist. Follow up large differences. Investigate validity of particularly small or particularly large values for total employment. (F) Females plus males should add to total persons. Query if they do not add.
		How many persons employed in this organization routinely used the Internet at work (for work purposes) as at <reference date>? ____ Optional extension: How many of these were female? ____ How many of these were male? ____	(F) Values for total, female and male persons must each be less than or equal to the corresponding figures for the number of persons employed. Query if they are not. If the response to the EG1 question on routine use of computers is zero (i.e. no persons employed routinely use computers), the response to this question is expected to be zero. Note that an inconsistency may be correct, as computers are not the only way to access the Internet. If any of the responses to the questions for EG4 to EG6 are yes, then the response to this question is expected to be non-zero.
EG3	Proportion of central government organizations with a LAN.	Did this organization have a LAN as at <reference date>? Yes ☐ No ☐	A yes response to this question should be associated with a non-zero response to the question for EG1. If the latter is zero, then both responses should be queried.

Indicator		Model question	Possible microedits and probes (applied to individual records)
EG4	Proportion of central government organizations with an intranet.	Did this organization have an intranet as at <reference date>? Yes ☐ No ☐	A yes response to this question should be associated with a non-zero response to the questions for EG1 and EG2. If the responses to questions for EG1 or EG2 (or both) are zero, then query responses. A yes response to this question will generally be associated with a yes response to the question for EG3 (i.e. a LAN is generally a prerequisite for an intranet). If the response to the question for EG3 is no, query a yes response to this question.
EG5	Proportion of central government organizations with Internet access, by type of access.	Did this organization have Internet access as at <reference date>? Yes ☐ No ☐ If Yes: Did this organization have narrowband Internet access as at <reference date>? Yes ☐ No ☐ Did this organization have fixed (wired) broadband Internet access as at <reference date>? Yes ☐ No ☐ Did this organization have wireless broadband Internet access as at <reference date>? Yes ☐ No ☐	(F) If the answer to the first question on Internet access is yes, then all other questions should be completed with a yes or no response. At least one of these responses must be yes. (F) If the first question is asked as a filter question, a no response should be associated with non-response to all the follow-up questions. (F) Whether or not the first question is asked as a filter question, a no response followed by yes responses to any of the follow-up questions needs to be queried as there is an inconsistency between the first and subsequent parts of the question. (F) If a particular type of access is not available in the country, then a yes response should be queried. A no response to the first question in conjunction with a yes response to the EG6 question, should be queried, though may be correct as web presence is a broader concept than website.
EG6	Proportion of central government organizations with a web presence.	Did this organization have a web presence as at <reference date>? Yes ☐ If yes, please give the web address (URL) of this organization's main web presence: _____ No ☐	In the case of a yes response, the editor should check the URL provided and confirm that it belongs to the entity. In the case of a no response (or missing URL with a yes response), if the editor has reason to believe that the entity does have a web presence (as defined for the indicator), he or she should perform an Internet search on the name of the entity. A yes response in conjunction with zero responses for the EG1 or EG2 (or both) questions may be correct but should be queried. A yes response in conjunction with a no response to the first of the EG5 questions (Internet access), should be queried.

Macroedits

234. Macroediting consists of checks of aggregated data for coherence, including:

- Consistency of estimates over time, for instance, the proportion of organizations using the Internet is expected to grow until it flattens out.
- Relationships between output variables from the survey, for instance, the proportion of government organizations using the Internet would be expected to be higher than the proportion with a web presence.
- Consistency of relationships with comparable data external to the survey and (possibly) data for other countries.
- Logical rules are obeyed, for instance, components of a percentage distribution should add to 100 and table components should add to totals.[38]

235. There may be several reasons for major consistency or relationship discrepancies being found during macroediting. One is the possibility that they are not actually errors – they may just reflect false assumptions on the part of the editors. Other possibilities for consistency failures are that comparative data are not actually comparable (for instance, definitions may have changed) or have errors. However, it is quite likely that large discrepancies are errors, which can arise through various sources, including incorrect estimation procedures, errors in data compilation, problems with expansion of sample data, or errors with the data of one or more significant individual units.

236. Not all of these sources of error are straightforward to resolve. It is suggested that interim tabulations and macroedits be performed during the course of the survey so that errors that cause failures may be discovered early in processing. An understanding of the macroedits to be applied might also be useful at the inception of the survey, for instance, in designing questionnaires or input edits so that failures are less likely at the output stage. Table 8 presents a number of suggested macrolevel edits for e-government core indicator data.

Table 8: Macroedits for e-government indicators

Indicator		Macroedits (applied to aggregated data)
EG1	Proportion of persons employed in central government organizations routinely using computers.	For historical trends, would expect medium to high growth in this indicator, followed by flattening out. Would generally expect EG1 to be greater than EG2. The proportion for large entities is expected to be greater than for smaller entities.
EG2	Proportion of persons employed in central government organizations routinely using the Internet.	For historical trends, would expect medium to high growth in this indicator, followed by flattening out. Would generally expect EG2 to be less than EG1. The proportion for large entities is expected to be greater than for smaller entities.
EG3	Proportion of central government organizations with a LAN.	For historical trends, would expect medium to high growth in this indicator, followed by flattening out. Would generally expect EG3 to be greater than EG4 for both basic and employment-weighted estimates. The proportion for large entities is expected to be greater than for smaller entities.
EG4	Proportion of central government organizations with an intranet.	For historical trends, would expect medium to high growth in this indicator, followed by flattening out. Would generally expect EG4 to be less than EG3 for both basic and employment-weighted estimates. The proportion for large entities is expected to be greater than for smaller entities.

38 After taking account of rounding in both cases.

Indicator		Macroedits (applied to aggregated data)
EG5	Proportion of central government organizations with Internet access, by type of access.	For historical trends, would expect medium to high growth in this indicator overall, with falling incidence of narrowband access and rising incidence of broadband. Services on offer in the country may suggest the trend and distribution between access types. Would generally expect EG5 (any Internet access) to be greater than EG6 (web presence) for both basic and employment-weighted estimates. The proportion for large entities is expected to be greater than for smaller entities.
EG6	Proportion of central government organizations with a web presence.	For historical trends, would expect medium to high growth in this indicator, followed by flattening out. Would generally expect EG6 to be less than EG5 (any Internet access) for both basic and employment-weighted estimates. The proportion for large entities is expected to be greater than for smaller entities.
EG7	Selected Internet-based services available to citizens, by level of sophistication of service.	For historical trends, would expect the proportion of the country's population theoretically able to access particular services to increase.

Estimation

237. Estimation can be defined as the processes involved in deriving estimates obtained from a survey. It covers dealing with missing data, treatment of outliers, treatment of misclassified units and weighting of sample data to obtain population estimates. Statistics Canada (2010) has detailed information on estimation processes. Estimation of survey error is covered in the next chapter.

Treatment of missing data (item and unit non-response)

238. Most surveys will have a degree of non-response. This can be *item non-response*, that is, some information in the questionnaire is missing or rejected, or *unit non-response*, that is no response is received at all. In the latter case, it is likely that the respondent cannot be contacted or refuses to take part in the survey.

239. In many cases, the agency conducting the survey will make estimates for non-response; this is usually referred to as *imputation*. It is important to note that non-response can be a significant contributor to both sampling and non-sampling error. In addition, estimation for non-response may introduce bias to the estimates and therefore needs to be performed carefully – especially if there is a high rate of non-response.

240. Obviously, the best practice is to minimize non-response, for instance, by good questionnaire design and non-response follow-up procedures.

Item non-response

241. There are a number of techniques for dealing with imputation for item non-response. They include *deterministic*, *hot deck*, *cold deck*, *nearest neighbour*, *mean or modal* and *historical* imputation. These techniques are described in annex 6 of UNCTAD (2009) and annex 5 of ITU (2009). Statistics Canada (2010) provides detailed advice on imputation for item non-response. It distinguishes deterministic and

stochastic imputation techniques, where the former has only one possible imputed value corresponding to the unit data and the latter involves a degree of randomness in determining the imputed value.

242. Deterministic imputation techniques include:

- Deductive (the value is deduced based on other data)
- Mean value (the missing value is replaced with the mean value for the imputation class)
- Ratio/regression (based on a model that makes use of the relationship that exists between variables)
- Sequential hot deck (uses information from the previous *clean* donor record in the imputation class to replace missing or inconsistent values)
- Sequential cold deck (uses donors from another source, for example, historical or census data)
- Nearest neighbour (uses a donor closest to the recipient in terms of matching variables within the imputation class).

243. Stochastic imputation techniques involve adding a random residual from an appropriate distribution or model to the imputed value. An example is random hot deck imputation.

244. Imputation guidelines provided by Statistics Canada include:

- Imputed records should be as similar as possible to the original record.
- There should be an imputation audit trail, with imputed values flagged and the imputation methodology identified.
- Imputed records should satisfy microedits.
- Imputation methods should aim to reduce non-response bias.

245. For business ICT use surveys, Eurostat (2011) describes both hot deck imputation, using donor data from similar units, and historical imputation, using data from a previous response if available. However, Eurostat does not recommend that countries impute for missing data and instead recommends contacting respondents and querying them about the missing data.

246. In cases where a large amount of data from a questionnaire is missing or clearly incorrect, then the unit may be treated as a unit non-response.

Unit non-response

247. Unit non-response can introduce bias to survey results in cases where non-responding units are not representative of responding units. It may also increase sampling error because of an effectively smaller sample size.

248. Unit non-response can be dealt with by following up with non-respondents and this is recommended where it is possible to do so. In particular, units that make a significant contribution to sample estimates, or are particularly large, should be followed up.

249. A common algebraic method of dealing with non-response involves adjustment of sample design weights to reflect non-response. For example, if a stratum has 10 units out of 100 selected, the design weight factor =100/10=10. However, if only 8 units respond, then the expansion factor can be increased to 100/8=12.5. Note that this technique also works if a stratum is completely enumerated.

250. Where population data are known, population weighting can be used to adjust for non-response. This is equivalent to post-stratification, where survey data are benchmarked against known population totals.

251. These techniques are described in more detail by Eurostat (2011), Statistics Canada (2010) and UNCTAD (2009).

Treatment of outliers

252. An outlier is a sample value that is inconsistent with those of similar units (for example, those in the same stratum). There is a variety of methods of dealing with outliers, one of which is to assume that the inconsistent value represents anomalies in the population and can be accepted on that basis. Other options are to delete the unit, change its value or give it a weight of 1.

253. For the core indicators, EG3 to EG6, outliers are less likely to cause a problem as the only volume measure is employment, and this can be compared against the frame value. Table 7 – Microedits for e-government indicators EG1 to EG6 – suggests that this edit be performed and also suggests investigating the validity of particularly small or particularly large reported values for total employment. Where the frame and reported employment values for a particular sample unit are inconsistent, the unit may be treated as misclassified. This is discussed below. For indicators EG1 and EG2, outliers may be problematic, for example, if a selected unit shows an unusually low or high proportion of employees using ICT. Statistics Canada (2010) has detailed information on the treatment of outliers.

Treatment of misclassified units

254. In most cases where government units are sampled, stratification will be based on information from the survey frame (employment size is most likely). A common problem for business (and therefore government organization) surveys is that frame errors will cause some units to be allocated to an incorrect stratum (or incorrectly included in, or excluded from, scope). Treatments include:

- Ignoring the misclassification and leaving the unit in its selected stratum with the same stratum weight as other units
- Removing the unit and adjusting stratum weights (this reduces the sample size so should only be done if there is a small number of misclassified units)
- Adjusting the stratum weights to reflect the correct data; see the example in box 17 of UNCTAD (2009).

255. Eurostat (2011) has a useful discussion on treatment of misclassified units in surveys of business use of ICT.

Weighting of data and derivation of estimates

256. Weighting up (also called *grossing up*) is the process of taking sample data and producing estimates for the target population. Population estimates may be calculated using only sample data, or may be a combination of sample data and information from the frame (the number of government organizations or the total number of persons employed in government organizations).

257. There are three calculation methods applying to the core indicators EG1 to EG6:

- Estimates for EG1 and EG2 show the proportion of persons employed routinely using computers/the Internet. These are calculated as the number of persons employed routinely using computers/the Internet divided by the total number of persons employed in government organizations. The first, or both estimates, may be calculated from the sample. The second estimate may be derived from the frame.

- Estimates for EG3 to EG6 (basic indicator) show the proportion of government organizations with a particular characteristic. The calculation is the number of government organizations with a particular characteristic divided by the number of government organizations. The first estimate is calculated from the sample and the second comes from the frame.
- Estimates for EG3 to EG6 (employment-weighted estimate) show the proportion of all persons employed in government organizations with a particular characteristic (for example, having a web presence). The resulting indicator is expressed as follows 'government organizations with a web presence account for x per cent of the total number of persons employed in government organizations'. The calculation is the number of persons employed in government organizations with the characteristic divided by the total number of persons employed in government organizations. The first, or both estimates, may be calculated from the sample. The second estimate may be derived from the frame.

258. Eurostat (2011) describes weighting for business use of ICT surveys and covers the three calculation methods above, assuming a stratified random sample survey design. UNCTAD (2009) provides formulae for the first two calculation methods above.

259. Core indicators EG1 and EG2 are examples where ratio estimation might be appropriate. In this situation, both the numerators (total number of persons employed in government organizations, routinely using computers/the Internet) and the denominator (total number of persons employed in central government organizations) would be estimated from the sample. However, if there is high quality information from the survey frame on employment, then a proportion estimator is probably appropriate.

260. For proportion variables of the type 'proportion of government organizations with a particular characteristic' (for example, EG6, basic indicator), Eurostat recommends weighting by the number of units in strata.

261. Example 4 presents the formulae for producing an estimate for EG6 from both a simple and a stratified random sample.

Example 4: Estimation of EG6 for a simple random sample and a stratified random sample

Estimation of the value of the indicators EG1 to EG6 is relatively straightforward, especially for a census (i.e. where all units in the population are selected in the survey). The formulae for calculating indicators in this situation are shown in chapter 4. As an example, the formula for calculating EG6, Proportion of central government organizations with a web presence is:

$$EG6 = \left[\frac{TGWEB}{TGO}\right] * 100$$

, where TGWEB=total number of central government organizations with a web presence and TGO=total number of central government organizations.

In a sample survey, the component, TGWEB is an estimate derived from the sample and TGO is assumed to be (for the purposes of this example) a known value derived from the population frame, denoted N. Given that not all units have been included in the survey, the contribution from the units in the survey has to be *weighted up* to derive the population estimate of TGWEB. In a simple random sample, an unbiased estimate for TGWEB is:

$$\left[\frac{a}{n}\right] * N$$

, where a is the number of sampled units responding that they have a web presence, n is the sample size and a/n is the estimated proportion of units with a web presence.

If we substitute the estimate for TGWEB into the formula for calculating EG6, we obtain an estimate for EG6 as follows:

$$\left(\left[\frac{a}{n}\right] * N/N\right) * 100$$

, which reduces to the intuitive solution, $\left[\frac{a}{n}\right] * 100$ because the N in the numerator and denominator cancel out.

In a stratified random sample, an unbiased estimate for EG6 is calculated by performing an aggregation across strata as follows:

$$\frac{\sum_i \frac{a_i}{n_i} * N_i}{N} * 100$$

, where ai is the number of sampled units in stratum i responding that they have a web presence, ni is the sample size of stratum i and Ni is the population of stratum i.

262. Annex 5 of ITU (2009) provides more information on the estimation of proportions and their standard errors, including the calculation of proportions where one or more strata are completely enumerated and ratio estimation, where the stratum and total population (N_i values and N) are also estimated.

Chapter 9. Data quality

263. This chapter provides general information on data quality and then considers particular data quality issues relating to the core e-government indicators.

264. References are made in this chapter to ABS (2009), Eurostat (2009 and 2011), ITU (2009), Statistics Canada (2010) and UNCTAD (2009).

Accuracy of estimates

265. Accuracy of estimates reflects both sampling error (precision) and non-sampling error. In practice, there may need to be a trade-off between sampling and non-sampling error. For example, use of smaller sample sizes will generally increase sampling error. However, it may also enable more careful data collection and processing, thus reducing non-sampling error.

266. Accuracy is defined by Eurostat (2009) as follows: "The accuracy of statistical outputs in the general statistical sense is the degree of closeness of estimates to the true values."

Precision

267. The precision of an estimate reflects the sampling error so the concept applies to sample surveys, rather than to censuses. Precision can be expressed as the coefficient of variation (CV), also called relative standard error (RSE). The CV is calculated as the standard error of the estimate divided by the value of the estimate. It may then be multiplied by 100 to convert it to a percentage (for instance, as 3 per cent of the value of the estimate). This method of expressing precision provides scale in relation to the estimate and also enables simple comparison of the sampling error around different estimates and between countries.

268. For estimates that are proportions and are expressed as percentages, the precision may be expressed as the standard error in percentage points. For business ICT use surveys, Eurostat (2011) specifies a standard error of less than or equal to 2 percentage points for the overall population and 5 percentage points for different subgroups of the population (for example, size classes).

269. Sampling error can also be expressed as a confidence interval around an estimate, for example, a 95 per cent confidence interval refers to the probability (95 per cent) that the parameter to be estimated will lie within an interval around the estimate of +/– 2 standard errors.[39] This calculation assumes that the estimate conforms with a *normal* statistical distribution, an assumption that usually applies well to large samples.

270. Example 5 shows the different methods of expressing precision for indicator EG6.

39 This is an approximation; the multiplier is actually 1.96.

Example 5: Precision of an estimate for e-government core indicator (EG6)[g]

In a hypothetical example, the estimated proportion of government organizations with a web presence is 0.83, therefore the value for core indicator EG6 is 83 per cent. If the standard error (SE) of this estimate is 0.01, the coefficient of variation (CV) is 100*0.01/0.83, that is, 1.2 per cent of the estimate. In percentage points, the SE is 1 pp.

If the estimated proportion of small organizations (fewer than 10 persons employed) with a web presence is 0.49, the value for core indicator EG6 for this size category is 49 per cent. If the SE of this estimate is 0.03, then the CV is 100*0.03/0.49, that is, 6.1 per cent of the estimate. In percentage points, the SE is 3 pp. It can be seen that the reliability of the more disaggregated estimate is lower than for the main indicator.

The reliability of the two estimates can be directly compared using the value of the respective CVs.

With a probability of 95 per cent, the value of the parameter to be estimated will lie within a 95 per cent confidence interval around the estimate. The interval can be expressed as the sample estimate +/– twice its SE. In the example for EG6, the 95 per cent confidence interval around the estimate is 0.83 +/– 0.02 (twice the SE). Therefore, with a confidence level of 95 per cent, the value of the parameter to be estimated (in percentage terms) will lie in the interval 83–2 to 83+2, that is, between 81 and 85 per cent. The 95 per cent confidence interval in the second example is 0.49 +/– 0.06, that is 43 to 55 per cent.

g Based on an example in ITU (2009).

Non-sampling error

271. Non-sampling error includes all statistical error that is not attributable to sampling. It therefore applies to both censuses and sample surveys. Statistics Canada[40] distinguishes random from systematic non-sampling errors. The former are unpredictable and will tend to cancel – an example of a random error is a data entry error. Systematic errors will tend to err in one direction, leading to a bias in final results – an example is a question that encourages an inflated response. Discussion of non-sampling error generally focuses on problems caused by systematic errors, that is, bias.

272. Bias can arise from various sources including:

- Coverage errors (undercoverage or overcoverage) caused by defects in the survey frame
- Other errors in the survey frame
- Definitional errors associated with statistical units
- Poor questionnaire design or inconsistency on the part of interviewers
- Respondent effects
- Low response rates, where characteristics of respondents and non-respondents are different
- Defects in the selection of sample units
- Data processing errors
- Estimation and imputation procedures.

273. Bias is frequently not measurable, and may not even be identifiable. It is recommended that all efforts be made to reduce or remove non-sampling error by careful attention to the survey material and all processes that may be prone to such error. For example:

- By careful design and testing of questions and question sequences
- By intensive training and checking of interviewers (if used) and other staff
- By reducing non-response rates as far as possible
- By minimizing data entry, editing and other processing errors.

40 See http://www.statcan.gc.ca/edu/power-pouvoir/ch6/nse-endae/5214806-eng.htm [Accessed 9 February 2014].

Assessing data quality

274. A high level of data quality is a primary goal of survey statisticians. As this manual has emphasized, data quality should be considered at each stage of the survey process. As financial and skilled resources needed to conduct a survey are always limited, data quality must be maximized within resource constraints. Appropriate quality control and quality assurance techniques should be practised, as discussed in annex B of Statistics Canada (2010).

275. Data quality can be viewed in terms of several dimensions as follows:[41]

- Institutional environment – the institutional and organizational factors that influence the effectiveness and credibility of the statistical agency (including impartiality, independence and commitment to data quality).
- Relevance – the degree to which users' current and potential needs are met and the alignment of concepts with the real world.
- Accuracy – a function of sampling and non-sampling error, as discussed above.
- Timeliness and punctuality – how quickly results are released and whether expected release dates are met.
- Accessibility – how easily data can be obtained by national and international users.
- Interpretability – the availability of metadata and other information enabling users to interpret the results.
- Coherence – the degree to which the statistical processes by which related outputs were generated used the same standards (classifications, definitions, target populations, methods).
- Comparability – over time, between jurisdictions and across countries.

276. It is recommended that countries use quality dimensions in planning and conducting surveys of e-government. More specific guidance may be found from the experiences of those statistical organizations that have data quality frameworks based on these or similar dimensions. They include: the Australian Bureau of Statistics (2009) *Data Quality Framework*; Eurostat (2009) *Standard for Quality Reports*; and Statistics Canada (2002) *Quality Assurance Framework*.

Documentation and evaluation

277. An important element of data quality is thorough documentation of all stages of the survey. This will start at the planning stage, with descriptions of consultation, budgets, survey methodologies and procedures. Documentation will occur during conduct of the survey, for example, recording changes in sample design during the field phase or changes in expected costs.

278. After the survey is completed, further documentation will describe the collection and present survey data and metadata (as shown in chapter 10).[42] Data quality reports produced for internal approval processes may be more detailed than those for external dissemination and could include information on the results of macroediting (see chapter 8) and an explanation of any divergences from expected findings or long-term trends.

279. In evaluating the success or otherwise of a survey, the views of relevant staff should be obtained as soon as possible after completion of the survey. Evaluation will also compare initial expectations (for example, on resources required) with final outcomes.

41 The list varies slightly across statistical agencies. This list includes all the quality dimensions discussed by the Australian Bureau of Statistics (2009), Eurostat (2009) and Statistics Canada (2010).

42 Tables 15 and 16 in chapter 10 present indicator and survey metadata associated with the core e-government indicators. The metadata cover a number of aspects relating to data quality, such as response rate and standard errors.

Particular data quality issues for the e-government core indicators

280. The main data quality issue for the e-government core indicators is ensuring comparability of units, and therefore output, across countries.[43] This was discussed earlier (in particular, see chapters 4 and 7) and a large part of this manual is devoted to maximizing comparability across countries, especially by:

- Defining government units in a consistent way
- Recommending that output be classified by size of organization, so that units of a particular size are compared to the same sized units in other countries
- Recommending that estimates of EG3 to EG6 be weighted by employment, to reduce the effect of non-comparability

281. Other particular data quality issues are likely to be similar to those of business surveys of ICT use. They include: understanding by respondents of the technical terms used in a questionnaire, for example, forms of Internet access; and meanings of terms such as intranet and LAN.

282. Statistical issues associated with e-government topics that are not part of the core indicator set are presented in table 5.

43 This may also be an issue at the national level, for instance, when comparing state jurisdictions and making comparisons over time.

Chapter 10. Dissemination

283. This chapter deals with dissemination of the e-government core indicators. It covers dissemination of data and metadata[44] in both national and international contexts. It also provides tabulation plans for all the indicators. Examples showing compilation of data and metadata for EG7 for Australia are presented in annex 3.

Forms of data dissemination

284. Data may be released in various media and formats, including:

- Hardcopy publications, summaries or press releases
- Electronic publications (for instance, pdf files of hardcopy publications, web publications in hypertext markup language (html) form)
- Web content apart from publications (such as tables,[45] press releases)
- Social media content (such as Facebook posts, Twitter feeds)
- Data files, such as spreadsheets (which may be downloadable from websites, e-mailed to users or provided on digital media such as CD-ROM).

285. Data may be free or charged, or a combination. For instance, pdf files might be free to download but printed versions, reflecting their cost of production, may be charged for. Hardcopy releases may be provided free to some users, for instance, government departments, but provided at cost to other users. Some agencies provide some free data on their website, but may charge for more detailed data.

286. All released data should be based on a single approved version of the underlying dataset. If revisions are later made, all released data should be subject to revision.

287. Where data are deemed unreliable (usually because of high standard errors), they should be suppressed and the reason should be indicated by a symbol in the relevant cell. Where data are suppressed because of confidentiality constraints, this should also be indicated by an appropriate symbol.

National tabulation plans

288. Tabulation plans for the core indicators are presented below (tables 9–14), classified according to size per the standards presented in this manual. The example tabulation for core indicators EG1 and EG2 includes the extension to a gender classification. These plans are suitable for national-level dissemination. How to report core indicator data to international organizations is covered later in this chapter.

44 The term 'metadata' can be explained as 'data about data'.
45 These may be static or user-generated from an underlying database.

Table 9: Example tabulation for core indicators EG1 and EG2

Gender and size	Proportion of persons employed in central government organizations routinely using:	
	Computer(s)	the Internet
	Percentage	
Total persons		
Male		
Female		
Organization size (number of persons employed)		
1–9		
10–49		
50–249		
250 and above		

Table 10: Example tabulation for core indicators EG3, EG4 and EG6

Size and weighting	Proportion of central government organizations with:		
	a LAN	an intranet	web presence
	Percentage		
Organization size (number of persons employed)			
1–9			
10–49			
50–249			
250 and above			
Total			
Employment-weighted			

Table 11: Example tabulation for core indicator EG5

Size and weighting	Proportion of central government organizations with Internet access:			
	narrowband	fixed (wired) broadband	wireless broadband	any Internet access
	Percentage			
Organization size (number of persons employed)				
1–9				
10–49				
50–249				
250 and above				
Total				
Employment-weighted	na	na	na	

Abbreviation: na = not applicable.

289. For indicator EG7, the tabulations follow the model questions, as illustrated by tables 12 and 13. The tabulation shown in table 12 (by list of jurisdictions) could be calculated first and its results used to compile table 13 (the population-weighted data should be readily derived from the jurisdiction-level information, given relevant population data).[46] The derivation is shown in annex 3 in the two examples for Australia (examples 6 and 7).

46 As described in the notes to EG7 in chapter 6, in some situations, the jurisdiction level might be too high (e.g. if part of a population cannot theoretically access the service because it is regionally based within the jurisdiction). In this situation, a dummy jurisdiction, with its population value, can be created and matched with another dummy jurisdiction representing the remainder of the jurisdiction in question. If the situation only affects a relatively small number of citizens, it is simpler to ignore the regional service and describe the situation in the statistical standards statement for EG7 indicator metadata.

Table 12: Example tabulation for core indicator EG7, for two jurisdictions

Internet-based services for citizens (a)	Name of jurisdiction 1	Name of jurisdiction 2
Population (million)		
Level 1: Obtain information from publicly accessible websites necessary to:		
Enrol to vote for the first time in government elections.	Yes-No-Not relevant (b)	Yes-No-Not relevant
Complete and lodge personal income tax return, least complex situation (c).	Yes-No-Not relevant	Yes-No-Not relevant
Obtain unemployment income benefits, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Obtain child support allowance, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Renew an international passport, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Renew a driver's licence, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.	Yes-No-Not relevant	Yes-No-Not relevant
Obtain a copy of a birth certificate for self.	Yes-No-Not relevant	Yes-No-Not relevant
Obtain a copy of a marriage certificate for self.	Yes-No-Not relevant	Yes-No-Not relevant
Renew registration for a motor vehicle, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Level 2: Request printed forms or download forms (e.g. in pdf format) from publicly accessible websites necessary to:		
Enrol to vote for the first time in government elections.	Yes-No-Not relevant	Yes-No-Not relevant
Complete and lodge personal income tax return, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Obtain unemployment income benefits, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Obtain child support allowance, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Renew an international passport, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Renew a driver's licence, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.	Yes-No-Not relevant	Yes-No-Not relevant
Obtain a copy of a birth certificate for self.	Yes-No-Not relevant	Yes-No-Not relevant
Obtain a copy of a marriage certificate for self.	Yes-No-Not relevant	Yes-No-Not relevant
Renew registration for a motor vehicle, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant

Internet-based services for citizens (a)	Name of jurisdiction 1	Name of jurisdiction 2
Level 3: Fill in online forms available on (or via) publicly accessible websites necessary to:		
Enrol to vote for the first time in government elections.	Yes-No-Not relevant	Yes-No-Not relevant
Complete and lodge personal income tax return, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Obtain unemployment income benefits, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Obtain child support allowance, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Renew an international passport, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Renew a driver's licence, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.	Yes-No-Not relevant	Yes-No-Not relevant
Obtain a copy of a birth certificate for self.	Yes-No-Not relevant	Yes-No-Not relevant
Obtain a copy of a marriage certificate for self.	Yes-No-Not relevant	Yes-No-Not relevant
Renew registration for a motor vehicle, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Level 4: Undertake the complete process, via publicly accessible websites, to:		
Enrol to vote for the first time in government elections.	Yes-No-Not relevant	Yes-No-Not relevant
Complete and lodge personal income tax return, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Obtain unemployment income benefits, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Obtain child support allowance, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Renew a driver's licence, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant
Renew registration for a motor vehicle, least complex situation.	Yes-No-Not relevant	Yes-No-Not relevant

Notes:

(a) Citizens refer to the whole population, including children. While children are not able to do many of the activities represented in the table, arguably, they indirectly benefit if their parents or guardians are able to.

(b) Not relevant means that the service (whether undertaken online or offline) is not relevant for a particular level of government. The distinction between Not relevant and No may be difficult to make and reasons for choosing one over the other should be explained in notes on particular services.

(c) Least complex situation refers to the simplest standard procedure in the country. For some countries, it might be easier to identify Internet-based services for a common, but not necessarily simple, situation than for the least complex situation. In this case, countries could report on the common situation and describe it in accompanying metadata. See example 6 for an illustration of the metadata.

Table 13: Example tabulation for core indicator EG7, weighted by population

Internet-based services for citizens	Central/federal government, percentage of citizens		State/provincial governments, percentage of citizens		All central and state governments, percentage of citizens	
	Who can (in theory) (a)	For whom not relevant (b)	Who can (in theory) (a)	For whom not relevant (b)	Who can (in theory) (a)	For whom not relevant (b)
Level 1: Obtain information from publicly accessible websites necessary to:						
Enrol to vote for the first time in government elections.						
Complete and lodge personal income tax return, least complex situation.						
Obtain unemployment benefits, least complex situation.						
Obtain child support allowance, least complex situation.						
Renew an international passport, least complex situation.						
Renew a driver's licence, least complex situation.						
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.						
Obtain a copy of a birth certificate for self.						
Obtain a copy of a marriage certificate for self.						
Register a motor vehicle, least complex situation.						
Level 2: Request printed forms or download forms (e.g. in pdf format) from publicly accessible websites necessary to:						
Enrol to vote for the first time in government elections.						
Complete and lodge personal income tax return, least complex situation.						
Obtain unemployment benefits, least complex situation.						
Obtain child support allowance, least complex situation.						
Renew an international passport, least complex situation.						
Renew a driver's licence, least complex situation.						
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.						
Obtain a copy of a birth certificate for self.						
Obtain a copy of a marriage certificate for self.						
Register a motor vehicle, least complex situation.						

Internet-based services for citizens	Central/federal government, percentage of citizens		State/provincial governments, percentage of citizens		All central and state governments, percentage of citizens	
	Who can (in theory) (a)	For whom not relevant (b)	Who can (in theory) (a)	For whom not relevant (b)	Who can (in theory) (a)	For whom not relevant (b)
Level 3: Fill in online forms available on (or via) publicly accessible websites necessary to:						
Enrol to vote for the first time in government elections.						
Complete and lodge personal income tax return, least complex situation.						
Obtain unemployment benefits, least complex situation.						
Obtain child support allowance, least complex situation.						
Renew an international passport, least complex situation.						
Renew a driver's licence, least complex situation.						
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.						
Obtain a copy of a birth certificate for self.						
Obtain a copy of a marriage certificate for self.						
Register a motor vehicle, least complex situation.						
Level 4: Undertake the complete process, via publicly accessible websites, to:						
Enrol to vote for the first time in government elections.						
Complete and lodge personal income tax return, least complex situation.						
Obtain unemployment benefits, least complex situation.						
Obtain child support allowance, least complex situation.						
Renew a driver's licence, least complex situation.						
Register a motor vehicle, least complex situation.						

Notes:

See notes for table 12. Additional notes for this table are:

(a) Who can (in theory) refers to the percentage of a country's citizens who are theoretically able to access each Internet-based service. Note that it does not refer to whether a citizen has the equipment or knowledge necessary to access those services, whether he or she needs to access those services nor whether he or she directly benefits (e.g. most of the services are not relevant to children but they may indirectly benefit if their parent or guardian accesses services electronically).

(b) For whom not relevant means that the service (whether undertaken online or offline) is not relevant for a particular level of government. The distinction between Not relevant and No may be difficult to make and reasons for choosing one over the other should be explained in notes on particular services.

290. For international comparison purposes, a metric may be created from table 13 to simplify the comparative presentation. An example of such a comparison is shown in table 14.

Table 14: Example comparison for core indicator EG7, all governments, levels 1 and 3

Internet-based services for citizens	Country 1, percentage of citizens		Country 2, percentage of citizens		Country 3, percentage of citizens	
	Who can (in theory) (a)	For whom not relevant (b)	Who can (in theory) (a)	For whom not relevant (b)	Who can (in theory) (a)	For whom not relevant (b)
Obtain information from publicly accessible websites necessary to:						
Enrol to vote for the first time in government elections.						
Complete and lodge personal income tax return, least complex situation.						
Obtain unemployment benefits, least complex situation.						
Obtain child support allowance, least complex situation.						
Renew an international passport, least complex situation.						
Renew a driver's licence, least complex situation.						
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.						
Obtain a copy of a birth certificate for self.						
Obtain a copy of a marriage certificate for self.						
Register a motor vehicle, least complex situation.						
Fill in online forms available on (or via) publicly accessible websites necessary to:						
Enrol to vote for the first time in government elections.						
Complete and lodge personal income tax return, least complex situation.						
Obtain unemployment benefits, least complex situation.						
Obtain child support allowance, least complex situation.						
Renew an international passport, least complex situation.						
Renew a driver's licence, least complex situation.						
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.						
Obtain a copy of a birth certificate for self.						
Obtain a copy of a marriage certificate for self.						
Register a motor vehicle, least complex situation.						

Notes: See notes for table 12.

Metadata reporting and dissemination

291. For international reporting, countries are asked to provide *statistical standards statements* providing both indicator and survey metadata.[47] Some of this information may be provided as notes to tables. The information will also be very useful for national users and should be provided with the data if possible. In particular, information on high sampling errors associated with individual estimates should be provided with tabulated data. Where data are suppressed because of high sampling errors or confidentiality reasons, this should be indicated (for example, by a symbol in the cell).

292. Tables 15 and 16 show general statistical standards statements for indicator and survey metadata respectively.

293. An example of a statistical standards statement for indicator EG7 is provided in example 8 in annex 3. Note that some of the information is also provided as notes to tables (shown as examples 6 and 7 in annex 3).

Table 15: Statistical standards statement – indicator metadata

Core indicator	Minimal metadata
EG1–EG2	Reference date, scope (which central government organizations have been included and how they are defined), extended scope (which other entities have been included in scope and whether a gender split has been calculated), major coverage problems, deviations from definitions and restrictions on output (such as the extent of data suppression because of confidentiality constraints).
EG3–EG6	Reference date, scope (which central government organizations have been included and how they are defined), extended scope (which other entities have been included in scope), major coverage problems, deviations from definitions and restrictions on output (such as the extent of data suppressions because of confidentiality constraints).
EG7	Methodology for measuring the indicator, notes on compilation of the indicator (e.g. brief outline of the agencies involved and the nature of the Internet-enabled services they offer), reference dates (for population and status of available Internet-based services for citizens), scope (which central and state government organizations have been included and how they are defined), major coverage problems and deviations from definitions. Since the indicator is considered experimental, countries are asked to comment on any difficulties they had understanding, or responding to, the model questions. See example 8.

Table 16: Statistical standards statement – survey metadata

Metadata class	Minimal metadata
Country	
Survey name and organization conducting the survey (if relevant)	
Reference date(s)	
General information about the survey	Survey history and changes to the survey over time that would affect comparisons (e.g. changes to definitions, methodology). Frequency of survey (e.g. annual, one-off). Whether the survey is stand-alone or a module in another survey. Whether the survey is mandatory or voluntary (legal basis for the survey). Main statistical standards used and deviations from the standards presented in this manual (for instance, differences in scope, statistical units, size classes).

47 Noting that there is some overlap (e.g. scope).

Metadata class	Minimal metadata
Scope (target population), survey frame and coverage, statistical units	Description of government organization scope and significant limitations on the scope or coverage of the survey (e.g. the exclusion of non-urban organizations). Survey frame(s) used, including an assessment of inaccuracies such as undercoverage and duplication. Statistical units used.
Survey methodology and procedures	Collection technique (e.g. mailed questionnaire). Whether a sample or census; if former, sample size and design (e.g. stratified random sample with all units with 250 employees or more selected). Estimation procedures, including imputation and misclassification rules for units, and imputation rules for missing items.
Response rate	For each major grouping.
Relative standard errors (coefficients of variation) or confidence intervals	RSEs may be presented in a range for each type of aggregate (e.g. total-level, jurisdiction-level).
Known non-sampling error	Bias (e.g. non-response, frame errors, questionnaire bias) and attempts made to minimize it.
Reference to further information about the survey (usually a website link)	This might include links to more detailed methodological information, questionnaires, how to obtain more detailed data, future plans, etc.
Contact information for further information about the survey or survey data	A name and e-mail address is very useful.

Data collection and dissemination by international organizations

294. It is expected that the e-government core indicator data will be collected and disseminated by ECA in collaboration with members of the *Partnership* and NSOs.

Reporting core indicator data to international organizations

295. For international reporting purposes, where possible, countries should provide numbers for indicators EG1 to EG6 rather than proportions. This makes it clear what the data mean and facilitates comparison of data across countries. It also enables re-aggregation of subcategories (for example, size categories). Population estimates for the total population and for each subpopulation (as indicated by the classificatory variables), also need to be provided so that proportions can be derived. Both sets of numbers should represent the whole population and not a sample.

296. For EG7, countries should provide jurisdiction-level information with relevant population numbers per table 12 and data weighted by population per table 13.

297. The numbers to be provided for indicators EG1 to EG6 are:

- TE: Total number of persons employed in central government organizations, split by organization size. Where possible, TE should also be split by male and female, by size. TE is the denominator for EG1 and EG2, and also for employment-weighted versions of indicators EG3 to EG6.
- TGO: Total number of central government organizations, split by organization size. This is the denominator for indicators EG3 to EG6.
- TEUC: Total number of persons employed in central government organizations, routinely using computers, split by organization size. This is the numerator of EG1. Where possible, TEUC should be also split by male and female, by size.

- TEUI: Total number of persons employed in central government organizations routinely using the Internet, split by organization size. This is the numerator of EG2. Where possible, TEUI should be also split by male and female, by size.
- TGLAN: Total number of central government organizations with a LAN, split by organization size. This is the numerator for EG3.
- TEGLAN: Total number of persons employed in central government organizations with a LAN. This is the numerator for the employment-weighted version of EG3.
- TGINTR: Total number of central government organizations with an intranet, split by organization size. This is the numerator for EG4.
- TEGINTR: Total number of persons employed in central government organizations with an intranet. This is the numerator for the employment-weighted version of EG4.
- TGINT: Total number of central government organizations with Internet access, split by organization size. This is the numerator for EG5 and is split by type of Internet access service used (as well as 'any Internet access').
- TEGINT: Total number of persons employed in central government organizations with *any* Internet access. This is the numerator for the employment-weighted version of EG5 and is not split by type of Internet access.
- TGWEB: Total number of central government organizations with a web presence, split by organization size. This is the numerator for EG6.
- TEGWEB: Total number of persons employed in central government organizations with a web presence. This is the numerator for the employment-weighted version of EG6.

Chapter 11. Conclusion

298. The *Manual for measuring e-government* joins three other manuals for measuring the core ICT indicators developed and promulgated by the Partnership on Measuring ICT for Development (ITU, 2009, 2014; UNCTAD, 2009; UIS, 2009[48]). The indicators, standards and methodologies presented in this manual focus on the seven core e-government indicators presented in the *Framework for a set of e-government core indicators* (Partnership and ECA, 2012), which was endorsed by the UNSC at its 2012 meeting (UNSC, 2012).

299. While the primary focus of the Manual is on a small set of core e-government indicators, a number of suggestions have been provided on expanding the scope of the indicators, adding additional classifications, and measuring other topics in surveys of government organizations.

300. It is acknowledged that important areas of e-government measurement are not included in the Framework or the Manual. One of those areas is delivery of government services to mobile telephones (especially where Internet access is limited) and another is measuring the impacts of e-government, both on government organizations and the broader economy and society. As with the other *Partnership* core ICT indicators, it is expected that the list of e-government indicators and their scope will grow with experience. Countries are encouraged to share their experiences with the *Partnership* in order to facilitate such development.

301. Countries are asked to consider including the core indicators model questions, along with the definitions and standards in the Manual, when designing or re-designing surveys that collect e-government data. It is acknowledged that countries may be restricted in mounting new surveys to collect indicators EG1 to EG6. However, collection of data for EG7 is likely to be a relatively inexpensive task and countries are therefore asked to trial the model question and provide feedback to the *Partnership*.

302. As with the other core ICT indicators, the resources of the *Partnership* will be available to assist in statistical data collection.

48 For a much larger set of indicators than the Partnership indicators on education, see Guide to Measuring Information and Communication Technologies in Education, UNESCO Institute for Statistics (2009).

Annex 1. Details of country-level e-government surveys

303. This annex presents information on existing (or relatively recent) surveys of e-government by individual countries. The compilation was largely completed by the end of 2012, with several updates in 2013. Unless otherwise stated, details are for the most recent survey at time of preparation.

Country	Collection agency and survey name	Reference year/s	Scope and units	Topics included	Methodology
Australia	Australian Bureau of Statistics (ABS) – Government Technology, Australia	2002/2003, 1999/2000	Federal, state/territory and local government organizations whose predominant activity falls within the institutional sector of General Government, including government education. Public corporations were excluded as were non-education organizations with employment less than 50 persons.	Information and communication technology (ICT) expenditure (operating and capital) and employment.	Frame: ABS Business Register with supplementation from government directories, websites and listings. Survey design: census of federal and state/territory government and vocational education organizations, and a stratified sample of local government, universities and schools.
Australia	Australian Bureau of Statistics – Government use of Information Technology, Australia	1997/1998, 1993/1994	Federal, state/territory and local government organizations whose predominant activity falls within the institutional sectors of General Government and the Reserve Bank of Australia. Public trading enterprises were excluded as were education organizations and foreign government representation.	Proportion of government organizations using ICT including: PCs, the Internet, website, web browser access, e-mail, networks (LAN, WAN), bar-coding, VoIP, video conferencing, use of the Internet for selected business activities, benefits of Internet use, barriers and limitations to Internet use, maintenance for website (homepage). Staff to technology use ratio. Information technology staff employment ratios. Expenditure on ICT. Proportion of government organizations with plans to adopt technology.	Frame: government organizations recorded on the ABS Business Register. Statistical unit: management unit (the highest level accounting unit within a business or organization, having regard to the required level of industry homogeneity, for which a set of accounts is maintained). Survey design: stratified random sample (plus a census of all units with 500 or more persons employed). Classification by employment size: 1–19 persons, 20–99 persons, 100–499 persons, 500–999 persons, 1000–4999 persons, 5000 or more persons.

Country	Collection agency and survey name	Reference year/s	Scope and units	Topics included	Methodology
Australia	Department of Finance and Deregulation – ICT benchmarking data collection exercise.	Annual, starting 2008/2009	All Australian government agencies subject to the Financial Management and Accountability (FMA) Act.	Total ICT expenditure, including a breakdown of expenditure by service tower and cost element. ICT personnel, including whether internal or external, and by level. ICT infrastructure deployed by agencies, including numbers of servers and desktop devices.	Frame: list of Australian government agencies subject to the FMA Act. Statistical unit: Australian government agencies subject to the FMA Act. Survey design: all in-scope agencies are included in the survey, although not all data items are collected from small and medium agencies. Classification by agency size: large (annual ICT expenditure over $20 million), medium (annual ICT expenditure $2 million–$20 million), small (annual ICT expenditure below $2 million).
Brazil	Center of Studies on Information and Communication Technologies – ICT Electronic Government Survey 2013.	2013	Government organizations of all branches (executive, legislative and judiciary/public prosecution) and all federative bodies (federal, states and municipalities) in Brazil. Excluded establishments: market institutions and profit agencies controlled by the government, schools, hospitals and health centres, museums, police stations, post offices, indirect administration and legislative branch of municipalities.	ICT infrastructure (including ICT investment, proportion of government organizations which use computers and types of computers, with Internet access by type, with a LAN, intranet). Management of ICT (existence of IT department, outsourcing IT, origin of resources spent on IT, type of expenditure on IT). Software (proportion of government organizations which use an open source operating system, with management systems, evaluation by type of activity, models of software development in government agency). Use of ICT by persons employed in government agencies (proportion of persons employed in central government organizations routinely using computers/the Internet, type of Internet activities). Systems (proportion of government organizations with management systems, systems for financial control, monitoring systems).	Statistical unit: Government organizations defined as federal and state governments: government units, including non-market institutions and non-profit agencies controlled by the government and social security funds; municipalities (only the executive branch). Survey design: census of federal government organization, stratified sample of state government organizations and municipalities. Collection method: CATI (computer assisted telephone interview).

Country	Collection agency and survey name	Reference year/s	Scope and units	Topics included	Methodology
				Interoperability and security (interoperability rules and standards, type of information filing, security copy resources, backup information security procedures). Information on public services through the Internet (proportion of government organizations with a web presence, provision and type of information about public services available on the Internet). Provision of public services (proportion of government organizations that provide services through the Internet, existence of electronic public services, barriers to the provision of public services via the Internet). Mobile devices, information available, accessibility, institutional channels of participation, communication and social networking, and open data. Individuals (skills, incl ICT, and abilities, barriers and incentives).	
Canada	Statistics Canada – Survey of Electronic Commerce and Technology.	Annual 1999–2007	Business and government (federal and provincial government institutions, including health care and social assistance; local governments are excluded).	Proportion of organizations using ICTs (including computers, e-mail, intranet, extranet, the Internet, RFID, websites). Use of ICT by employees (computer, the Internet, e-mail). Proportion of organizations with particular website features e.g. online payment. Proportion of organizations using the Internet to sell and purchase products, logistics management. Proportion of organizations using particular methods of Internet access.	Frame: Statistics Canada's Business Register supplemented by an administrative list is also used to cover some sectors, including the public sector. Statistical unit: enterprise (organizational unit of a business that directs and controls the resources relating to its domestic organization and for which consolidated financial and balance sheet accounts are maintained). Survey design: sample was stratified based on industry and size (which, for the public sector, is number of employees). All large units are selected. Collection method: mail-based survey.

Country	Collection agency and survey name	Reference year/s	Scope and units	Topics included	Methodology
The Czech Republic	Czech Statistical Office – ICT Usage in Public Administration.	Annual 2003–2010	State administration offices (ministries, central state administration offices, labour offices, courts, regional veterinary offices etc.), regional offices and municipalities (or parts of Prague).	Usage of ICTs to cover needs of organization (the Internet, security facilities). Websites and services available online for citizens and enterprises. Citizens' access to ICTs arranged by public administration (public Internet access point, information kiosk). Employees with access to ICTs. Electronic data switch in/between state administration offices.	Frame: Czech Business Register. Survey design: census of chosen organizations; the Czech Statistical Office developed a short module related to ICT usage in the public administration sector, which is collected on the annual questionnaire for organizational units of the state, territorial self-governing units, partially budget-funded organizations and similar government institutions. Collection method: mail survey, which was also possible to fill out and submit electronically.
The Czech Republic	Czech Statistical Office – Survey of the websites of public administration	Annual 2003–2011	Survey covered 25 central state administration offices (ministries, Czech Statistical Office, Mapping and Cadastre, National Security Office, Energy Regulatory Office), all 14 regional offices (including capital city Prague) and all 205 municipalities with extended competence.	Monitors availability of information and online services on public administration websites, including information (e.g. job vacancies) and services (e.g. languages, FAQ). Municipalities with extended competence were also monitored from the point of availability of specific basic online services (personal documents, birth certificate, wedding certificate, business license, construction permit, announcement of moving, social contributions). Their availability was assessed by degree of sophistication (Stage 1 – Information: online information about public services, Stage 2 – One-way interaction: downloading of forms, Stage 3 – Two-way interaction: processing of forms, Stage 4 – Transaction: full electronic case handling).	Frame: database of organizations gathered from Portal of Public Administration. Collection method: Website survey collects data straight from websites (by statistician who is surfing through public administration websites as a regular citizen who is searching for specific information and services).

Country	Collection agency and survey name	Reference year/s	Scope and units	Topics included	Methodology
Denmark	Statistics Denmark – Use of ICT in the Public Sector.	Annual, 2000/2011	Public sector authorities at central and at decentralized level (state, counties and municipalities). Excludes hospitals, schools, libraries etc. Includes higher education institutions.	Proportion of public authorities with updated ICT strategy. Proportion of public authorities applying basic guidelines for ICT architecture. Proportion of public authorities offering digital services at their website, providing facilities to download forms at their website, providing facilities to submit administrative information by means of web-based forms via their website, providing facilities to access personal data from administrative systems via their website. Proportion of public authorities using electronic document management, using electronic case handling. Proportion of public authorities applying complete digital treatment of internal procedures concerning certification and payment. Proportion of public authorities that have integrated electronic purchases with their enterprise resource planning (ERP) system. Proportion of public authorities exposed to virus attacks (resulting in a loss of information or working time). Proportion of public authorities using open source software, using open source at own server, using open source office products, using open source to other purposes.	Frame: Statistics Denmark's Business Register. Survey design: census of selected organizations, stand-alone survey (with a 75 per cent response rate). Collection method: web form and mail-based in combination. Classification by population size: the municipalities are grouped by population: 0–39,999 and 40,000+. International comparability: while there is some commonality of questions between the Danish and the Norwegian survey, structural differences in the public sector of the two countries, make it difficult to make direct comparisons.
Denmark	Statistics Denmark – ICT expenditures in public authorities	Annual, 2003–2007	Public sector authorities at central and at decentralized level (state, counties and municipalities).	Value of expenditures/investments for: computer and related equipment, telecommunication equipment, audio and video equipment, other ICT goods, pre-packaged software, customized software, ICT services, ICT education expenditure, rental and service subscriptions. Own account software production (person-years spent on). Background variables are obtained from the Business register.	Frame: Statistics Denmark's Business Register. Survey design: census of selected organizations, stand-alone survey. Collection method: mail-based.

Country	Collection agency and survey name	Reference year/s	Scope and units	Topics included	Methodology
Egypt	The Ministry of Communication and Information Technology (MCIT) and the Central Agency for Public Mobilization and Statistics (CAPMAS) – Measuring ICT access and use by governmental and public sector enterprises.	Annual, from 2007	Public entities and governmental ministries (government businesses and universities are excluded).	Proportion of government organizations with a fixed line telephone, mobile cellular telephone, computer, website, intranet, LAN, extranet. Proportion of government organizations undertaking particular Internet activities (e.g. sending or receiving e-mail). Proportion of government organizations using the Internet and by type of access.	Frame: The frame includes all public and governmental entities in Egypt and is provided by the Central Agency for Organization and Administration. Statistical units: governmental and public sector enterprises. Survey design: census, stand-alone survey. Collection method: personal interview, data collected on paper forms. Features of survey processing: data entry is using intelligent packages within the data collection systems. Output classifications used: location (governmental), employment size and urban vs. rural. Comments on international comparability: no international organization collects this kind of information, but work is underway to update some of these indicators for WSIS target indicators within the WSIS forum.

Country	Collection agency and survey name	Reference year/s	Scope and units	Topics included	Methodology
Finland	Ministry of Finance – Finnish Government ICT Review.	Annual, 1975–2010	Central government administration including state agencies at central, regional and local level that are financed through the government budget. Excluded from the survey scope are: Parliament and institutions that work under its supervision such as Social Insurance Institution of Finland (KELA), the Bank of Finland and the National Audit Office. Also excluded are state enterprises and local self-governing authorities who provide social services, health care and primary education. Universities and polytechnics were excluded from 2010	ICT expenditure and IT personnel, IT hardware (number) and software. Remote working (number of people). IT security problems experienced (proportion of government organizations). IT plans and strategies. Electronic services and their development initiatives.	
Lebanon	Ministry of Administrative Reforms and the Civil Service Board.	2011	Central government ministries (19), Public institutions (33), Mouhafazat (6), Municipalities (959).	Proportion of persons employed in central government organizations routinely using computers. Proportion of persons employed in central government organizations routinely using the Internet. Proportion of central government organizations with a LAN. Proportion of central government organizations with an intranet. Proportion of central government organizations with Internet access, by type of access: Modem, DSL, Leased line, Fibre. Proportion of government organizations with a web presence. Proportion of government organizations offering online services by level of sophistication of service: Electronic forms, level 1, Electronic services, level 2, Electronic transactions, level 3.	

Country	Collection agency and survey name	Reference year/s	Scope and units	Topics included	Methodology
Morocco	Ministère de la fonction publique et de la modernisation de l'Administration – Cartographie de l'utilisation des Technologies de l'Information et de la Communication (TIC) dans les secteurs publics.	Annual, 2008–2010	Ministerial departments and public institutions (278 entities), including regional and local levels of government.	Number of staff dedicated to ICT (engineers, technicians) as a proportion of total staff. Number of workstations as a proportion of total staff. Proportion of workstations connected to the Internet. Number of government websites and proportion of government institutions with at least one site. Number of government online services and proportion of government institutions providing online services. Proportion of government institutions with an ICT master plan.	(Details for 2009 survey). Survey design: census of all in-scope units. Collection method: the questionnaire was available in paper form (used by 10 per cent of respondents), in electronic form (used by 50 per cent of respondents), and as an online questionnaire accessible via the Internet (used by 40 per cent of respondents). Output classifications used: by sector (Administrative, Economic and Productive, Infrastructure and Social).
				Proportion of government institutions with a LAN. Proportion of government institutions with a server. Proportion of government institutions with a broadband Internet connection (greater than 256 kbps). Proportion of government institutions with Internet access by type. Proportion of servers with an open source operating system. Proportion of government institutions that have implemented security measures for computer equipment.	

Country	Collection agency and survey name	Reference year/s	Scope and units	Topics included	Methodology
New Zealand	Statistics New Zealand (b) – Government Use of Information and Communication Technologies Survey.	2006	Institutional sector code: all 3111 (Central Government), all 3121 (Funded Social Security Schemes). Australian and New Zealand Standard Industrial Classification 1993 (ANZSIC93): M81130 (Local Government Administration) with Institutional sector code of 3291 (Other Local Authorities). Business type code: All 08 (Central Government) and 10 (Local Government). Excludes: state owned enterprises and local authority trading enterprises.	Proportion of government staff with access to the Internet at work. Proportion of government organizations using ICT including: computers, the Internet, networks (LAN, intranet, VPN), mobile phone, VoIP, RFID, ICT security, website presence and content, and with access to the Internet (by type). Total government operating and capital expenditure on ICT. Proportion of government organizations planning to invest in ICT. Other topics: barriers, training.	Frame: Statistics NZ Business Frame. Survey design: census of chosen organizations (323 enterprises), stand-alone survey. Collection method: mail-based survey.
	State Services Commission – Government Use of ICT Survey.	2008	Central government and state owned enterprises except those classified as Conservation Sector organizations (Fish and Game Council, Reserve Boards etc.), School Boards of Trustees, Tertiary Education Institutions, and Trusts. Also excluded were very small (less than about five employees) organizations.	ICT expenditure. Desktops or laptops per ICT user. Number of desktops, laptops and servers by organization size and type. Internet connection by type (proportion of organizations). Use of video technology by type (proportion of organizations). Networked State Services (offered to consumers). Desktop strategies. ICT employees and contract staff. Open source software policy and support (proportion of organizations). Data exchange by type (proportion of organizations).	Frame: Public Sector Directory. Respondent: government CIOs. Survey design: census of chosen organizations, stand-alone survey. Collection method: online questionnaire, with a printed version of the questionnaire supplied to respondents who requested this method. Classification by size: <50 employees, 50–99 employees, 100–499 employees, 500–999 employees, 1000–4999 employees, 5000 or more employees.

Country	Collection agency and survey name	Reference year/s	Scope and units	Topics included	Methodology
Nigeria	National Bureau of Statistics (NBS) and National Information Technology Development Agency (NITDA) – Scan-ICT.	2011 (as part of Scan-ICT project).	Public sector institutions and establishments – federal and state government ministries, agencies and departments; public sector organizations; local government areas (LGAs), local council development areas (LCDAs) and wards, organizations and institutions, etc.	Number and percentage of government ministries, departments and agencies (MDAs) with Internet connection. Number and percentage of MDAs using computers. What the Internet was used for (e.g. selling, placing orders, banking) by percentage of government MDAs. Number and percentage of government MDAs with corporate networks. Number and percentage of government MDAs with websites. Barriers to ICT, use of the Internet and e-government. Percentage of government MDAs that implement e-government systems (e.g. back-office systems). Percentage of government MDAs providing services online. Number of government MDAs with an IT security or disaster recovery/business continuity process. ICT personnel (as a percentage of total staff) in government MDAs. Means of internal and external communication by staff (percentage of staff using each means). Number of government MDAs with plans for e-governance initiatives. Number of computers used by government MDAs. Number of persons in government MDAs that use computer. Expenditure on ICTs (as a percentage of total expenditure) in government MDAs. Total supply and demand, ICT skills (programmers, software, system developers, analysts – computer scientists – telecom or network engineers, technicians etc.).	Frame: based on information from updated listing by the NBS and field team. Survey design: random sample within each state of Nigeria. Collection method: face-to-face personal interview. Respondent: head of ICT units in MDAs and head of MDA. For more information, see NBS and NITDA (2012).

Country	Collection agency and survey name	Reference year/s	Scope and units	Topics included	Methodology
Norway	Statistics Norway – Use of information and communication technology in public administration.	2004, 2008, 2012	Public administration is defined as enterprises within state and social administration, state business management, lenders of the state, state enterprises (owned 100 per cent by the state) and the Bank of Norway.	Proportion of organizations using electronic business processes, including order processing, invoice processing, reception and submission of electronic invoices. Proportion of organizations using open source software, by type. Proportion of organizations offering electronic services (download and print forms, order written material, self-worked services with electronic response, submit data in web form, submit data in prefilled web form, see data in administrative systems, online payment of services on homepage, choose electronic communication). Proportion of organizations with strategies in particular areas of ICT. (For 2012) Expenses on computer equipment, software and related consultancy services.	Frame: Statistics Norway's Central Register of Establishments and Enterprises. Survey design: census of chosen organizations, stand-alone survey. Collection method: mail- and web-based questionnaires. Survey processing: The web form contains checks that guide the enterprises to give consistent answers. Data from the paper forms are checked and revised.
Norway	Statistics Norway – ICT usage in municipalities and county municipalities.	Annual, 2002–2008	All municipalities and county municipalities.	Proportion of organizations using electronic case handling and electronic communication. Proportion of relevant cases handled electronically. Proportion of organizations using open source software, by type. Proportion of organizations with strategies in particular areas of ICT.	Survey design: census of chosen organizations. Collection method: data are provided electronically from municipalities and county municipalities. Survey processing: data are verified through logical checks in the electronic questionnaire. International comparability: some of the variables in the Danish survey are comparable with some variables in the Norwegian survey.

Country	Collection agency and survey name	Reference year/s	Scope and units	Topics included	Methodology
Oman	Information Technology Authority – ICT Usage in Government Survey.	2009, 2010 and 2011	The survey covered most government entities.	Proportion of employees with ICT skills and qualifications. Staff to computers ratio. Proportion of computers connected to the Internet. Proportion of government entities with ICT maintenance service. Proportion of government entities by type of Internet access. Proportion of government employees routinely using computer and the Internet at work and using e-mail to communicate at work (internal and external). Proportion of online services by type of service. Proportion of government entities using particular communication tools. Proportion of government entities with intranet, WiFi, websites, portals and network connection presence.	Survey design: census of selected government organizations. Collection method: the survey was collected online at ITA website (www.ita.gov.om).

Country	Collection agency and survey name	Reference year/s	Scope and units	Topics included	Methodology
The Russian Federation	National Research University – Higher School of Economics (HSE) based on data from the Federal Service for State Statistics (Rosstat).	2010	Federal and regional government agencies and local self-government institutions. Federal authorities include the Executive Office of the President of Russia, the Federal Assembly of the Russian Federation, Government of the Russian Federation, executive and judicial authorities of the Russian Federation and other administrative bodies of the Russian Federation. Regional authorities include legislative, executive and judicial authorities. Local self-government institutions include municipal agencies, local administrations, municipal supervisory organizations and other local self-government agencies, and municipal election commissions. Public Authorities are classified in accordance with the Russian Classification of Government Authorities and Agencies (RCGAA).	Proportion of government organizations using computers. Proportion of government organizations with Internet access and broadband access. What the Internet was used for (e.g. selling, placing orders, banking) by percentage of government organizations. Proportion of government organizations with a website. Proportion of government organizations with computing networks, intranet and extranet.	
Sri Lanka	Information & Communication Technology Agency of Sri Lanka (ICTA) – Government Organizations Employees Survey (carried out by consultants to ICTA).	2010, 2008	Scope: Colombo-based government organizations and provincial or regional government organizations.	Proportion of staff undertaking certain tasks using office ICT facilities. Proportion of staff with particular ICT knowledge and skills. Proportion of staff using ICT, including the Internet and e-services. Proportion of staff with particular attitudes and perceptions of ICT usage/delivering services by using ICT. Proportion of staff with particular expectations of future improvements in government IT services.	Survey design: stratified random sample of government organizations (Colombo-based offices and provincial/regional organizations) and government employees (strata were executive officers and non-executive officers). Collection method: face-to-face interview. Focus group discussions were also held.

Country	Collection agency and survey name	Reference year/s	Scope and units	Topics included	Methodology
				Proportion of staff who are satisfied with e-government services provided by their organizations. Proportion of staff with particular perceptions regarding their organization's ICT status.	
	Information & Communication Technology Agency of Sri Lanka (ICTA) – Survey on ICT Usage in the Government Sector (carried out by consultants to ICTA).	2008	Scope: per list of strata under Methodology. Public bodies such as hospitals, schools, universities, banks, railway stations and post offices were out of scope.	Proportion of organizations using ICT (word processing, spread sheets, databases, presentations, e-mail, the Internet, type of Internet connection, types of connectivity). Proportion of organizations providing services to the general public using ICT, the availability of a website and if so, what services are provided via their respective websites. Use of e-mail by government employees. Inventory of ICT equipment per 100 employees. Level of software applications usage and security issues. Personnel handling ICT-related work and training. Budgeting and ICT-related expenditures. Future ICT plans.	Survey design: the sample was stratified into strata as follows: ministries, departments, statutory boards and ministries of the provincial governments, departments of the provincial governments, district secretariats, and divisional secretariats. Collection method: hand delivered forms, with some e-mailed, follow-up short interview.

Source: Australian Bureau of Statistics; Czech Statistical Office; Center of Studies on Information and Communication Technologies (Brazil); Department of Finance and Deregulation (Australia); Information & Communication Technology Agency of Sri Lanka; Information Technology Authority Oman; Ministère de la fonction publique et de la modernisation de l'Administration (Morocco); Ministry of Communication and Information Technology (Egypt); Ministry of Finance (Finland); National Bureau of Statistics (Nigeria) and National Information Technology Development Agency (Nigeria); National Research University – Higher School of Economics and the Federal Service for State Statistics (Rosstat) (the Russian Federation); Presidency of the Council of Ministers (Lebanon); State Services Commission (New Zealand); Statistics Canada; Statistics Denmark; Statistics New Zealand; Statistics Norway.

Annex 2. Partnership on Measuring ICT for Development – core list of ICT indicators

Core indicators on ICT infrastructure and access	
A1	Fixed telephone subscriptions per 100 inhabitants
A2	Mobile cellular telephone subscriptions per 100 inhabitants
A3	Fixed (wired)-broadband Internet subscriptions per 100 inhabitants, by speed
A4	Wireless-broadband subscriptions per 100 inhabitants
A5	International Internet bandwidth per inhabitant (bits/second/inhabitant)
A6	Percentage of the population covered by at least a 3G mobile network
A7	Fixed broadband Internet prices per month
A8	Mobile cellular prepaid prices per month
A9	Mobile broadband Internet prices per month
A10	TV broadcasting subscriptions per 100 inhabitants
Core indicators on access to, and use of, ICT by households and individuals	
HH1	Proportion of households with a radio
HH2	Proportion of households with a television
HH3	Proportion of households with telephone
HH4	Proportion of households with a computer
HH5	Proportion of individuals using a computer
HH6	Proportion of households with Internet
HH7	Proportion of individuals using the Internet
HH8	Proportion of individuals using the Internet, by location
HH9	Proportion of individuals using the Internet, by type of activity
HH10	Proportion of individuals using a mobile cellular telephone
HH11	Proportion of households with Internet, by type of service
HH12	Proportion of individuals using the Internet, by frequency
HH13	Proportion of households with multichannel television, by type
HH14	Barriers to household Internet access
HH15	Individuals with ICT skills, by type of skills
HH16	Household expenditure on ICT
Core indicators on use of ICT by businesses	
B1	Proportion of businesses using computers
B2	Proportion of persons employed routinely using computers
B3	Proportion of businesses using the Internet
B4	Proportion of persons employed routinely using the Internet
B5	Proportion of businesses with a web presence
B6	Proportion of businesses with an intranet
B7	Proportion of businesses receiving orders over the Internet
B8	Proportion of businesses placing orders over the Internet
B9	Proportion of businesses using the Internet, by type of access
B10	Proportion of businesses with a local area network (LAN)
B11	Proportion of businesses with an extranet
B12	Proportion of businesses using the Internet by type of activity

Core indicators on the ICT (producing) sector	
ICT1	Proportion of total business sector workforce involved in the ICT sector
ICT2	ICT sector share of gross value added
Core indicators on international trade in ICT goods	
ICT3	ICT goods imports as a percentage of total imports
ICT4	ICT goods exports as a percentage of total exports
Core indicators on ICT in education	
ED1	Proportion of schools with a radio used for educational purposes (for ISCED 1–3)
ED2	Proportion of schools with a television used for educational purposes (for ISCED 1–3)
ED3	Proportion of schools with a telephone communication facility (for ISCED 1–3)
ED4	Learners-to-computer ratio in schools with computer-assisted instruction (for ISCED 1–3)
ED4bis	Learners-to-computer ratio (for ISCED 1–3)
ED5	Proportion of schools with Internet access (for ISCED 1–3):
ED6	Proportion of learners who have access to the Internet at school (for ISCED 1–3)
ED7	Proportion of learners enrolled at the post-secondary level in ICT-related fields (for ISCED levels 4–6)
ED8	Proportion of ICT-qualified teachers in schools (for ISCED 1–3)
EDR1	Proportion of schools with electricity (for ISCED 1–3)
Core indicators on e-government	
EG1	Proportion of persons employed in central government organizations routinely using computers
EG2	Proportion of persons employed in central government organizations routinely using the Internet
EG3	Proportion of central government organizations with a local area network (LAN)
EG4	Proportion of central government organizations with an intranet
EG5	Proportion of central government organizations with Internet access, by type of access:
EG6	Proportion of central government organizations with a web presence
EG7	Selected Internet-based services available to citizens, by level of sophistication of service

Annex 3. Case study: e-government core indicator EG7, Australia

304. This annex illustrates the compilation of EG7 for Australia. This is an appropriate example because:

- Australia has a relatively complicated government structure, with one federal (central) government, and eight state/territory (provincial) governments.
- Most Internet-based services offered by Australian governments are quite well advanced and therefore all four levels need to be investigated carefully.

305. Example 6 shows jurisdiction-level data, while example 7 shows the derivation of population-weighted data from jurisdiction-level data. Example 8 shows a statistical standards statement corresponding to the EG7 tabulations for Australia.

306. While every attempt was made to provide correct data, the example is presented primarily for purposes of illustration rather than to convey comprehensive information about the status of e-government in Australia. Details are as at August to September 2012.

Example 6: Core indicator EG7, Australia, supplementary indicator, by jurisdiction

Internet-based services for citizens (a)	Australian (central) Government	New South Wales	Victoria	Queensland	South Australia	Western Australia	Tasmania	Northern Territory	Aust. Capital Territory (ACT)
Population (million) (b)	22.4822	7.2477	5.5745	4.5130	1.6450	2.3872	0.5117	0.2324	0.3707
Level 1: Can citizens obtain information from publicly accessible websites necessary to:									
Enrol to vote for the first time in government elections (c).	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Complete and lodge personal income tax return (d), least complex situation (e).	Yes	NR (f)	NR	NR	NR	NR	NR	NR	NR
Obtain unemployment income benefits (g), least complex situation.	Yes	NR	NR	NR	NR	NR	NR	NR	NR
Obtain child support allowance (h), least complex situation.	Yes	NR	NR	NR	NR	NR	NR	NR	NR
Renew an international passport (i), least complex situation.	Yes	NR	NR	NR	NR	NR	NR	NR	NR
Renew a driver's licence (j), least complex situation.	NR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police (k).	NR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Internet-based services for citizens (a)	Australian (central) Government	New South Wales	Victoria	Queensland	South Australia	Western Australia	Tasmania	Northern Territory	Aust. Capital Territory (ACT)
Obtain a copy of a birth certificate for self (l).	NR	NR	NR	NR	NR	NR	NR	NR	Yes
Obtain a copy of a marriage certificate for self (l).	NR	NR	NR	NR	NR	NR	NR	NR	Yes
Renew registration for a motor vehicle (m), least complex situation.	NR	NR	NR	NR	NR	NR	NR	NR	Yes
Level 2: Can citizens request printed forms or download forms (e.g. in pdf format) from publicly accessible websites necessary to:									
Enrol to vote for the first time in government elections (c).	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Complete and lodge personal income tax return (d), least complex situation (e).	Yes	NR	NR	NR	NR	NR	NR	NR	NR
Obtain unemployment income benefits (g), least complex situation.	NR	NR	NR	NR	NR	NR	NR	NR	NR
Obtain child support allowance (h), least complex situation.	Yes	NR	NR	NR	NR	NR	NR	NR	NR
Renew an international passport (i), least complex situation.	Yes	NR	NR	NR	NR	NR	NR	NR	NR
Renew a driver's licence (j), least complex situation.	NR	NR	NR	NR	NR	NR	NR	NR	NR
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police (k).	NR	NR	NR	NR	NR	NR	NR	NR	NR
Obtain a copy of a birth certificate for self (l).	NR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obtain a copy of a marriage certificate for self (l).	NR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Renew registration for a motor vehicle (m), least complex situation.	NR	NR	NR	NR	NR	NR	NR	NR	NR
Level 3: Can citizens fill in online forms available on (or via) publicly accessible websites necessary to:									
Enrol to vote for the first time in government elections (c).	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Complete and lodge personal income tax return (d), least complex situation (e).	Yes	NR	NR	NR	NR	NR	NR	NR	NR

Internet-based services for citizens (a)	Australian (central) Government	New South Wales	Victoria	Queensland	South Australia	Western Australia	Tasmania	Northern Territory	Aust. Capital Territory (ACT)
Obtain unemployment income benefits (g), least complex situation.	Yes	NR	NR	NR	NR	NR	NR	NR	NR
Obtain child support allowance (h), least complex situation.	Yes	NR	NR	NR	NR	NR	NR	NR	NR
Renew an international passport (i), least complex situation.	Yes	NR	NR	NR	NR	NR	NR	NR	NR
Renew a driver's licence (j), least complex situation.	NR	No	Yes	Yes	Yes	Yes	No	Yes	No
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police (k).	NR	No	No	No	No	Yes	No	No	No
Obtain a copy of a birth certificate for self (l).	NR	No	Yes	No	Yes	No	No	Yes	Yes
Obtain a copy of a marriage certificate for self (l).	NR	No	Yes	No	Yes	No	No	Yes	Yes
Renew registration for a motor vehicle (m), least complex situation.	NR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Level 4: Can citizens undertake the complete process, via publicly accessible websites, to:									
Enrol to vote for the first time in government elections (c).	No	No	No	No	No	No	No	No	No
Complete and lodge personal income tax return (d), least complex situation (e).	Yes	NR	NR	NR	NR	NR	NR	NR	NR
Obtain unemployment income benefits (g), least complex situation.	No	NR	NR	NR	NR	NR	NR	NR	NR
Obtain child support allowance (h), least complex situation.	No	NR	NR	NR	NR	NR	NR	NR	NR
Renew a driver's licence (j), least complex situation.	NR	No	Yes	Yes	Yes	Yes	No	Yes	No
Renew registration for a motor vehicle (m), least complex situation.	NR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes:

(a) Citizens refer to the whole population, including children. While children are not able to do many of the activities represented in the table, arguably, they indirectly benefit if their parents or guardians are able to.

(b) Population data are sourced from the Australian Bureau of Statistics (ABS) publication Australian Demographic Statistics, Dec 2011, cat. no 3101.0. They refer to the population at 31 December 2011. Note that the Australia total is the sum of

populations of the states and territories and therefore understates the Australian population by about 3,000 people (the population from Other Territories comprising Jervis Bay Territory, Christmas Island and the Cocos (Keeling) Islands).

(c) The Australian Electoral Commission (AEC) administers voter registration for all Australians for federal (Australian Government), state/territory and local government elections. A single registration covers voting for all levels of government in Australia. Even though voters can complete an online form, it needs to be printed, signed and returned to the AEC.

(d) Income tax for individuals is levied by the Australian Government (not states or territories) and administered by the Australian Taxation Office (ATO). The ATO website has information on taxation obligations and downloadable forms. The e-tax application can be downloaded from the ATO website, completed on an individual's own computer and uploaded to the ATO via an Internet connection. E-tax enables calculation of income tax information and lodgement of the form.

(e) Least complex situation refers to the simplest standard procedure in the country. For some services, the procedure referred to is a common one, though not necessarily simple.

(f) NR is Not relevant and means that the service (whether undertaken online or offline) is not relevant for a particular level of government. The distinction between Not relevant and No may be difficult to make and reasons for choosing one over the other are explained in notes on particular services.

(g) Payment of social security income benefits is an Australian government function, administered by the Department of Human Services (Centrelink). Unemployment benefits are called Newstart Allowance. While a form is not necessary to claim the allowance, an Intent to Claim must be completed and is followed up by a personal interview. The responses in this table refer to the Intent to Claim application which is available online or can be communicated by phone, e-mail or in person. The fact that an Intent to Claim application form is not downloadable from the website is deemed to be not relevant as an alternative hardcopy version does not exist.

(h) Payment of a range of child support benefits is an Australian government function, administered by the Department of Human Services (Centrelink). The most common situation is reported in this table. It is Family Tax Benefit Part A, which is income-tested and paid for each eligible child or student up to the age of 22.

(i) Passport applications are an Australian government function. The situation chosen was a standard passport renewal for an adult (where the passport had not been lost or stolen).

(j) This is a state/territory function. All Australian states and territories have a licensing authority, which sends out licence renewal notices (or applications) before the expiry date. For New South Wales, Tasmania and the ACT, drivers licences must be renewed in person. For Victoria, Queensland, South Australia, Western Australia and the Northern Territory, in many situations, licences may be renewed and paid for online. The fact that a renewal notice is not downloadable from a website is deemed to be not relevant for all jurisdictions as an alternative hardcopy version does not exist (except as posted). The jurisdictions for which Yes has been reported for Level 3 are those allowing payment online. The online form is generally a very simple one associated with the payment (e.g. verifying a reference number).

(k) Each Australian jurisdiction (including the federal government) has its own police force. Theft and burglary are the responsibility of states and territories (though note that the Australian Federal Police provides policing services for the ACT). Most jurisdictions only allow reports of a crime to be made by phone or in person at a police station (this excludes Crime Stoppers reports, where the public can anonymously report information about crimes online). Queensland has a small number of online forms for reporting some crimes but they do not cover theft. Western Australia has an online reporting facility for thefts of value less than $3,000. The fact that a declaration form is not downloadable from a website is deemed to be not relevant for all jurisdictions as an alternative hardcopy version does not exist.

(l) This is a state/territory function, and all Australian states and territories have a registry of births, deaths and marriages. The situation chosen was an application for a standard certificate.

(m) This is a state/territory function, and all Australian states and territories have a motor vehicle registry, which sends out registration renewal notices. The least complex situation depends on the state/territory but involves renewal of a vehicle already registered in the state/territory and, in some cases, a relatively new vehicle not requiring an inspection (e.g. in New South Wales, vehicles more than five years old need to undergo a vehicle inspection as part of the registration process; however, the result of the check is available electronically and is incorporated into the renewal application process). The fact that a renewal notice is not downloadable from a website is deemed to be not relevant for all jurisdictions as an alternative hardcopy version does not exist (except as posted).

307. The derivation of population-weighted data from jurisdiction-level data is shown in example 7. For the central government jurisdiction, Yes-No-Not relevant data from example 6 are applied to the Australian population. For the state/territory government level, Yes-No-Not relevant data are aggregated using state/territory populations to weight the data.

Example 7: Core indicator EG7, Australia, main indicator, weighted by population

Internet-based services for citizens	Australian (central) Government, percentage of citizens		State/territory governments, percentage of citizens		Australia, all central, state and territory governments, percentage of citizens	
	Who can (in theory) (a)	For whom not relevant (b)	Who can (in theory) (a)	For whom not relevant (b)	Who can (in theory) (a)	For whom not relevant (b)
Level 1: Obtain information from publicly accessible websites necessary to:						
Enrol to vote for the first time in government elections.	100%	0%	100%	0%	100%	0%
Complete and lodge personal income tax return, least complex situation.	100%	0%	0%	100%	100%	0%
Obtain unemployment benefits, least complex situation.	100%	0%	0%	100%	100%	0%
Obtain child support allowance, least complex situation.	100%	0%	0%	100%	100%	0%
Renew an international passport, least complex situation.	100%	0%	0%	100%	100%	0%
Renew a driver's licence, least complex situation.	0%	100%	100%	0%	100%	0%
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.	0%	100%	100%	0%	100%	0%
Obtain a copy of a birth certificate for self.	0%	100%	100%	0%	100%	0%
Obtain a copy of a marriage certificate for self.	0%	100%	100%	0%	100%	0%
Register a motor vehicle, least complex situation.	0%	100%	100%	0%	100%	0%
Level 2: Request printed forms or download forms (e.g. in pdf format) from publicly accessible websites necessary to:						
Enrol to vote for the first time in government elections.	100%	0%	100%	0%	100%	0%
Complete and lodge personal income tax return, least complex situation.	100%	0%	0%	100%	100%	0%
Obtain unemployment benefits, least complex situation.	0%	100%	0%	100%	0%	100%
Obtain child support allowance, least complex situation.	100%	0%	0%	100%	100%	0%
Renew an international passport, least complex situation.	100%	0%	0%	100%	100%	0%
Renew a driver's licence, least complex situation.	0%	100%	0%	100%	0%	100%
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.	0%	100%	0%	100%	0%	100%
Obtain a copy of a birth certificate for self.	0%	100%	100%	0%	100%	0%
Obtain a copy of a marriage certificate for self.	0%	100%	100%	0%	100%	0%
Register a motor vehicle, least complex situation.	0%	100%	0%	100%	0%	100%
Level 3: Fill in online forms available on (or via) publicly accessible websites necessary to:						
Enrol to vote for the first time in government elections.	100%	0%	100%	0%	100%	0%
Complete and lodge personal income tax return, least complex situation.	100%	0%	0%	100%	100%	0%
Obtain unemployment benefits, least complex situation.	100%	0%	0%	100%	100%	0%
Obtain child support allowance, least complex situation.	100%	0%	0%	100%	100%	0%

Internet-based services for citizens	Australian (central) Government, percentage of citizens		State/territory governments, percentage of citizens		Australia, all central, state and territory governments, percentage of citizens	
	Who can (in theory) (a)	For whom not relevant (b)	Who can (in theory) (a)	For whom not relevant (b)	Who can (in theory) (a)	For whom not relevant (b)
Renew an international passport, least complex situation.	100%	0%	0%	100%	100%	0%
Renew a driver's licence, least complex situation.	0%	100%	64%	0%	64%	0%
Make an official declaration of theft of personal goods (excl motor vehicle and burglary) to the relevant police.	0%	100%	11%	0%	11%	0%
Obtain a copy of a birth certificate for self.	0%	100%	35%	0%	35%	0%
Obtain a copy of a marriage certificate for self.	0%	100%	35%	0%	35%	0%
Register a motor vehicle, least complex situation.	0%	100%	100%	0%	100%	0%
Level 4: Undertake the complete process, via publicly accessible websites, to:						
Enrol to vote for the first time in government elections.	0%	0%	0%	0%	0%	0%
Complete and lodge personal income tax return, least complex situation.	100%	0%	0%	100%	100%	0%
Obtain unemployment benefits, least complex situation.	0%	0%	0%	100%	0%	0%
Obtain child support allowance, least complex situation.	0%	0%	0%	100%	0%	0%
Renew a driver's licence, least complex situation.	0%	100%	64%	0%	64%	0%
Register a motor vehicle, least complex situation.	0%	100%	100%	0%	100%	0%

Notes: See notes for example 6

Additional notes for this table are:

(a) *Who can (in theory)* refers to the percentage of Australia's citizens who are theoretically able to access each Internet-based service. Note that it does not refer to whether a citizen has the equipment or knowledge necessary to access those services, whether he or she needs to access those services nor whether he or she directly benefits (e.g. most of the services are not relevant to children but they may indirectly benefit if their parent or guardian accesses services electronically).

(b) *For whom not relevant* means that the service (whether undertaken online or offline) is not relevant for a particular level of government. The distinction between Not relevant and No may be difficult to make and reasons for choosing one over the other are explained in notes on particular services. At the aggregate level for Australia, all central, state and territory governments, Not relevant only applies to Level 2, where forms are not able to be ordered or downloaded via a website because that function is not necessary (in some cases, they are only posted and in others they do not exist at all).

Example 8: Statistical standards statement for core indicator EG7, Australia

Metadata element	Metadata
Methodology for measuring indicator EG7	Web-based research using the Australian Government and state/territory government web portals.
Notes on compilation of the indicator	Notes are provided as footnotes to the tables (examples 6 and 7). The compilation was undertaken by the author of this manual (Sheridan Roberts) and took about 2.5 person days of effort. Many of the Internet-based services require logons or insertion of specific information in order to complete the task. In such cases, Ms. Roberts used available documentation about the service (although it was generally fairly obvious which category – Yes, No or Not relevant – the service fell into).
Reference period	August to September 2012 (the period during which the research was conducted).
Scope	The Australian Government (i.e. central government), all state and territory governments (New South Wales, Victoria, Queensland, South Australia, Western Australia, Tasmania, Northern Territory, Australian Capital Territory). Municipal governments (local government) were excluded from scope.
Major coverage problems	None.
Deviations from definitions	No major deviations – see notes for details.
Difficulties in understanding, or responding to, the model question.	The only difficulty was distinguishing between Not relevant and No in some cases. See footnotes to examples 6 and 7.

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