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**Intergovernmental Group of Experts on E-Commerce and the Digital Economy**

**First draft of the  
UNCTAD Manual for the Production of Statistics on the Digital  
Economy  
2020 Revised Edition**

For discussion at the  
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COMMENTS AND CONTRIBUTIONS TO THIS DRAFT SHOULD BE SENT TO  
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## Contents

PART A. INTRODUCTION .....	4
Chapter 1 - Objectives and overview of the Manual .....	4
Chapter 2 – Background (CHAPTER TO BE UPDATED) .....	7
2.1 Digital for policymaking .....	7
2.2 ICT indicators for policymaking.....	7
2.2 UNCTAD’s work on measurement of the digital economy.....	9
2.3 The Partnership on Measuring ICT for Development.....	10
PART B. METHODOLOGICAL ISSUES.....	14
Chapter 3 - Conceptual frameworks for measurement of the digital economy (CHAPTER TO BE UPDATED).....	14
3.1 A conceptual framework for the measurement of the digital economy .....	14
3.2 Concepts of e-business .....	16
3.2 ICT-enabled services.....	19
Chapter 4 - Statistical standards for indicators on ICT use by businesses, on the ICT sector, on trade in ICT goods and ICT-enabled services, and e-commerce .....	20
4.1 Measuring ICT demand (use) .....	20
4.2 Measuring the ICT sector (supply of ICT goods and services).....	34
4.3 Measuring trade in ICT goods .....	39
4.4 Measuring trade in ICT services .....	43
4.5 Measuring ICT-enabled (digitally delivered) services .....	46
4.6 Measuring e-commerce .....	51
Chapter 5 - Data sources and data collection methods.....	53
5.1 The General Statistical Business Process Model (GSBPM) .....	54
5.2 Sources for business ICT use data.....	55
5.3 Modules and stand-alone surveys on the use of ICT by businesses.....	61

5.4	Data collection methods and quality control.....	70
	Chapter 6 – Model questions and questionnaires for measuring ICT use.....	75
6.1	Model questions for a module.....	75
6.2	Model questions for a stand-alone ICT use survey.....	75
6.3	Model questionnaires for ICT-enabled services .....	75
	Chapter 7- Designing ICT business surveys and processing data.....	75
7.1	Business surveys on the use of ICT .....	75
7.2	ICT sector surveys.....	75
7.3	Data processing.....	75
	Chapter 8- Dissemination.....	75
8.1	Dissemination of metadata at the indicator level .....	75
8.2	Dissemination of metadata for surveys .....	75
8.3	Metadata reports .....	75
	PART C- Institutional Issues.....	75
	Annex XX. Classification of ICT goods (OECD list of ICT goods based on HS 2017) .....	76
	Annex XX. Classification of ICT services .....	80
	Annex XX. Potentially ICT-enabled services sub-groupings with the corresponding CPC Ver.2.1 products codes.....	81
	Annex XX. UNCTAD model questionnaire on use of ICT in businesses.....	83
	Annex XX. UNCTAD model questionnaire: exports of services that can be delivered over ICT networks.....	88

## PART A. INTRODUCTION

### *Chapter 1 - Objectives and overview of the Manual*

1. The *Manual* for the Production of Statistics on the Digital Economy has been prepared for the benefit of statistical agencies, in particular in developing and transition economies.<sup>1</sup> The *Manual* is an update of the UNCTAD *Manual for the Production of Statistics on the Information Economy 2009*, enlarging its thematic contents, adapting the new statistical standards approved since 2009, and including new model questionnaires.

2. It is directed towards those staff that are responsible for producing official statistics on the digital economy, in particular in national statistical offices (NSOs). The main aim of the *Manual* is to support the production of digital economy statistics that are internationally comparable – more specifically, statistics on the ICT-producing sector, ICT trade of goods and services (including of ICT-enabled services) and use of ICT by businesses. The *Manual* does not cover household statistics.<sup>2</sup> The *Manual* has been prepared by the United Nations Conference on Trade and Development (UNCTAD) and reflects its mandate to assist developing economies in measuring and monitoring the digital economy.

3. The *Manual* is intended to be a practical tool for producing digital economy statistics at the national level; these, in turn, serve as key inputs to countries' national ICT and digital economy policies and strategies. The *Manual* explains the international standards that guide work in this area and offers advice on collecting, processing and disseminating digital economy statistics and associated metadata.

4. Statistical systems in developing economies are diverse and reflect, among other things, a country's wealth, culture, and legal and political frameworks. Understandably, the level of statistical capacity is unequal with respect to adherence to internationally recommended standards and methods, data collection systems and collection frequency, and the availability of key social and economic indicators. The *Manual* takes the differing practices and capabilities of NSOs into account and highlights specific challenges that some developing economies face in their production of ICT statistics. Its contents are based largely on the work of the members of the Partnership on Measuring ICT for Development.

5. In 2005, the Partnership developed a core list of ICT indicators, which was endorsed by the UN Statistical Commission at its 2007 meeting.<sup>3</sup> The Commission encouraged countries to use the list as a basis for their ICT measurement activity. The *Manual* presents the Partnership core indicators on ICT use by business and the ICT sector, and provides associated definitions, classifications, methodologies and model questions.

6. The *Manual* will refer to international standards, definitions and model questionnaires on ICT

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<sup>1</sup> Henceforth referred to as "developing economies".

<sup>2</sup> A manual on household statistics is under preparation by the International Telecommunications Union (ITU), to be published in 2009.

<sup>3</sup> See UNSC Document E/2007/24, E/CN.3/2007/30.

statistics that have been developed by UNCTAD, the Organisation for Economic Co-operation and Development (OECD) and Eurostat (both of which are members of the Partnership). Some of the standards have already been approved by the United Nations Statistical Commission. In addition, it addresses statistical issues that are of particular interest to developing economies and are not extensively covered in the work of the OECD and Eurostat. For example, the *Manual* identifies areas of ICT use in developing economies which should be measured (such as use of email) and provides relevant methodological advice (for instance, on construction of business frames, data collection methods and use of existing surveys where resources are insufficient for carrying out stand-alone ICT surveys).

7. As well as covering these and other technical aspects of ICT statistics, the *Manual* reviews important institutional aspects of the statistical process, such as collaboration with data providers, and cooperation with data users and producers.

8. The *Manual* is organized as follows:

- Part A introduces the *Manual* and describes the background to the measurement of the digital economy.
- Part B covers the methodological and practical aspects of the production of ICT statistics on the digital economy, including:
  - Digital economy measurement concepts;
  - The core indicators and associated statistical standards;
  - Data sources for digital economy statistics;
  - Model questions and questionnaires (including the newly developed model questionnaire on ICT-enabled services);
  - Methodological issues relating to data collection, survey design and processing; and
  - The dissemination of data and metadata.
- Part C deals with institutional issues such as coordination between actors in the national statistical system, the work of international organizations and capacity-building.

9. The *Manual* is supported by XX annexes that provide further technical advice and useful references.

10. The material presented in this *Manual* is meant to serve as the basis for UNCTAD training on measuring the digital economy. The training course, which is based on the UNCTAD *TrainForTrade* methodology, is broadly organized around modules following the structure of the content of the *Manual*.<sup>4</sup> The training courses are useful tools in building the capacities of countries to produce statistics on the digital economy.

11. ICTs play an increasingly important role in the economic and social development of countries,

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<sup>4</sup> Countries interested in such a course should contact the UNCTAD secretariat at [emeasurement@unctad.org](mailto:emeasurement@unctad.org).

and governments formulate policies on ICT for development in order to seize the opportunities offered by these technologies. ICT statistics are essential to plan, monitor and evaluate these policies. This is a new area of measurement for most countries, as is the development of the necessary statistical standards and collection methodologies. Rapid technological change requires that new indicators be introduced and old ones discarded more frequently than in other areas of statistics. The UNCTAD secretariat will therefore regularly update and revise this *Manual*, with the objective of keeping member States informed of the most recent developments on the subject matter.

## **Chapter 2 – Background (CHAPTER TO BE UPDATED)**

### **2.1 Digital for policymaking**

(TO BE DEVELOPED)

### **2.2 ICT indicators for policymaking**

12. The potential for ICT to increase economic growth and reduce poverty is receiving increasing attention from Governments and the international community. Designing and implementing ICT policies and strategies requires proper knowledge of the state of ICT in a country and its use by organizations (government as well as business) and individuals (and often, the main barriers to such use). Consequently, calls for ICT statistics have become more frequent, both at the national and the international level (see Box 1). Furthermore, the measurement of ICT access, use and impact enables assessment and monitoring of the digital divide within a country and between countries.

#### **Box 1. The WSIS mandate**

The measurement of ICT has been an important part of international debates on ICT for development. While ICTs can present opportunities for economic and social development for developing economies, the digital divide between developed and developing economies also presents new challenges. The UN Millennium Development Goals, for example, include the target of making available the benefits of new technologies, especially ICT, to developing economies.

Measuring ICT for development was a principal concern of the World Summit on the Information Society (WSIS), which was held in two phases, Geneva in 2003 and Tunis in 2005. The Geneva phase highlighted the importance of benchmarking and measuring progress towards the information society through internationally comparable statistical indicators. The Tunis phase recognized that the development of ICT indicators is important for measuring the digital divide, and called upon countries and international organizations to allocate appropriate resources for the provision of ICT statistics, and to develop effective measurement methodologies including basic ICT indicators and an analysis of the state of the information society. In particular, member States called for periodic evaluation, using an agreed methodology, such as described in paragraphs 113–120 of the Tunis Agenda for the Information Society, and referring to the work of the Partnership on Measuring ICT for Development.<sup>5</sup>

In 2008, the UN Economic and Social Council (ECOSOC) in its resolution E/2008/31 acknowledged the work of the Partnership on Measuring ICT for Development to develop indicators and noted the lack of indicators to measure progress made towards achieving the targets of the Geneva Plan of Action. The ECOSOC thus recommended that the Partnership consider the creation of benchmarks and indicators, including impact indicators, for further consideration and decision by the UN Statistical Commission, in order to track progress towards the attainment of the specific goals and targets set out in the outcome documents of the WSIS.

13. During the past decade or so, a number of countries have made efforts to collect data on ICT in their society.<sup>6</sup> As a result, they are now in a better position to:

<sup>5</sup> Tunis Agenda for the Information Society (2005), WSIS-05/TUNIS/DOC/6(Rev.1)-E.

<sup>6</sup> "Society" is used in a broader context here and covers both social and economic realms.

- Assess the impact of ICT on their economies;
- Benchmark their economies and social situation against those of other countries;
- Identify the type of qualified people needed to advance their country's digital economy; and
- Calculate the investment needed to provide businesses with access to different ICTs.

14. In short, ICT statistics have helped policymakers and business people to make informed decisions about public policy measures and private investment in ICT.

15. Among developed economies, the NSOs of the members of the OECD have been producing statistics on the ICT sector and use of ICT by businesses in a reasonably harmonized way, on the basis of statistical developments facilitated by the OECD's Working Party on Indicators for the Information Society (WPIIS). As a result of this effort, a comparable set of such statistics is available for most OECD countries.

16. However, in developing economies, the availability of ICT indicators is still scarce, even though Governments, civil society and the business sector explicitly recognize the urgent need for such information. Many developing economies are preparing ICT-related policies and strategies without the guidance of statistical evidence. Reliable and timely indicators on ICT are needed to maximize its potential to facilitate a range of economic and social developments, including poverty reduction, increases in health and education standards, generation of new industries and employment opportunities, and improvements in competitiveness (see Box 2).

**Box 2. Lack of data for ICT policymaking**

In many developing economies, ICT policies and strategies have been set up to foster access to, and use of, ICTs by individuals and organizations, and to integrate national markets into the global digital economy. According to an UNCTAD survey, in 2006, 116 developing economies had introduced national ICT Master Plans (UNCTAD, 2006). At the same time, only 28 countries already had official statistics on the use of ICT by businesses. Without data on ICT access, use and impact, it will be difficult for policymakers to design, analyse, evaluate and review national ICT policies.

17. In many cases, developing economies need to increase their awareness about measurement efforts of other countries and may require assistance to incorporate ICT topics into their statistical programmes. With the increasing use of ICT by governments, businesses and households in those countries, it is essential to start measuring ICT now, for at least two reasons:

- First, the development and growth of the digital economy is irreversible – organizations and individuals all over the world are increasingly demanding and using ICT; and
- Second, the experiences of countries that have started to collect digital economy statistics show that it takes several years to design and implement a good national strategy for measuring the digital economy and to incorporate ICT statistics into national strategies for the development of statistics (NSDS). Hence, the earlier that countries begin work on an e-measurement strategy, the more likely it is that they will achieve good results as ICT and e-business spread to more parts of the developing world.



## 2.2 UNCTAD's work on measurement of the digital economy

18. With the aim of improving the ability of developing economies to formulate policies that will enable them to seize the benefits of ICT, the ICT Analysis Section of UNCTAD collects and publishes data on ICT use by businesses and on the state of the ICT sector. It also provides technical assistance and undertakes research and analysis (see Figure 1). These activities strengthen the statistical capacity of developing economies, allow UNCTAD to track global progress in the use of ICT and contribute to the evaluation of the WSIS implementation (see Box 1).

Figure 1. UNCTAD and ICT for development

19. Since 2004, UNCTAD has been collecting statistics on ICT business use and the ICT sector through an annual survey. The questionnaire is based on the Partnership's core list of ICT indicators (see Annex 1). Results from the annual survey feed into a database that supports UNCTAD research and analysis, and its advisory work on ICT policies, including ICT policy reviews, available through the UNCTAD statistical portal at [unctadstat.unctad.org](http://unctadstat.unctad.org).

20. UNCTAD analyses trends and developments in ICT access, use and impact in developing economies. In particular, it follows trends in e-commerce, the use of ICT by businesses for management and production, the impact of ICT on productivity, international trade in ICT goods and services, and the ICT sector. The research is published in UNCTAD's *Digital Economy Report (formerly the Information Economy Report)* at [unctad.org/der](http://unctad.org/der) and other publications. At the same time, UNCTAD raises the awareness of Governments about the importance of ICT statistics for monitoring ICT-related policies and assessing their impact.

21. UNCTAD provides technical assistance to developing economies on the measurement of ICT use by businesses and the ICT sector, focusing on:

- Assisting NSOs in undertaking data collection, analysis and dissemination, including through advisory missions;
- Organizing expert meetings and conducting technical workshops for practitioners in developing economies to enable exchanges of experiences and discussions of methodological, analytical and dissemination issues; and
- Conducting training courses and developing training material, guidelines and other technical documentation on the collection of ICT statistics and the production of indicators.

22. The recently established Intergovernmental Group of Experts (IGE) on E-commerce and the Digital Economy convened by UNCTAD aims to build international consensus on issues to do with relevant statistics. On its advice, UNCTAD is establishing a new Working Group on Measuring E-commerce and the Digital Economy, which will support dialogue and policy development, and help improve the availability of relevant statistics, particularly in developing countries. It will also seek to identify specific measurement opportunities and challenges for developing countries.

23. UNCTAD is an active member of the Partnership on Measuring ICT for Development and a member of its Steering Committee. It also leads the Partnership's task group on capacity-building. This *Manual*, which is a contribution of UNCTAD to the Partnership, is aligned with the Partnership's objectives and recommendations.

### 2.3 The Partnership on Measuring ICT for Development

24. The Partnership on Measuring ICT for Development (Box XX) is a multi-stakeholder initiative consisting of 14 international and regional organizations involved in ICT measurement. The Partnership was launched during UNCTAD XI in June 2004. It aims to identify and further develop different initiatives regarding the availability and measurement of ICT indicators at regional and international levels. It provides an open framework for coordinating ongoing and future activities, and for developing a coherent and structured approach to advancing the development of ICT indicators globally, and in particular in developing economies. The collaboration between Partner agencies ensures that there is no duplication of work and that resources are utilized efficiently.

**Box XX: The Partnership on Measuring ICT for Development**

**Current members (as of 2019):**

ITU, OECD, Eurostat, UNCTAD, UIS, ILO, four UN Regional Commissions (UNECLAC, UNESCWA, UNESCAP, UNECA), the World Bank, UNDESA, UNEP/Secretariat of the Basel Convention, and the United Nations University Institute for Sustainability and Peace (UNU-ISP).

**Structure:**

A Steering Committee (currently consisting of ITU, UNCTAD and UIS) plus task groups. Some task groups have members that are not members of the *Partnership*.

**Capacity building:**

The capacity-building work of the *Partnership* is undertaken by its members independently but coordinated through the *Partnership*. Activities include the conduct of training courses and workshops, as well as the production of technical material (of which this manual, as well as its previous editions of 2009 and 2014, are examples). Other methodological manuals include those on statistics of the Information Economy (UNCTAD, 2007 and 2009), e-government (*Partnership* and UNECA, 2013), use of ICT in education (UIS, 2009). OECD (2011) and Eurostat (2013) cover broader areas of information society measurement. Materials from the workshops and training Courses designed for NSIs are available online.<sup>7</sup>

More information on the *Partnership*, its members and its activities can be found [at http://www.itu.int/ITU-D/ict/partnership/index.html](http://www.itu.int/ITU-D/ict/partnership/index.html).

25. The main objectives of the Partnership are:

- To facilitate agreement on internationally comparable ICT indicators and to develop methodologies to collect those indicators;
- To assist in building statistical capacity in developing economies for the production of ICT statistics; and
- To set up a global database on ICT indicators.

26. One of the main achievements of the Partnership was the development of a core list of ICT indicators, with their corresponding definitions and other metadata, in close consultation with other stakeholders, mainly NSOs. The core list, with the revisions and additions presented in this manual, includes more than 60 indicators, covering ICT infrastructure and access, ICT access and use by households and businesses, the ICT (producing) sector, trade in ICT goods and services, ICT in education, e-government and electronic waste. The main purpose of the core list is to help countries produce high quality and internationally comparable ICT statistics. The indicators have associated statistical standards, including concepts, definitions, model questions, classificatory variables, and

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<sup>7</sup> <https://www.itu.int/en/ITU-D/Statistics/Pages/events/tech.aspx>.

guidance on scope and statistical units. The complete revised core list can be found in Annex **XX**.

27. This edition of the Manual updates standards for digital economy statistics, including use of ICT by businesses, the ICT sector, trade in ICT goods and services and e-commerce.

**Box ??.** Historical development of the core list of ICT indicators

Following the stocktaking exercise carried out by the *Partnership* in 2004, the United Nations Regional Commissions hosted several regional statistical workshops on ICT measurement. At these workshops, NSOs discussed the status of ICT statistics in their respective regions and proposed regional core lists of indicators. The regional lists of indicators were presented for information to the United Nations Statistical Commission (UNSC) at its thirty-sixth session (New York, March 2005). Based on the regional lists, and feedback received from NSOs, the *Partnership* consolidated a core list of ICT indicators. The list was circulated to all NSOs for further comments and suggestions. A final list was discussed, and agreed upon, at the WSIS Thematic Meeting on Measuring the Information Society (Geneva, February 2005). The core list was endorsed by the UNSC at its thirty-eighth session (New York, March 2007). The core list was subsequently revised, including the addition of new indicators on ICT in education, and discussed by countries at the Partnership's Global Event on Measuring the Information Society (Geneva, May 2008), which was part of the WSIS cluster of events. . The work of the Partnership has been recognized by the Economic and Social Council (ECOSOC) through several resolutions. The United Nations Statistical Commission validates the statistical development work of the Partnership, thus guaranteeing that standards are coherent with those of other areas of official statistics. Every two years, the Secretary-General presents to the Statistical Commission a report on international activities in the area of ICT statistics (see Partnership for Measuring ICT for Development 2012, 2014, 2016 and 2018).

\*\* end of Box \*\*

28. The need for establishing international comparisons and benchmarks requires comparable sets of statistics across countries. The core list of ICT indicators is recommended as the basis for the collection of internationally comparable ICT statistics. The development of ICT indicators is a continuous process, and the Partnership will continue to review the list periodically to address evolving policy needs.

29. The core list is not mandatory and nor is it intended to be limiting – it is expected that national ICT policies may require larger numbers of indicators for planning, monitoring and evaluation (see Example 3). It is also expected that countries with different levels of development will have different priorities for the production of indicators.

**Example 3.** Inclusion of ICT indicators in household surveys in Latin America

In Latin America, thirteen countries (as of February 2007) are including the necessary questions in their permanent household surveys to collect the information required to calculate the core indicators on access to, and use of, ICT by households and individuals. The collection of these indicators is related to the interest in national policies targeted to providing access to ICT by the population.

Source: Partnership on Measuring ICT for Development, 2007.

30. The Partnership also monitors the availability of national statistics on ICT, and its partners collaborate to build the capacities of statisticians in order to help them improve the availability and quality of ICT statistics, as well as their analysis.

31. The ongoing work of the Partnership focuses on capacity-building, dissemination and database development, the development of new ICT indicators in the area of government, and the analysis of ICT

**Commented [JLC2]:** All examples to be updated. Participants of the Working Group are invited to suggest examples.

impacts. The Partnership also developed a thematic list of “ICT for SDGs” indicators with a view to raise the visibility of ICT as contributors to the monitoring framework of the 2030 Agenda for Sustainable Development.

#### ***ITU’s work on measuring the information society***

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32. The International Telecommunication Union (ITU) is responsible for the measurement of telecommunication and ICT topics such as ICT use and individuals, as well as some indicators related to e-commerce and ICT skills. ITU has produced two main methodological manuals:

- Telecommunication Indicators Handbook<sup>8</sup>
- Manual on Measuring ICT Access and Use by Households and Indicators<sup>9</sup>

#### ***OECD’s work on measuring the digital economy***

33. The OECD is involved in efforts to measure the digital economy, through forums such as the Working Party on Measurement and Analysis of the Digital Economy (WP MADE). It has developed guidelines for measuring the information society (including model questionnaires such as the one included here in Annex XX), which are periodically reviewed and revised. In 2014, it benchmarked its member countries along several relevant dimensions, identified gaps, and developed a measurement agenda. For each relevant policy domain, the OECD defines key benchmark indicators and relevant policy levers, along with work to review existing metrics and identify gaps. The OECD has also commenced work on the measurement of areas such as artificial intelligence (AI), IoT, digital security and privacy, consumer trust in online environments, skills in the digital era, barriers to trade in digital services, and digitalization and the future of work. The OECD focuses mainly on the needs and capabilities of its member States, most of which have relatively advanced statistical offices. The situation in these countries is often considerably different from that of developing countries, and especially LDCs, where statistical capacities are much more limited. The

#### ***Eurostat’s work on ICT statistics***

34. The European Union (EU) has a digital scoreboard that measures the performance of the EU and its member States in a range of areas, from connectivity and digital skills to the digitization of businesses and public services. It also produces the Digital Economy and Society Index. In addition, it has established a Monitoring Framework for the Digital Economy and Society.

35. In order to gather internationally comparable indicators, Eurostat and the National Statistical Offices have developed a Methodological Manual for the surveys on ICT usage in enterprises and households<sup>10</sup>, including model questionnaires.

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<sup>8</sup> <https://www.itu.int/ITU-D/ict/publications/world/material/handbook.html>

<sup>9</sup> <https://www.itu.int/pub/D-IND-ITCMEAS-2014>. The 2014 is being revised at the time of drafting this Manual.

<sup>10</sup> <https://circabc.europa.eu/faces/jsp/extension/wai/navigation/container.jsp>

36. Eurostat has also promoted applied research projects with advanced use of survey data. For example, the ESS LAIT project<sup>11</sup> explored the possibility of linking data from enterprise surveys (including on the use of ICT) and econometric models to measure the impact of ICT on business performance.

***ILO's measurement of employment aspects of the digital economy***

37. The International Labour Organization (ILO) undertakes methodological work through the International Conference of Labour Statisticians, which deals with employment aspects of the digital economy. This includes employment in the ICT sector or in ICT-related occupations, but also areas such as informal employment and work-related aspects of digital platforms.

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<sup>11</sup> [https://ec.europa.eu/eurostat/cros/content/esslait\\_en](https://ec.europa.eu/eurostat/cros/content/esslait_en)

## PART B. METHODOLOGICAL ISSUES

### **Chapter 3 - Conceptual frameworks for measurement of the digital economy (CHAPTER TO BE UPDATED)**

38. This chapter presents the concepts underlying ICT measurement, with the objective of providing official statisticians, and others with an interest in ICT statistics, with a basic framework for measuring ICT. It includes a conceptual framework for digital economy measurement and defines a number of concepts associated with e-business measurement.

#### **3.1 A conceptual framework for the measurement of the digital economy**

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39. A distinctive characteristic of the digital economy is the intensive use by businesses of ICT for the collection, storage, processing and transmission of information. Business data from some industrialized countries show that improvements in productivity can be explained, at least partly, by use of ICT.

40. Use of ICT is supported by supply of goods and services produced by the ICT sector and through trade. Additionally, a robust ICT sector can contribute to aggregate labour productivity growth (OECD, 2007; UNCTAD, 2007).

41. The digital economy can be defined and measured, based on the 'building blocks' of supply and demand (see Figure 2). Statistical measurement instruments (surveys and other statistical operations) can cover these 'blocks' or conceptual areas.

**Figure 2. The building blocks of the digital economy**

Source: adapted from OECD (2005) and Månsson et al. (2004)

42. Statistical operations can separately investigate the supply of and demand for ICT, as well as ICT infrastructure and trade.<sup>12</sup> From the supply side, statistics are collected about the ICT sector, that is, ICT manufacturing and services industries that supply ICT infrastructure, goods and services. The output of the ICT sector in terms of goods can be classified using the World Customs Organization's (WCO) Harmonized System (HS) and equivalent national classifications.<sup>13</sup> ICT services are mainly estimated using the International Monetary Fund's (IMF) Balance of Payments (BOP) classification which is rather broad and only captures transactions between residents and non-residents. The ICT sector is defined in terms of the UN's International Standard Industrial Classification of All Economic Activities (ISIC) and

<sup>12</sup>Some countries have surveys for the measurement of other topics relating to the digital economy, such as innovation and R&D in firms (based in the OECD/Eurostat Oslo *Manual* and OECD Frascati *Manual*), patents, and human resources in Science and Technology (OECD Canberra *Manual*).

<sup>13</sup>The UN's Central Product Classification has been used for the OECD's revised ICT goods classification (released in 2008).

equivalent national classifications (see Chapter 4).<sup>14</sup> Measurement from the demand side addresses access to, and use of, ICT by businesses, households and government organizations (though this *Manual* will provide methodological advice on demand side measures of the business sector).

43. The types of ICT indicators respond to different needs of policymakers and other data users, at different stages of ICT development:

- ICT readiness indicators (i.e. on the readiness of a country's infrastructure, society, economy and business sector to undertake ICT-related activities) are of particular interest to policymakers in countries at early stages of ICT maturity, but are likely to lose relevance or evolve as technologies become more prevalent;
- ICT intensity indicators (i.e. on the use of ICT and the extent to which ICT-related activities are carried out by businesses and other institutional actors) are likely to be of interest to policymakers in countries where ICT is spreading;
- Indicators on the outcomes and impacts of ICT on business activities and economic growth are likely to be of interest in countries with a relatively high level of ICT development.

44. Priorities for statistical work on ICT should follow users' needs. As national ICT policies move from diagnostic or design to implementation and to evaluation, decision makers will be interested in the corresponding phases of the statistical work (see Table 1).

**Table 1. Policymaking and corresponding statistical work**

45. As indicated above, statistical programmes should reflect the evolution of information needs and are generally expected to extend and improve ICT measurement activities as technologies permeate society and the economy.

46. Evaluations of the impact of ICT on an economy may be studied through the compilation of ICT satellite accounts. Such an account is a national accounting tool and represents a statistical framework for organizing and presenting information about ICT products and ICT-related activity. It is based on the System of National Accounts (SNA) concepts, definitions and methods. Satellite accounts enable the calculation of the direct contribution of ICT to the main national accounting aggregates, such as gross fixed capital formation and gross domestic product (GDP), etc. Few countries have to date made use of this approach.<sup>15</sup> It integrates statistics related to the supply of ICT products (production, imports), and to the demand and use (intermediate consumption, final use, exports, capital formation, etc.) and can be considered as a major milestone in the statistical work on ICT. A pre-requisite for the preparation of satellite accounts is to establish classifications on industries and products used in all ICT-related surveys. It helps also to identify areas where deficiencies may exist in the collection of ICT statistics.

47. In developing economies, especially the least developed countries (LDCs), ICT infrastructure, supply and use may be at a low level. Data on ICT are therefore likely to be scarce and measurement

<sup>14</sup> The ICT sector definition was revised by the OECD in 2006 in order to comply with ISIC Rev. 4.

<sup>15</sup> The Australian Bureau of Statistics has prepared several presentations of the progress made on this statistical exercise ([http://www.unescap.org/stat/ict/ict2004/12.ABS\\_ICT\\_Satellite\\_Account\\_Framework.pdf](http://www.unescap.org/stat/ict/ict2004/12.ABS_ICT_Satellite_Account_Framework.pdf)). Other countries, including Chile ([http://www.itu.int/ITU-D/ict/conferences/panama06/material/27\\_Chile\\_Presentation\\_satellite\\_account\\_s.pdf](http://www.itu.int/ITU-D/ict/conferences/panama06/material/27_Chile_Presentation_satellite_account_s.pdf)) and Azerbaijan have also worked on this topic.

programmes will probably need to be prioritized. The internationally agreed core list of ICT indicators (see Annex 1) should provide guidance on the choice of priorities, while this *Manual* will help countries by providing guidance on the collection of relevant statistics.

### 3.2 Concepts of e-business

#### *E-business*

48. E-business refers to the use of ICT to facilitate business processes. Businesses can use ICT to communicate with government organizations, suppliers and clients (via email, for example) or to purchase and sell goods and services on line (e-commerce). ICT can also be used to automate business processes, to manage resources and to implement business policies (in marketing, human resources, finance, etc.). A diversity of business processes as well as barriers that hamper their use can be investigated in statistical surveys (see Example 1).

#### **Example 1. Measurement of e-business processes in Senegal**

In 2001, a survey of medium-sized and large industrial enterprises was carried out in Senegal. While almost all of the businesses (92 per cent) were connected to the Internet, in most cases only the head of the enterprise had access (because of the perception of high cost relative to the benefits). The most common use of the Internet was for email, to communicate primarily with suppliers, followed by internal business exchanges and customers. A reason cited for a low level of use of the Internet for other e-business processes (such as customer relationship management, banking and finance management or dealing with government institutions for administrative purposes) was that other partners, such as customers and suppliers, the Government, banks and insurance companies, were not using the Internet (yet) and therefore were not able to interact on line. The overall lack of local content useful for entrepreneurs (including business information, legal and regulatory documents, and administrative forms) was noted as another major reason for not using the Internet more frequently. At the same time, business owners felt that, in particular, on-line government could significantly contribute to reducing costs in terms of both time and transport.

Source: E-Commerce and Development Report (UNCTAD, 2004).

49. For a definition of e-business that could be used for statistical purposes, several broad business functions are identified and described in terms of e-business processes (see table 2). In 2003, an OECD expert group on the measurement of e-business processes proposed a definition of e-business processes as those “(automated) business processes (both intra and inter-business) over computed mediated networks”. In addition, the group proposed that e-business processes should integrate tasks and extend beyond a stand-alone or individual application.

**Table 2. Types of e-business processes**

50. For the purpose of preparing a survey questionnaire, a pragmatic approach to the measurement of e-business is to select processes of particular interest for which feasible questions (easily responded to with yes/no) could be included in an economy-wide survey. The model questionnaires on ICT use by businesses proposed by OECD and Eurostat include questions that cover some e-business processes. This approach has also been followed in those developing economies that have started to collect ICT data from businesses (see Example 2).

#### **Example 2. ICT business survey in Thailand**

**Commented [JLC5]:** All examples to be updated. Participants of the Working Group are invited to suggest examples.



Since 2004, the National Statistical Office of Thailand, which reports to the Ministry of ICT, has carried out annual business surveys on the use of ICT. Previously, the NSO had included ICT-related questions in the Manufacturing Survey of 2003.

The questionnaires for the stand-alone surveys on the use of ICT investigate different aspects of e-business practices, such as the purposes of the use of Internet, the use of the firm's website and reasons for carrying out Internet purchases and sales. Options that can be recorded in the questionnaire (as yes/no answers) include use of the Internet for information search and monitoring the market, email and other communications, advertising, purchase and sale of goods and services, and, banking and financial services. On the use of a website, the questionnaire allows for multiple responses such as marketing of products, inquiries and contact facilitation, receiving purchase orders, providing after sales service, on-line payment and information networking. On the reasons for carrying out Internet transactions, the questionnaire allows grading the importance of a list of possible reasons. The questionnaire is structured in modules, which makes it easier for the firm to respond.

The 2004 and 2005 Information and Communication Technology Surveys implemented by the National Statistical Office of Thailand can be linked with the Manufacturing Surveys carried out for different reference years (2003, 2006) via the unique 11-digit registration code for firms. ICT variables collected in the Information and Communication Technology Surveys can therefore be linked, at the firm level, with business performance and other (for instance, employment) variables. Econometric models (in particular, Cobb-Douglas production functions) can thus be estimated and tested with microdata, to analyse the relationship between adoption and use of ICT and economic results. An alternative that does not allow for measuring a delayed impact is to jointly analyse the economic and ICT variables contained in only one survey, namely the Manufacturing Survey 2003.

The results showed that firms with a combined use of computers, the Internet and the website had an average 21% higher sales than firms without any of the ICTs considered, after controlling for a series of firm-specific economic characteristics, as well as industry and regional aspects of demand and supply. Among the three ICTs considered, computers contributed with 14%, Internet access with 3% and web presence with 4%. Results also suggested that an increase of 10% in the share of employees using computers is associated with 3.5% higher sales per employee in Thai manufacturing firms. Differences were found regarding to size: the link between ICT use and labour productivity is strongest in large firms. Regional patterns were also found.

The approach followed by the NSO of Thailand can be considered good practice for countries willing to start the collection of ICT indicators. In a first phase, a set of indicators is produced by including a module on ICT in an existing survey. In a second phase, the available information is increased by carrying out a stand-alone survey on the use of ICT.

*Source: UNCTAD (2008b) and 2004 and 2005 Information and Communication Technology Survey (<http://web.nso.go.th/>).*

51. Analyses of the impact of e-business on business performance and growth have so far been supported by statistical evidence consisting of aggregate indicators and business micro-data from developed countries. Developing economies should take into account their requirements for further data analysis when planning investigations on e-business and determining a particular form of data collection. In particular, the need for linking data on e-business from stand-alone ICT surveys with other information on the business' performance (such as information from taxation records and general business surveys) should be taken into account.

52. Developing economies could also consider the possibility of including a module on e-business in current business surveys, thereby enabling the linkage of ICT with economic variables in order to analyse the impact of e-business processes on business performance. These options are further discussed in Chapter 5.

### *E-commerce*

53. Electronic transactions (or e-commerce) are at the core of the statistical measurement of e-

business. The great policy interest in measuring the volume and characteristics of e-commerce has driven theoretical work in expert groups (such as the OECD's WPIIS) and practice by statistical offices and other institutions.

54. The need for an operational definition of e-commerce, suitable as a basis for items in statistical questionnaires, was recognized early by expert groups. In 2000, OECD member countries endorsed two definitions of electronic transactions based on a narrow and a broad definition of the communications infrastructure. According to the OECD definitions, it is the method by which the order is placed or received, not the payment or channel of delivery, which determines whether the transaction is an electronic commerce transaction. The narrow definition of electronic commerce transactions refers to those conducted over the Internet, whilst the broad definition refers to all computer-mediated networks (see Box 4).

**Box 4. OECD definitions of electronic commerce transactions and interpretation guidelines**

The OECD provides two definitions for e-commerce transactions and guidelines for their interpretation:

Broad definition of e-commerce transactions: An electronic transaction is the sale or purchase of goods or services, whether between businesses, households, individuals, Governments, and other public or private organizations, conducted over computer-mediated networks. The goods and services are ordered over those networks, but the payment and the ultimate delivery of the good or service may be conducted on or off line.

As a guideline for the interpretation of the definition above, the OECD notes that the broad definition includes orders received or placed on any on-line application used in automated transactions, such as Internet applications, electronic data interchange (EDI) or interactive telephone systems.

Narrow definition of e-commerce transactions: An Internet transaction is the sale or purchase of goods or services, whether between businesses, households, individuals, Governments, and other public or private organizations, conducted over the Internet. The goods and services are ordered over the Internet, but the payment and the ultimate delivery of the good or service may be conducted on or off line.

As a guideline for the interpretation of the definition above, the OECD notes that the narrow definition includes orders received or placed on any Internet application used in automated transactions, such as web pages, extranets and other applications that run over the Internet such as *EDI over the Internet* or over any other web-enabled application regardless on how the Web is accessed (e.g. through a mobile phone or a TV set, etc.). The definition excludes orders received or placed by telephone, facsimile or conventional email.

Source: Adapted (slightly) from OECD, 2005 and 2007.

55. The measurement of electronic transactions presents specific difficulties. In relation to the communications infrastructure over which the transactions are carried out, technological convergence (in particular the inter-operability of communication networks) is making it more difficult to distinguish Internet electronic commerce from electronic commerce conducted over other networks. Potential data collection problems include:

- The small volume of e-commerce activity in the economy, with consequent high standard errors and poor reliability of disaggregated data, and
- Poor quality of reported data resulting from the lack of record keeping and often misunderstanding of statistical e-commerce concepts.<sup>16</sup>

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<sup>16</sup> Other statistical difficulties in e-commerce measurement are described in OECD, 2005 and 2007.

56. In order to take into account the different situations in countries in terms of technological development, the Partnership recommends collecting data only on whether orders are received or placed over the Internet, including by email (the latter is excluded from the OECD definitions).

57. Some countries have collected data on e-commerce by relevant breakdowns such as the nature of products or location of the buyer/seller. The reliability of these splits has been questioned (for instance, a business may not know or have recorded the destination of its on-line sales) and therefore such a breakdown is not recommended for countries starting data collection on the use of ICT by businesses.

### **3.2 ICT-enabled services**

**(To be defined from the conceptual viewpoint. The statistical standards are presented in chapter 4)**

## **Chapter 4 - Statistical standards for indicators on ICT use by businesses, on the ICT sector, on trade in ICT goods and ICT-enabled services, and e-commerce**

58. This chapter reflects work carried out by UNCTAD and other international organisations (OECD, G20, WTO) in relation to topics in the statistical measurement of the digital economy since 2009. It describes the main statistical standards covering the calculation of the core ICT indicators on: use of ICT by businesses, the ICT sector, trade in ICT goods and services, trade in ICT-enabled services and e-commerce. It also presents metadata associated to the *Partnership's* core ICT indicators, such as methods of calculation and definitions of terms. Related information can be found in Chapter 6 (model questions and questionnaires for business ICT use surveys) and Chapter 7 (designing business ICT surveys, including questions of scope, coverage, units, sampling and data processing) as well as in annexes XXX (classification of ICT goods), XXX (classification of ICT services) and XXX (classification of ICT-enabled services).

59. Besides the core list of indicators, other measurement areas are briefly mentioned in the chapter regarding the access to and use of ICT by businesses. These include the use of mobile phones, investment in ICT, cybersecurity measures, as well as advanced topics related to e-commerce. It is likely that these topics will be of interest of countries with high penetration of ICT in the business sector, but the inclusion of ICT related questions in business survey modules (rather than stand-alone surveys, see Chapter 5). OECD and Eurostat model questionnaires can be adapted for investigating these topics.

**Commented [JLC6]:** These additional topics will be developed. To be adjusted as per the final contents of this chapter

### **4.1 Measuring ICT demand (use)**

#### *Core indicators on the use of ICT by businesses*

60. There are 12 core indicators on the use of ICT by businesses. Two of the core indicators (indicators B9 and B12) are breakdowns of another indicator (B3). For each indicator, Table ? shows a definition of the main concepts involved, the method of calculation, and model questions. Chapter 6 further develops the questionnaire to collect the necessary information to compute the indicators based on such model questions. A model questionnaire provided in Annex 2 shows a logical sequence for the model questions.

61. For each indicator, a short reference to policy relevance has been included, so that statisticians in charge of compiling ICT indicators get familiar with the origin of the information needs.

**Commented [JLC7]:** Section on Policy Relevance to be developed in each indicator table

**Table 2:** Core indicators on the use of ICT by businesses

<p><b>Indicator code and name:</b>  <b>B1: Proportion of businesses using computers</b></p>
<p><b>Definition of concepts:</b></p> <p>The proportion of businesses using computers is calculated by dividing the number of in-scope businesses. using computers during the 12-month reference period by the total number of in-scope businesses.</p>
<p><b>Clarifications and methodological issues:</b></p> <p>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 or TV sets.</p>
<p><b>Model question:</b></p> <p>Did your business use computer(s) during &lt;reference period&gt;? Yes/ No</p>
<p><b>Disaggregation and classifications:</b></p>
<p><b>Policy relevance:</b></p>

<p><b>Indicator code and name:</b>  <b>B2: Proportion of persons employed routinely using computers</b></p>
<p><b>Definition of concepts:</b></p> <p>The proportion of persons employed routinely using computers (in all in-scope businesses) by the total number of persons employed (in all in-scope businesses).</p>
<p><b>Clarifications and methodological issues:</b></p> <p>Persons employed refer to all persons working for the business, not only those working in clerical jobs. They include short-term and casual employees, contributing family workers and self-employed persons, who may be paid or unpaid. The definition is aligned with UNSD and ILO standards.          Computer: as above.</p> <p>Filters: The question is only asked of those businesses answering 'yes' to the question "Did your business use computer(s)?"</p> <p>Routinely means at least once a week.</p>
<p><b>Model question:</b></p> <p>What percentage of persons employed in your business routinely used a computer at work during &lt;reference period&gt;? Percentage values (no decimals) from 0% to 100%</p>
<p><b>Disaggregation and classifications:</b></p>
<p><b>Policy relevance:</b></p>

<b>Indicator code and name:</b> B3: Proportion of businesses using the internet
<b>Definition of concepts:</b> The proportion of businesses using the Internet is calculated by dividing the number of in-scope businesses using the Internet by the total number of in-scope businesses.
<b>Clarifications and methodological issues:</b> The Internet is a world-wide public computer network. It provides access to a number of communication services including the World Wide Web and carries email, news, entertainment and data files, irrespective of the device used (not assumed to be only via a computer it may also be by mobile phone, games machine, digital TV etc.). Access can be via a fixed or mobile network.
<b>Model question:</b> Did your business use the Internet during <reference period>? Yes/ No
<b>Disaggregation and classifications:</b>
<b>Policy relevance:</b>

<p><b>Indicator code and name:</b>  <b>B4: Proportion of persons employed routinely using the Internet</b></p>
<p><b>Definition of concepts:</b></p> <p>The proportion of persons employed routinely using the Internet is calculated by dividing the number of persons employed routinely using the Internet (in all in-scope businesses) by the total number of persons employed (in all in-scope businesses).</p>
<p><b>Clarifications and methodological issues:</b></p> <p>Persons employed: as above  Computer: as above  Internet: as above. The wording refers to actual use of the internet rather than having access.</p> <p>Filters: the question is only asked of those businesses answering 'yes' to the question "Did your business use computers?"</p>
<p><b>Model question:</b></p> <p>What percentage of persons employed in your business routinely used the Internet at work during &lt;reference period&gt;? Percentage values (no decimals) from 0% to 100%</p>
<p><b>Disaggregation and classifications:</b></p>
<p><b>Policy relevance:</b></p>

<p><b>Indicator code and name:</b>  <b>B5: Proportion of businesses with a web presence</b></p>
<p><b>Definition of concepts:</b></p> <p>The proportion of businesses with a web presence is calculated by dividing the number of in-scope businesses with a web presence by the total in-scope businesses.</p>
<p><b>Clarifications and methodological issues:</b></p> <p>A web presence includes a website, home page or presence on another entity's website (including a related business). It excludes inclusion in an on-line directory and any other web pages where the business does not have control over the content of the page.</p> <p>Filters: The question is only asked of those businesses answering 'yes' to the question "Did your business use the Internet?"</p>
<p><b>Model question:</b></p> <p>Did your business have a web presence as at &lt;reference date&gt;? Yes/ No</p>
<p><b>Disaggregation and classifications:</b></p>
<p><b>Policy relevance:</b></p>

<p><b>Indicator code and name:</b>  <b>B6: Proportion of businesses with an intranet</b></p>
<p><b>Definition of concepts:</b></p> <p>The proportion of businesses with an intranet is calculated by dividing the number of in-scope businesses with an intranet by the total number of in-scope businesses.</p>
<p><b>Clarifications and methodological issues:</b></p> <p>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.</p> <p>The question is only asked of those businesses answering 'yes' to the question "Did your business use computer(s)?"</p>
<p><b>Model question:</b></p> <p>Did your business have an intranet as at &lt;reference date&gt;? Yes/ No</p>
<p><b>Disaggregation and classifications:</b></p>
<p><b>Policy relevance:</b></p>

<p><b>Indicator code and name:</b>  <b>B7: Proportion of businesses receiving orders over the internet</b></p>
<p><b>Definition of concepts:</b></p> <p>For international comparability, the proportion of businesses receiving orders over the Internet by the total number of in-scope businesses. Alternatively, output can be presented as the proportion of in-scope businesses using the Internet.</p>
<p><b>Clarifications and methodological issues:</b></p> <p>Orders received include orders received via the Internet whether or not payment was made on line. They include orders received via websites, specialized Internet marketplaces, extranets, EDI over the Internet, Internet-enabled mobile phones and email. They also include orders received on behalf of other organizations – and orders received by other organizations on behalf of the business. Orders received exclude orders that were cancelled or not completed. In theory, a business without access to the Internet could receive Internet orders via agents. Where this is thought to be common, countries could alter the scope of the question to those businesses using computer(s).</p> <p>Filters: The question is only asked of those businesses answering 'yes' to the question "Did your business use the Internet?"</p>
<p><b>Model question:</b></p> <p>Did your business receive orders or goods or services (that is, make sales) via the Internet during &lt;reference period&gt;? Yes/ No</p>
<p><b>Disaggregation and classifications:</b></p>
<p><b>Policy relevance:</b></p>



<p><b>Indicator code and name:</b>  <b>B8: Proportion of businesses placing orders over the internet</b></p>
<p><b>Definition of concepts:</b></p> <p>For international comparability, the proportion of businesses placing orders over the Internet is most simply calculated by dividing the number of in-scope businesses placing orders over the Internet by the total number of in-scope businesses. Alternatively, output can be presented as the proportion of in-scope businesses using the Internet.</p>
<p><b>Clarifications and methodological issues:</b></p> <p>Orders placed include orders placed via the Internet whether or not payment was made on line. They include orders placed via websites, specialized Internet marketplaces, extranets, EDI over the Internet, Internet-enabled mobile phones and email. Orders placed exclude orders that were cancelled or not completed. In theory, a business without access to the Internet could place Internet orders via agents. Where this is thought to be common, countries could alter the scope of the question to those businesses using computer(s).</p> <p>Filters: The question is only asked of those businesses answering 'yes' to the question "Did your business use the Internet?"</p>
<p><b>Model question:</b></p> <p>Did your business place orders for goods or services (that is, make purchases) via the Internet during &lt;reference period&gt;? Yes/ No</p>
<p><b>Disaggregation and classifications:</b></p>
<p><b>Policy relevance:</b></p>

<p><b>Indicator code and name:</b>  <b>B9: Proportion of businesses using the Internet by type of access (Narrowband, fixed broadband and mobile broadband)</b></p>
<p><b>Definition of concepts:</b></p> <p>This indicator should be calculated as the proportion of in-scope Internet-using businesses that use each type of access service, for instance, the proportion of Internet-using businesses that use a broadband service as their means of access.</p>
<p><b>Clarifications and methodological issues:</b></p> <p>It is expected that countries will collect data at a finer level than 'narrowband' and 'broadband'. The categories chosen by countries should allow aggregation to total narrowband and total broadband, as well as fixed and mobile broadband, as defined below. As businesses can use more than one type of access service, multiple responses are possible. Possible country variations to the response categories are: remove the categories where items are not feasible; add or split categories according to technologies available and country data requirements.</p> <p>Filters: The question is only asked of those businesses answering 'yes' to the question "Did your business use the Internet?"</p>
<p><b>Model question:</b></p> <p>How did your business connect to the Internet during &lt;reference period&gt;? The list of response categories should allow the grouping into narrowband and broadband, and for the later, into fixed and mobile. Yes/ No or tick box for each response category</p>
<p><b>Disaggregation and classifications:</b></p>

**Policy relevance:**

**Indicator code and name:**

**B10: Proportion of businesses with a local area network (LAN)**

**Definition of concepts:**

The proportion of businesses with a LAN is calculated by dividing the number of in-scope businesses with a LAN by the total number of in-scope businesses.

**Clarifications and methodological issues:**

A LAN refers to a network connecting computers within a localized area such as a single building, department or site; it may be wireless. Substituting the question by Did your business have an internal network? Could provide relevant information on information sharing within businesses rather than the actual technology used.

Filters: The question is only asked of those businesses answering 'yes' to the question "Did your business use computer(s)?"

**Model question:**

Did your business have a local area network (LAN) as at <reference date>? Yes/ No

**Disaggregation and classifications:**

**Policy relevance:**

**Indicator code and name:**

**B11: Proportion of businesses with an extranet**

**Definition of concepts:**

The proportion of businesses with an extranet is calculated by dividing the number of in-scope businesses with and extranet by the total number of in-scope businesses.

**Clarifications and methodological issues:**

An extranet is a closed network that uses Internet protocols to securely share a business' information with suppliers, vendors, customers or other businesses partners. It can take the form of a secure extension of an Intranet that allows external users to access some parts of the business' Intranet. It can also be a private part of the business' website, where business partners can navigate after being authenticated in a login page.

Filters: The question is only asked of those businesses answering 'yes' to the question "Did your business use computer(s)?"

**Model question:**

Did your business have an extranet as at <reference date>? Yes/ No

**Disaggregation and classifications:**

**Policy relevance:**

<p><b>Indicator code and name:</b>  <b>B12: Proportion of businesses using the Internet by type of activity</b></p>
<p><b>Definition of concepts:</b></p> <p>The proportion of businesses using the Internet by type of activity can be calculated as: either the proportion of in-scope businesses or the proportion of Internet-using businesses that undertook each activity. For international comparability, output is most simply presented as the proportion of in-scope businesses undertaking each activity, for instance, the proportion of businesses using the Internet for sending or receiving emails. An alternative presentation is the proportion of business internet users undertaking each activity.</p>
<p><b>Clarifications and methodological issues:</b></p> <p>Internet: as above.  Businesses should be asked about all Internet activities (that is, the question used by countries should specify multiple responses). Activities are not necessarily mutually exclusive and hence multiple responses are possible as the business may use the Internet for various purposes. Possible country variations to response categories are to add or split categories according to country data requirements.</p> <p>Filters: The question is only asked of those businesses answering 'yes' to the question "Did your business use the Internet?"</p>
<p><b>Model question:</b></p> <p>For which of the following activities did your business use the Internet during &lt;reference period&gt;?  Response categories:</p> <ul style="list-style-type: none"> <li>- Sending or receiving e-mail</li> <li>- Telephoning over the Internet/ VoIP or using video conferencing</li> <li>- Use of instant messaging, bulletin boards</li> <li>- Getting information about goods or services</li> <li>- Getting information from general government organizations</li> <li>- Internet banking</li> <li>- Accessing other financial services</li> <li>- Interacting with general government organizations</li> <li>- Providing customer services</li> <li>- Delivering products online</li> <li>- Internal or external recruitment</li> <li>- Staff training</li> </ul> <p>Yes/ No or tick box for each response category</p> <p><b>[Is there a need to adapt to possible changes in the household indicators?]</b></p>
<p><b>Disaggregation and classifications:</b></p>
<p><b>Policy relevance:</b></p>

62. The core ICT indicators are expressed in terms of proportions obtained as quotients of a numerator that refers to the characteristic to be measured and a denominator that refers to the reference population. The use of proportions rather than absolute figures allows ready comparison of the resulting data across industries, size intervals, countries and any other available classificatory variables. Methods for estimating proportions (and their associated statistical errors) from a sample are further discussed in Chapter 7 and Annex 5 of this *Manual*.

63. The denominator of the core indicators on use of ICT by businesses is the population to which the indicator refers (e.g. the total number of businesses or the total number of employees). The population will be determined by the scope (and coverage) of the survey. Ideally, countries should collect indicators in respect of the whole business sector (or at least per the scope recommendations associated with the core indicators). However, countries may decide, according to their industrial structure, policy needs or resources available, to investigate only parts of the business sector (e.g. the manufacturing sector). In any case, the description of the scope (and coverage) of the survey is a key item of metadata (see Chapter 7).

64. Some indicators (B7, B8, B9 and B12) may be alternatively presented as proportions of the population of businesses that use the Internet (see **box XX**). This requires changing the denominator to the total number of businesses that use the Internet and users should be informed of that difference. For international comparisons, it is simpler to compare results when referred to the whole population of businesses.

65. For all indicators, sub-indicators may be calculated by using the classificatory variables economic activity (referred to as industry in many countries) and enterprise size (in terms of number of employees) as breakdowns. In order to investigate the existence of digital gaps or economic differences between businesses located in urban and rural areas, countries could also present the results broken down by geographical classification (usually, according to the location of a business' headquarters). This may be difficult where the recommended statistical unit – the enterprise – is used because some enterprises consist of a number of establishments in different locations. In this case, it is recommended that data be presented at the enterprise level (see Chapter 7).

66. The recommended breakdown of indicators on the use of ICT by economic activity, enterprise size, and geographical location is further examined in Chapter 7 and discussed in terms of dissemination in Chapter 8. When possible, the breakdowns are related to international statistical classifications (such as ISIC Rev. 4 for economic activities).

**Box XX: Alternative presentations of ICT indicators**

The following tables show the alternative ways in which indicator B9 can be calculated and presented (for each size category and for the total population): in table A, absolute numbers provide a reference to the proportions; in table B, indicator B9 is calculated as a proportion of the total business population (i.e., dividing each row in table B by row 1 of table A and expressing the result as a percentage); in table C, indicator B9 is calculated as a proportion of the Internet-using business population (i.e. dividing each row in table B by row 2 of table A). Table B is the preferred presentation of ICT indicators.

Table A: Absolute figures

Indicator	All businesses	Number of employees			
		0-9	10-49	50-249	250 and more
Number of businesses	36200	30000	5000	1000	200
B3: Proportion of businesses using internet	4150	3000	800	200	150
B9: of which:					
-narrowband	1265	1000	200	50	15
- broadband	2885	2000	600	150	135
- fixed broadband	2620	1900	500	120	100
- mobile broadband	265	100	100	30	35

Table B: B9 expressed as proportions of the total business population

Indicator	All businesses	Number of employees			
		0-9	10-49	50-249	250 and more
Number of businesses	36200	30000	5000	1000	200
B3: Proportion of businesses using internet	4150	3000	800	200	150
B9: of which:					
-narrowband	3,5%	3,3%	4,0%	5,0%	7,5%
- broadband	8,0%	6,7%	12,0%	15,0%	67,5%
- fixed broadband	7,2%	6,3%	10,0%	12,0%	50,0%
- mobile broadband	0,7%	0,3%	2,0%	3,0%	17,5%

Table C: B9 expressed as proportions of the Internet-using business population

Indicator	All businesses	Number of employees			
		0-9	10-49	50-249	250 and more
Number of businesses	36200	30000	5000	1000	200
B3: Proportion of businesses using internet	4150	3000	800	200	150
B9: of which:					
-narrowband	30,5%	33,3%	25,0%	25,0%	10,0%
- broadband	69,5%	66,7%	75,0%	75,0%	90,0%
- fixed broadband	63,1%	63,3%	62,5%	60,0%	66,7%
- mobile broadband	6,4%	3,3%	12,5%	15,0%	23,3%

\*\*\* end of BOX \*\*\*

67. For indicator B9 *Proportion of businesses using the Internet by type of access*, the response categories should cover the range of technological options and should enable aggregation to *total narrowband* and *total broadband*. The interest is usually focused on the bandwidth of the connection, that is, the amount of data that can be sent or downloaded measured in kilobits per second (Kbit/s). There is a distinction between narrowband and broadband, defined as bandwidths below or above 256 Kbit/s respectively<sup>17</sup> [check with ITU].

68. The adoption of broadband brings significant improvements in terms of enabling the full capabilities of Internet-based applications and thus measuring the bandwidth is very important. For example, Internet-based telephony can significantly reduce the cost of communications, higher connection speeds can reduce the time required for performing e-business processes, more users can connect simultaneously to the Internet. Different technological options are presented in **box ?** (including the distinction between narrowband and broadband), but it is expected that countries will collect data at a more detailed level in their questionnaires (see **example ?** for a particular national classification of types of connection). The categories chosen by countries should allow aggregation to total narrowband and total broadband, as well as fixed and mobile broadband (see definitions in **table ?** based on ITU standards<sup>18</sup>). Co-operation with national telecommunications authorities may help statistical offices in preparing the list of response categories, based on the available technologies at the moment of the survey.

<b>Box ?:</b> Types of connection to the Internet	
Narrowband  (download speed of less than 256 Kbit/s, in one or both directions)	Analogue modem (dial-up via standard phone line). The modem converts a digital signal into analogue for transmission by traditional (copper) telephone lines. It also converts analogue transmissions back to digital.
	Integrated Services Digital Network (ISDN). ISDN is a telecommunication service that turns a traditional (copper) telephone line into a higher speed digital link. ISDN is usually considered to be narrowband.  DSL (Digital subscriber Line) at speeds below 256kbit/s
	Other narrowband includes mobile phone and other forms of access. Narrowband mobile phone access services include CDMA 1x (Release 0), GPRS, WAP and i-mode.  Countries should add appropriate category/ies to questionnaires based on services available.
Broadband  (download speed equal to or greater than 256 Kbit/s, in one or both directions)	<u>Fixed broadband, which can be segmented as fixed wired broadband and fixed wireless broadband.</u>  Fixed (wired) broadband Internet connections refers to connections to high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This can include for example cable modem, DSL, fibre-to-the-home/building and other fixed (wired) broadband

**Commented [JLC8]:** As per ITU 2010 definitions

<sup>17</sup> ITU indicator on broadband by speed segments the speed in the following intervals: 256kbps to 2Mbps, 2Mbps to 10Mbps, above 10Mbps (the latter further segmented as 10Mbps to 100Mbps, 100Mbps to 1Gbps, above 1Gbps).

<sup>18</sup> <https://www.itu.int/en/ITU->

[D:/Statistics/Documents/publications/handbook/2010/TelecomICT\\_Indicators\\_Definition\\_March2010\\_for\\_web\\_E.doc](D:/Statistics/Documents/publications/handbook/2010/TelecomICT_Indicators_Definition_March2010_for_web_E.doc)

	<p>subscriptions, as well as technologies such as powerline communications, etc.</p> <p>It excludes those users of temporary broadband access (e.g., roaming between PWLAN hotspots), and those with Internet access via mobile cellular networks. WiMax should be excluded.</p> <p>It excludes technologies listed under wireless broadband category.</p> <p>Fixed wireless broadband includes satellite, terrestrial fixed wireless and terrestrial mobile wireless subscriptions.</p> <p><u>Mobile broadband</u></p> <p>Mobile broadband access services include <i>Wideband CDMA</i> (W-CDMA), known as <i>Universal Mobile Telecommunications System</i> (UMTS) in Europe; High-speed Downlink Packet Access (HSDPA), complemented by High-Speed Uplink Packet Access (HSUPA); CDMA2000 1xEV-DO and CDMA 2000 1xEV-DV. Access can be via any device (mobile cellular phone, laptop, PDA, etc.)</p> <p>Includes mobile connections with data speeds of 256 kbit/s or greater and which have been used to make an Internet data connection via IP in the previous 3 months. The connection must allow access to the greater Internet via HTTP. Standard SMS and MMS messaging do not count as an active Internet data connection even if they are delivered via IP.</p>
	<p>Countries should add appropriate category/ies to questionnaires based on services available.</p>

### Other ICT demand (use) indicators

69. In addition to collecting information to produce the core ICT indicators, countries may be interested in information on other aspects of ICT demand, including: the use of mobile phones for business-related activities, current and capital expenditure on ICT, IT security measures and experiences, type and value of goods purchased and sold via e-commerce, and barriers to ICT.

70. The use of mobile phones is increasingly changing the way small businesses in developing countries are conducting their operations, in particular when fixed telephone lines are not available.<sup>19</sup> The potential impact of mobile phones on business performance is therefore gaining increasing attention, although few countries are currently collecting indicators on such use [still correct?]. Table ? offers possible indicators on business mobile phone use. Mobile phone use indicators and model questions will be further developed as users' needs and mobile services available become clearer. Countries interested in collecting mobile phone indicators may also want to include questions on the use of fixed telephone in businesses, which would allow comparison between the two technologies. [Para to be updated. Mobile phone use is now pretty much ubiquitous in developing countries. Is there a need to refer to mobile money/payment?]

**Table ?.** Proposed indicators and model questions on mobile phone use in businesses

<sup>19</sup> For more information on mobile phone use by businesses, see UNCTAD, 2006 and UNCTAD, 2008. [Update]

**Commented [JLC9]:** To be adjusted as per the final contents of the chapter

<p><b>Indicator code and name:</b>  <b>M1: Proportion of businesses using mobile phones</b></p>
<p><b>Definition of concepts:</b></p> <p>The proportion of businesses using mobile phones is calculated by dividing the number of in-scope businesses using mobile phones during the 12-month reference period by the total number of in-scope businesses.</p>
<p><b>Clarifications and methodological issues:</b></p> <p>Mobile phones refer to portable telephones subscribing to a public mobile telephone service using cellular technology, which provides access to the PSTN. Users of both post-paid subscriptions and pre-paid accounts are included.</p>
<p><b>Model question:</b></p>
<p><b>Disaggregation and classifications:</b></p>
<p><b>Policy relevance:</b></p>

<p><b>Indicator code and name:</b>  <b>M2: Proportion of businesses receiving orders via mobile phones</b></p>
<p><b>Definition of concepts:</b></p> <p>The proportion of businesses receiving orders via mobile phones is calculated by dividing the number of in-scope businesses receiving orders via mobile phones by the total number of in-scope businesses. Alternatively, output can be presented as the proportion of in-scope businesses.</p>
<p><b>Clarifications and methodological issues:</b></p> <p>Mobile phones: as above  Orders received include orders received via mobile phones whether or not payment was made via mobile phones.</p>
<p><b>Model question:</b></p>
<p><b>Disaggregation and classifications:</b></p>
<p><b>Policy relevance:</b></p>



<p><b>Indicator code and name:</b>  <b>M3: Proportion of businesses placing orders via mobile phones</b></p>
<p><b>Definition of concepts:</b></p> <p>Proportion of businesses placing orders via mobile phones is calculated by dividing the number of in-scope businesses placing orders via mobile phones by the total number of in-scope businesses. Alternatively, output can be presented as the proportion of in-scope businesses</p>
<p><b>Clarifications and methodological issues:</b></p> <p>Mobile phones: as above  Orders placed include orders placed via mobile phones whether or not payment was made via mobile phones.</p>
<p><b>Model question:</b></p>
<p><b>Disaggregation and classifications:</b></p>
<p><b>Policy relevance:</b></p>

<p><b>Indicator code and name:</b>  <b>M4: Proportion of businesses using mobile phones by type of activity</b></p>
<p><b>Definition of concepts:</b></p> <p>The proportion of businesses using mobile phones by type of activity can be calculated as: either the proportion of in-scope businesses or the proportion of mobile phones-using businesses that undertook each activity.</p> <p>Possible response categories:</p> <ul style="list-style-type: none"> <li>- For getting information about goods or services</li> <li>- For sending or receiving email</li> <li>- For accessing the Internet</li> <li>- For accessing banking or other financial services (Includes electronic transactions with a bank for payment, transfers, etc. or for looking up account information)</li> <li>- For interacting with general government organizations (General government organizations are defined in table 3)</li> <li>- For providing customer services (Customer services include providing prices and product information through SMS, information on available account credit, product configuration, etc.)</li> <li>- For delivering products over the mobile phone line (Delivering products over the mobile phone line refers to goods and services delivered over the line in digitized form, e.g. ring tones, software, music, videos, games)</li> </ul>
<p><b>Clarifications and methodological issues:</b></p> <p>Mobile phones: as above  Orders placed include orders placed via mobile phones whether or not payment was made via mobile phones.</p>
<p><b>Model question:</b></p>

<b>Disaggregation and classifications:</b>
<b>Policy relevance:</b>

71. Investment in ICT by businesses indicates the effort to update operations of the business sector and can also provide a partial measure of the size of the national ICT market (see **example ?**). It is important to recall that in many countries, national policies to foster the use of ICT also provide fiscal benefits to businesses adopting technologies.

**Example ?. Measurement of investment in ICT goods and services in the Republic of Moldova**

The survey ‘Situation regarding the informatisation and availability of computer techniques’ carried out by the Department of Statistics of the Republic of Moldova includes a set of quantitative questions on: total expenditure on acquisition of ICT goods (broken down by own budget and governmental grants), investment and current expenditure on ICT projects, purchase and licensing of software, and training of staff in ICT. These values can be aggregated at the firm level and further broken down by economic activity, size of firm and other classification variables recorded on the questionnaire, as well as analysed in relation to the performance of firms, via the linkage of questionnaires from different surveys.

Source: Survey questionnaire, Department of Statistics.

**Commented [JLC10]:** Example to be updated. Participants of the Working Group are invited to suggest examples.

72. IT security measures are included in the OECD and Eurostat 2006 model questionnaires (annexes XX and XX respectively) via the inclusion of specific yes/no questions on security measures in place. The OECD model includes the following IT security measures: virus protection software, anti-spyware, firewall, spam filter, secured communication between clients and servers, authentication software or hardware, intrusion detection systems, regular backup of critical data and offsite backup. IT security problems experienced (e.g. virus attacks resulting in loss of data or time) may also be asked about (though businesses may be reluctant to provide information on security breaches).

**Commented [JLC11]:** To be updated

**4.2 Measuring the ICT sector (supply of ICT goods and services)**

73. Central to the ICT statistical system is the measurement of the supply side, that is, the ICT sector and its products (goods and services). This requires the statistical coverage of economic activities such as ICT manufacturing, wholesale trade of ICT goods, telecommunications and computer-related services. As for any other economic activity, key statistical information about the ICT sector includes indicators on production of goods and services, labour force and business performance (income, value added and productivity measures). This section deals with the statistical definition of the ICT sector and with the relevant core indicators.

74. General business surveys and censuses of manufacturing or services sectors may partly cover the ICT sector, and complementary information can be obtained via the analysis of foreign trade in ICT goods (see section 4.3).

### Definition of the ICT sector

75. The definition of the ICT sector used in this *Manual* was established by the OECD's WPIIS. The original definition was agreed in 1998 and based on ISIC Rev. 3. With the revision of ISIC to Rev. 3.1, a refinement to ICT wholesaling was introduced in 2002. **[Still relevant to refer to 3.1?]**

76. The principles applied to the 1998 and 2002 definitions of the ICT sector by the OECD were (OECD, 2005):

For manufacturing industries, the products of a candidate industry:

- must be intended to fulfil the function of information processing and communication including transmission and display, or
- must use electronic processing to detect, measure and/or record physical phenomena or to control a physical process.

For services industries (also referred to as ICT services), the products of a candidate industry:

- must be intended to enable the function of information processing and communication by electronic means.

77. The ISIC Rev. 3.1 categories comprising the ICT sector (2002) are shown in **box ?** below.<sup>20</sup>

#### **Box ?. The 2002 OECD ICT sector definition (based on ISIC Rev. 3.1)**

##### ICT Manufacturing

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

##### ICT Services

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

\* The activity of these classes is excluded from the OECD's 2007 definition of the ICT sector (see **box ?**).

Source: OECD, 2005 and 2007.

78. As many **[most?]** countries are adopting the more recent ISIC Rev.4 version, this *Manual* recommends adopting the 2007 definition of the ICT sector in **box ??** below, based on ISIC rev. 4 codes. It

<sup>20</sup> Given that the implementation of ISIC Rev. 4 will take several years for most countries, it is likely that many countries will continue to use the 2002 definition (based on ISIC Rev. 3.1) for at least the next 3–4 years. The timetable proposed for countries to adapt national classifications to ISIC Rev. 4 is 2009 and to use it for statistical programmes from 2011. The UNSC has requested that the timeline is reviewed, recognizing the need for flexibility and the desirability of advancing the adoption (UNSC, 2007).

is important to note that, while correspondences have been established between ISIC rev. 3.1 and ISIC rev. 4, the current definition is not a one-to-one transformation of industry codes. Countries should establish a definition of the ICT sector based on their national classification, noting that it should be as comparable as possible with the international standard ISIC Rev. 4. Ideally, the level of detail for the collection of information about the economic activity of businesses should allow classifying them by ISIC rev. 4 codes.

**Box 7. The 2007 OECD ICT sector definition (based on ISIC Rev. 4)**

ICT manufacturing industries

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

ICT trade industries

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

ICT services industries

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

Source: OECD, 2007.

79. The United Nations Statistics Division (UNSD) has recognized the OECD ICT sector definitions (both 2002 and 2007) and publishes them as ‘alternate structures’ of ISIC.<sup>21</sup>

80. In conjunction with its 2006 review of the ICT sector, the OECD defined a Content and media sector. It includes: publishing (including music but excluding software); programme activities (motion picture, video and television); sound recording; and programming and broadcasting activities.

81. The introduction of ISIC Rev. 4 [**pls redraft – now more than a decade ago**] should be taken as an opportunity to update national classifications and classification fields on business registers (or other registers used as population frames for business surveys). The adaptation of international classifications by countries can involve the addition of extra detail in selected areas or the collapse of some categories if certain breakdowns are deemed not to be relevant. In the latter case, care should be taken not to collapse any of the 4-digit categories comprising parts of the ICT sector (for instance, ICT manufacturing).

82. To help countries to assess the compliance of a national classification with ISIC (or other international standards), the UNSD has outlined a series of checks which cover compliance with the classification structure and classification principles, comparability of data and use of the national classification in the statistical system (UNSD, 2005).

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<sup>21</sup> The ISIC Rev. 3.1 alternate structure for the ICT sector can be found here: [http://unstats.un.org/unsd/cr/registry/docs/i31\\_ict.pdf](http://unstats.un.org/unsd/cr/registry/docs/i31_ict.pdf). The ISIC Rev. 4 alternate structure has been agreed and can be found at <http://unstats.un.org/unsd/cr/registry/isic-4.asp>.

### Core indicators on the ICT sector

83. The core list of ICT indicators recommended by the Partnership includes two core indicators on the ICT sector: the proportion of total business sector workforce involved in the ICT sector and the proportion of total value added (see [table ?](#)).

**Table ?.** Core indicators for the ICT sector

<b>Indicator code and name:</b> ICT1: Proportion of total business sector workforce involved in the ICT sector
<b>Definition of concepts:</b> The proportion of total business sector workforce involved in the ICT sector is calculated by dividing the ICT sector workforce by the total business sector workforce (expressed as a percentage).
<b>Clarifications and methodological issues:</b> ICT workforce (or ICT employment) consists of those persons employed in businesses that are classified as belonging to the ICT sector. Total business workforce represents all persons engaged in domestic production in the business sector. In a national accounts framework, employment can be measured in terms of headcounts, jobs, full-time equivalents (FTE) or hours worked. Currently, total headcounts or jobs are used for most countries.
<b>Model question:</b>
<b>Disaggregation and classifications:</b>
<b>Policy relevance:</b>

<b>Indicator code and name:</b> ICT2: Value added in the ICT sector (as a percentage of total business sector value added).
<b>Definition of concepts:</b> Value added in the ICT sector is calculated as the estimated value added of the ICT sector divided by total business sector value added (expressed as a percentage).
<b>Clarifications and methodological issues:</b> Value added for a particular industry represents its contribution to national GDP. It is sometimes referred to as GDP by industry and is not directly measured (but is estimated in a national accounts framework). In general, it is calculated as the difference between production (gross output) and intermediate inputs (the energy, materials and services required to produce final output).
<b>Model question:</b>
<b>Disaggregation and classifications:</b>
<b>Policy relevance:</b>

84. In calculating proportions or percentages with respect to the total business sector, a definition based on business activities is recommended in preference to an institutional definition. The business sector, in this case, is defined as ISIC (Rev. 3.1) divisions 10 to 74, excluding 70 (real estate activities<sup>22</sup>). Some countries may have particular interest in including in the scope of their measurement agriculture, fishing and forestry activities - which are largely informal in developing countries, as well as community, social and personal services. The relevant definition of the business sector should be stated for the international comparability of indicators.

85. The calculation of value added for a sector is done in the framework of a country's national accounts (in particular the System of National Accounts – SNA93 and its predecessor, SNA68). Value added can be calculated at factor costs, at basic prices or at producers' prices. The numerator and denominator of the indicator should be calculated using the same methodology. The differences between the methods are based on the inclusion of taxes, subsidies on products and production, trade and transport costs and value added taxes (see [table ?](#) for more detail).

**Table ?. Valuation of value added**

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

Source: Partnership on Measuring ICT for Development (2005b), based on concepts outlined in both the 1968 and 1993 versions of the System of National Accounts (SNA68 and SNA93).

86. The calculation of indicators for the ICT sector requires obtaining macroeconomic aggregates (total employment, value added) which are central for the compilation of ICT satellite accounts (supply side). It has to be recalled that no international standards exist for ICT satellite accounts and the ongoing work is mainly exploratory (see [example ??](#) below and chapter 3).

**Example ??: Calculation of ICT satellite accounts in Australia**

The Australian Bureau of Statistics (ABS) carries out research on the production, distribution and use of ICT goods and services since the late 1980s ICT Industry Survey. Official statistics on ICT supply have been produced since 1987-88 and are currently produced biennially.

The ABS also compiles statistics on international trade, imports and exports, in ICT goods and services. Complementary

**Commented [JLC12]:** Example to be updated. Participants of the Working Group are invited to suggest examples. Countries that have used ICT sector satellite accounts include Azerbaijan, Colombia, Ghana, Malaysia, and South Africa.

<sup>22</sup> It is excluded because a significant proportion of its value added consists of imputed rent of owner-occupied dwellings.

research on a range of ICT issues (for example, investment in ICT, ICT employment and wages and salaries, business payments to consultants and contractors for ICT related work, in house production of software for own final use, etc.) has also been conducted. Major measurement difficulties that have been identified include trade in software, treatment of computer games, capitalization of own account software and other.

Source: Australian Bureau of Statistics.

### 4.3 Measuring trade in ICT goods

87. Global demand for ICT goods and services through international trade and investment can drive the activities of many upstream domestic ICT and non-ICT industries. Trade data, combined with statistical information about the supplying sectors (value added, jobs, input-output tables) can eventually provide insight into the “extended footprint” of the ICT and this in a cross-border perspective<sup>23</sup>. Internationally comparable statistics on foreign trade in ICT goods are therefore crucial to understand the supply and demand at global and national levels.

#### Definition of ICT goods

88. The ICT goods classification used in the 2009 edition of this *Manual* was based on the work of the OECD through its Working Party on Indicators for the Information Society (WPIIS). WPIIS developed the classification in accordance with the guiding principle that ICT goods “must either be intended to fulfil the function of information processing and communication by electronic means, including transmission and display, or use electronic processing to detect, measure and/or record physical phenomena, or to control a physical process”.

89. When the definition was first released in 2003 it was based on a list of 6-digit items according to the World Customs Organization (WCO) Harmonized System (HS) classification, the HS 1996 and HS 2002 editions. Since then the definition of ICT goods has been revised (2008) and the transition from HS 2002 to HS 2007, and later to HS 2012 resulted in breaks in time series.

90. In 2018, UNCTAD released a technical<sup>24</sup> focusing on the transition from HS 2012 to HS 2017, establishing the necessary correspondences between HS codes. The definition of ICT goods has been updated with respect to the previous edition of the *Manual* to reflect the adoption of the new revision of the HS classification and to enable the use of data reported under HS 2017 for describing recent trends. UNCTAD requested the United Nations Statistics Division (UNSD) to establish the exact correspondence between HS 2012 and HS 2017 as regards the current definition of ICT goods. The correspondence table covers the five categories of ICT goods:

- Electronic components
- Computers and peripheral equipment
- Communication equipment

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<sup>23</sup> G20 Toolkit for Measuring the Digital Economy. Draft Version, November 2018.

<sup>24</sup> UNCTAD (2018), TECHNICAL NOTE NO10 UNEDITED. TN/UNCTAD/ICT4D/10. MAY 2018 “Updating the Partnership Definition of ICT Goods From HS 2012 to HS 2017”

- Consumer electronic equipment
- Miscellaneous.

91. Using this definition, UNCTAD publishes annually trade in ICT goods data in *UNCTADStat*<sup>25</sup>.

92. The list based on HS 2017 is available in at Annex X

93. In 2007-2008, the OECD worked to finalize a classification of Information Economy (including ICT products<sup>26</sup> and Content and media products) based on the UN's 2007 Central Product Classification (CPC) Ver. 2. However, like for the ISIC rev. 4, it is expected that it will take some time before most countries are using the revised CPC. This *Manual* therefore recommends that the 2003 version of the ICT goods classification be used for the next few years. A correspondence between the goods component of the ICT product definition based in CPC and the HS is expected to be prepared shortly, providing countries with a revised classification for measuring trade in ICT goods.

**Commented [JLC13]:** Revise this after classification of ICT sectors

### Core indicators on the trade in ICT goods

94. The Partnership core ICT indicators on trade are imports and exports of ICT goods expressed as a percentage of total imports or exports, as described in Table 6 below.

**Table 6. Core indicators on trade in ICT goods**

<b>Indicator code and name:</b> ICT3: ICT goods imports as a percentage of total imports
<b>Definition of concepts:</b> ICT3 is calculated as the quotient of the value of imports of all ICT goods divided by the total value of imports (expressed as a percentage).
<b>Clarifications and methodological issues:</b> ICT goods are defined by the OECD's ICT goods classification in terms of the 2017 HS classification (see Annex XX). Other concepts are per the UN COMTRADE database e.g. re-exports and reimports are not netted out, and data are presented in US dollars (converted by the UN from country currencies).
<b>Model question:</b>  <b>Not applicable (extracted from trade data)</b>
<b>Disaggregation and classifications:</b>
<b>Policy relevance:</b>

<sup>25</sup> <https://unctadstat.unctad.org>

<sup>26</sup> OECD document DSTI/ICCP/IIS(2006)11/FINAL.



<p><b>Indicator code and name:</b>  <b>ICT4: ICT goods exports as a percentage of total exports</b></p>
<p><b>Definition of concepts:</b></p> <p>ICT4 is calculated as the quotient of the value of exports of all ICT goods divided by the total value of exports (expressed as a percentage).</p>
<p><b>Clarifications and methodological issues:</b></p> <p>ICT goods are defined by the OECD's ICT goods classification in terms of the 2017 HS classification (see Annex <b>XX</b>). Other concepts are per the UN COMTRADE database e.g. re-exports and reimports are not netted out, and data are presented in US dollars (converted by the UN from country currencies).</p>
<p><b>Model question:</b></p> <p><b>Not applicable (extracted from trade data)</b></p>
<p><b>Disaggregation and classifications:</b></p>
<p><b>Policy relevance:</b></p>

### *Data collection on the trade in ICT goods*

95. The usual data source for indicators ICT3 and ICT4 is foreign trade data, which are usually compiled by national customs authorities in collaboration with statistical offices. A high level of harmonization – but with some time lag in the availability of data - has been achieved in international statistics on foreign trade, which has allowed the production and maintenance of harmonized databases such as the UN COMTRADE database.<sup>27</sup> The valuation of imports and exports in the SNA is generally identical with that in the Balance of Payments methodology, to which the reader should refer for details on the methods.

96. In order to produce the core indicators on trade in ICT goods, countries should investigate the availability of suitable classifications of goods by their customs authority, and establish cooperative procedures between this institution and the NSO. Countries that use national classifications of goods not compatible with the WCO's Harmonized System should establish the necessary correspondence tables (it is, of course, recommended that countries adopt international standards in classifications wherever possible).

97. There is a potential in combining trade data with other sources of statistical information. Some countries match customs data with information from the business register (via business identifiers). An established relation between these two enables the analysis of the effects of international trade on production, employment and enterprise performance. For instance, trade by size of enterprise broken down by sector of economic activity, by export markets and by location (e.g. region) would allow analysis of trade effects on employment and value added by region of a country. The International Merchandise Trade Statistics: Supplement to the Compilers Manual (UNSD, 2008) [**latest edition?**] provides methodological advice on this topic which is further discussed in Chapter 5.

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<sup>27</sup> See <http://unstats.un.org/unsd/comtrade/default.aspx>.

#### 4.4 Measuring trade in ICT services

98. It is widely acknowledged that measuring trade in services (not only those related to the ICT) is more difficult than measuring trade in goods. Services are intangible, hard to define and unlike goods they leave little or no administrative trail when crossing the border. The UN Statistical Commission adopted the first Manual on Statistics of International Trade in Services (MSITS) as an international standard in 2002, which included the Extended Balance of Payments Services classification (EBOPS 2002), subsequently revised in 2010 as EBOPS 2010

99. Policy interest in ICT services and ICT-enabled services trade is very high<sup>28</sup>. It represents an increasingly important component of the digital economy and is of strong and growing concern to policymakers and other stakeholders. It offers considerable development opportunities by linking economies into global value chains and enhancing the productivity and competitiveness of ICT-using industries, while also creating anxiety in some importing countries about job loss. Answering the need for statistical standards in the measurement of ICT-enabled services, between 2015 and 2016 a *Task Group on ICT Services and ICT-enabled Services* has been created under the umbrella of the *Partnership on Measuring ICT for Development* to coordinate efforts and reduce the risk of duplicating work.

100. Activities comprised under ICT services are those "*intended to enable and/or fulfill the function of information processing and communication.*" An initial proposal to create a complementary grouping for ICT services using balance of payments statistics disaggregated at the three-digit level of the Extended Balance of Payments Services classification (EBOPS) 2010<sup>29</sup>, following the methodology developed in the Manual on Statistics of International Trade in Services (MSITS 2010) (United Nations, 2012) and the IMF Balance of Payments and International Investment Position Manual (BPM6 in its latest version) (International Monetary Fund, 2009).

##### *Statistical definition of the grouping "ICT services"*

101. The statistical definition of *ICT services* is now well established. ICT service activities are defined as an aggregation of ISIC Rev.4 codes as a component of the ICT sector (see section 4.2). The definition was developed by the OECD *Working Party on Indicators for the Information Society* (WPIIS), and subsequently adopted by the *Partnership on Measuring ICT for Development*. In preparing the statistical definition the *ICT services*, correspondences between EBOPS 2010, CPC Ver.2, CPC Ver.2.1, and ISIC Rev.4 were used.

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<sup>28</sup> This and the following section are based on the UNCTAD technical notes "International Trade in ICT Services and ICT-enabled Services" (TECHNICAL NOTE NO.3 UNEDITED TN/UNCTAD/ICT4D/03 OCTOBER 2015), and "Implementing a Survey on Exports of ICT-enabled Services" (TECHNICAL NOTE NO.11 UNEDITED TN/UNCTAD/ICT4D/11. JUNE 2018). Ssee [https://unctad.org/en/Pages/DTL/STI\\_and ICTs/ICT4D-Technical-Notes.aspx](https://unctad.org/en/Pages/DTL/STI_and ICTs/ICT4D-Technical-Notes.aspx).

<sup>29</sup> See [https://unstats.un.org/unsd/classifications/Econ/Download/In%20Text/EBOPS2010\\_english.pdf](https://unstats.un.org/unsd/classifications/Econ/Download/In%20Text/EBOPS2010_english.pdf).

102. The list of ISIC Rev.4, EBOPS 2010 and CPC Ver.2.1 codes corresponding to the *ICT sector* are given in Table XX below.

**Table XX ICT services complementary grouping**

EBOPS 2010	EBOPS 2010 description	CPC Ver.2.1	CPC Ver.2.1 description	ISIC Rev.4	ISIC Rev.4 description
9.1	Telecommunications services	841	Telephony and other telecommunications services	61	Telecommunications
		842	Internet telecommunications services		
		84631	Broadcasting services	60*	Programming and broadcasting activities
9.2.1	Computer services - Computer software	83143	Software originals	5820*	Software publishing
		8434	Software downloads		
		84391	On-line games		
		84392	On-line software		
9.2.2	Computer services - Other computer services	8313	IT consulting and support services	6202*	Computer consultancy and computer facilities management activities
		83141	IT design and development services for applications	6201*	Computer programming activities
		83142	IT design and development services for networks and systems	6202*	Computer consultancy and computer facilities management activities
		8315	Hosting and information technology (IT) infrastructure provisioning services	6311*	Data processing, hosting and related activities
		8316	IT infrastructure and network management services	6202*	Computer consultancy and computer facilities management activities
		8713	Maintenance and repair services of computers and peripheral equipment	9511*	Repair of computers and peripheral equipment
		92919*	Other education and training services, n.e.c.	8549*	Other education
8.3	Licenses to reproduce and/or distribute computer software	73311	Licensing services for the right to use computer software	5820*	Software publishing

Note: \* Partial allocation.

103. If a country does not have data for all the *ICT services* with the detail given above with 4 digits of the ISIC Rev.4, it may still partially compile data using less detailed classifications, for instance, EBOPS 2010.

### Core indicators on the trade in ICT services

104. UNCTAD has proposed two indicators on *imports and exports of ICT services as a share of total services*.

<b>Indicator code and name:</b> ICT5: imports of ICT services as a proportion of total imports of services
<b>Definition of concepts:</b> ICT5 is calculated as the quotient of the value of imports of all ICT services divided by the total value of imports of services (expressed as a percentage).
<b>Clarifications and methodological issues:</b> ICT services are defined as per Table XX and include: <ul style="list-style-type: none"><li>- Telecommunications services</li><li>- Computer services - Computer software</li><li>- Computer services - Other computer services</li><li>- Licenses to reproduce and/or distribute computer software</li></ul>
<b>Model question:</b> Not applicable (calculated from BOP data)
<b>Disaggregation and classifications:</b> Can be disaggregated by EBOPS 2010 codes or with more detail by ISIC Rev. 4 codes.
<b>Policy relevance:</b>

<b>Indicator code and name:</b> ICT6: exports of ICT services as a proportion of total exports of services
<b>Definition of concepts:</b> ICT6 is calculated as the quotient of the value of exports of all ICT services divided by the total value of exports of services (expressed as a percentage).
<b>Clarifications and methodological issues:</b> ICT services are defined as per Table XX and include: <ul style="list-style-type: none"><li>- Telecommunications services</li><li>- Computer services - Computer software</li><li>- Computer services - Other computer services</li><li>- Licenses to reproduce and/or distribute computer software</li></ul>
<b>Model question:</b> Not applicable (calculated from BOP data)

<p><b>Disaggregation and classifications:</b></p> <p>Can be disaggregated by EBOPS 2010 codes or with more detail by ISIC Rev. 4 codes.</p>
<p><b>Policy relevance:</b></p>

#### 4.5 Measuring ICT-enabled (digitally delivered) services

105. Information and communications technologies (ICTs) are a key enabling factor for the development of services trade, especially thanks to the falling prices for voice and data communications which enable companies to segment and relocate work to remote locations, including to foreign affiliates. This trend is accompanied by a transformation of the nature of the traded services, with an evolution, from basic call centers, simple software coding, and generation of digital content to more complex business process such as system design and R&D. Producing data on international trade in digitally-delivered services (also referred to as ICT-enabled services or ITES) is also of interest for trade in services negotiations, which typically differentiate by mode of supply of such services.

106. At the national level, the successful implementation of such a survey therefore benefits from the cooperation of, at least, the central bank (usually responsible for Balance of Payment and other related statistics) and the NSO. The sectoral ministry or national agency in charge of the development and regulation of ecommerce and services trade should also be involved. For the initial phases of the data collection (GSBPM phase "Specify needs" and "Build") it may be important to involve the private sector, to understand better the information needs as well as the concrete modalities of ICT-enabled services exist in the country.

107. Pilot surveys were implemented to test a draft questionnaire. The recommended questionnaire after piloting is presented in Annex XX. The questionnaire comprises three parts. Part A aims at collecting basic information about the enterprise. Part B identifies exports of services that were delivered by the enterprise remotely over ICT networks (so-called ICT-enabled services) during the reporting period. Part C allows detailing these ICT-enabled exports by type of service, mode of delivery and partner economy.

##### Mode of delivery

108. ITES are defined as "services products delivered remotely over ICT networks" (i.e. over voice or data networks, including the Internet). Trade in ITES would thus essentially encompass all services transactions delivered remotely over ICT networks.

109. In the terminology of the statistical standard MSITS (2010),<sup>30</sup> ITES are delivered via Mode 1 (cross-border supply). Excluded are those services that involve the movement of physical objects or people, such as transport, or those that require face-to-face contact, such as personal services, even if they make use ICT for purposes other than remote delivery (for example, using an ICT application for making a reservation or for payment).

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<sup>30</sup> This terminology is also used in trade agreements such the General Agreement on Trade in Services (GATS).

*Statistical definition of the grouping “ICT-enabled services”*

110. The UNCTAD technical note defines potential vs actual ICT enabled services as follows: “the proposed classification identifies those services that can potentially be delivered remotely over ICT networks and those that cannot. Because correspondences exist between the CPC classification (product level) and other international classifications, such as EBOPS, and the International Standard Industrial Classification (ISIC) (economic activity level), these are used to bring further clarity as to what types of services are potentially ICT-enabled.

111. The ITES grouping includes services that *can* be delivered remotely over ICT networks, i.e. *potentially* ICT-enabled services. As mentioned above, services that cannot be delivered remotely over ICT networks are excluded. As for *ICT services*, the definition has been developed by analysing the existing classifications EBOPS, CPC and ISIC in their latest versions, and their correspondence. Each of the 275 CPC items from the latest EBOPS 2010-CPC Ver.2- CPC Ver.2.1 correspondence table were divided into two main types with altogether 21 logical sub-categories as summarized in table 3: 1) *Potentially ICT-enabled services* (nine sub-categories); and 2) *Non-ICT enabled services*, comprising a) Transport and travel services (three sub-categories); and b) On-site or personal services (nine sub-categories). The sub-categories within each of these types were determined with the aim of creating a concise and intuitively logical taxonomy.<sup>31</sup> The nine sub-categories of services that can potentially be delivered remotely over ICT networks (1.1-1.9) comprise the proposed definition of ITES. ISIC Rev. 4 codes are given in Table XX below and more detailed in Annex XX.

**Table XX. Sub-categories of Type 1: potentially ICT-enabled services**

1.1 ICT services - Telecommunications
1.2 ICT services - Computer services (including computer software)
1.3 Sales and marketing services, not incl. trade and leasing services
1.4 Information services
1.5 Insurance and financial services
1.6 Management, administration, and back office services
1.7 Licensing services
1.8 Engineering, related technical services, research and development (R&D)
1.9 Education and training services

*Core indicators on trade in ICT-enabled services*

112. The following indicators should be added to the *Partnership core list of ICT indicators*: 1) *imports and 2) exports of ICT-enabled services as a proportion of total imports (exports) of services*. Reporting data disaggregated by the main sub-categories of the complementary grouping for ICT-enabled services is recommended in addition to the aggregate value.

<sup>31</sup> This classification still requires the development of a consolidated set of definitions by sub-category (based on the correspondences with EBOPS and CPC).

<p><b>Indicator code and name:</b>  <b>ICT7: imports of ICT-enabled services as a proportion of total imports of services</b></p>
<p><b>Definition of concepts:</b></p> <p>ICT7 is calculated as the quotient of the value of imports of all ICT-enabled services divided by the total value of imports of services (expressed as a percentage).</p>
<p><b>Clarifications and methodological issues:</b></p> <p>ICT-enabled services are defined as per Table XX and include:</p> <p>ICT services</p> <ul style="list-style-type: none"> <li>- Telecommunications</li> <li>- Computer services (including computer software)</li> </ul> <p>Other potentially ICT-enabled services:</p> <ul style="list-style-type: none"> <li>- Sales and marketing services, not incl. trade and leasing services</li> <li>- Information services</li> <li>- Insurance and financial services</li> <li>- Management, administration, and back office services</li> <li>- Licensing services</li> <li>- Education and training services</li> </ul>
<p><b>Model question:</b>  Not applicable (calculated from BOP data)</p>
<p><b>Disaggregation and classifications:</b></p> <p>Can be disaggregated by EBOPS 2010 codes or with more detail by ISIC Rev. 4 codes.</p>
<p><b>Policy relevance:</b></p>

<p><b>Indicator code and name:</b>  <b>ICT8: exports of ICT-enabled services as a proportion of total exports of services</b></p>
<p><b>Definition of concepts:</b></p> <p>ICT8 is calculated as the quotient of the value of exports of all ICT-enabled services divided by the total value of exports of services (expressed as a percentage).</p>
<p><b>Clarifications and methodological issues:</b></p> <p>ICT-enabled services are defined as per Table XX and include:</p> <p>ICT services</p> <ul style="list-style-type: none"> <li>- Telecommunications</li> <li>- Computer services (including computer software)</li> </ul> <p>Other potentially ICT-enabled services:</p> <ul style="list-style-type: none"> <li>- Sales and marketing services, not incl. trade and leasing services</li> </ul>



<ul style="list-style-type: none"> <li>- Information services</li> <li>- Insurance and financial services</li> <li>- Management, administration, and back office services</li> <li>- Licensing services</li> <li>- Education and training services</li> </ul>
<p><b>Model question:</b> Not applicable (calculated from BOP data)</p>
<p><b>Disaggregation and classifications:</b>  Can be disaggregated by EBOPS 2010 codes or with more detail by ISIC Rev. 4 codes.</p>
<p><b>Policy relevance:</b></p>

#### *Data collection on Trade in ITES*

113. In terms of collecting data on trade in ITES, two methods may be considered. A first approach is to measure the value of services delivered via Mode 1 (cross-border supply) following the survey methodology developed in MSITS (2010) for the list of potentially ICT-enabled services. ICT-enabled services can only be supplied across borders (Mode 1) without travel by natural persons (Mode 4) or consumers (Mode 2). Most services deemed to be supplied cross-border (Mode 1), without people also crossing borders, are ICT-enabled. In this approach, the compiling agency (central bank and/or statistical office) would need to identify modes of supply in collection and compilation. If only administrative records are used (such as ITRS) then these records would need to be examined for clues about the mode of supply employed. If business surveys are used, then questions can be added to identify modes of supply and, by extension, ITES.

114. Alternatively, a specific question can be included in a business survey. This option is further developed when presenting the UNCTAD model questionnaire on trade in ITES. The result of pilot tests suggested however the removal of references to the concepts of modes 1, 2, 3 and 4, while keeping the *description* of the different modes of supply defined as: cross-border supply, consumption abroad, supply through a commercial presence and through the presence of natural persons.

115. For the collection of data, countries should use as sample frame the statistical business register, or ideally, the balance of payments (BOP) register of services exporting firms if one is available. Usually the BOP register is managed by the national central bank and it includes details about the exporting or importing resident enterprises. A BOP register should include not only the basic identification variables, such as name, postal address of the company, name of managers, but also key economic variables regarding, in particular, the nature and type of exports and imports performed over the last few years.

**Example: Pilot survey on ICT-enabled services in India**

The UNCTAD classification of 9 categories of services was adopted in the survey implemented in India with minor deviations in financial services and exclusion of insurance services. The survey was to provide information on both country wise and mode wise exports for 8 remaining categories of the ICT-enabled services. Table below summarises the sampling approach adopted for each category of ICT-enabled services.

Table 1. Summary of the sampling approach in India

Category of service	Principle followed for dividing the population surveyed into census and sample segments
Telecommunications	Enterprises are ranked in descending order of value of exports as provided by the Reserve Bank of India from the international transaction reporting system (ITRS) database, and the enterprises (starting from the highest contributor) having a cumulative contribution of 90% to the total value of exports are regarded as 'census' units. The remaining enterprises are included in the 'sample' sector.
Engineering, related technical services and R&D	
Computer services (including computer software)	Top 100 enterprises from National Association of Software and Services Companies (NASSCOM) member list having a cumulative contribution of 70% to the total value of exports are included in 'census' sector. Apart from this, Software Technology Parks of India (STPI) units which are not members of NASSCOM are also regarded as 'census' units.
Sales and marketing services, not including trade and leasing services	The remaining enterprises are included in the 'sample' sector.
Information services	
Management, administration and back office services	
Licensing services	

Source: DGCIS.

Out of the originally proposed 2,600 units, notices could be served to only 2,485 units belonging to 7 subsectors. At the end, the overall response was about 74%. **[Please also check box III.1 in DER2019 (unctad.org/der).]**

## 4.6 Measuring e-commerce

116. E-commerce is defined as the sale or purchase/procurement of goods or services (includes getting estimates, negotiating, ordering, arranging contracts); electronic data interchange (EDI); mobile commerce; integration of ordering system with that of customers/suppliers; integrated invoicing and payment by customers; full integration with back-end systems; use of an extranet; secure transactions; automated payment of suppliers.
117. The core indicators on e-commerce B7 and B8 refer the receipt or placement of orders. The measurement of the value of e-commerce is not part of the definition of B7 and B8. Business-to-Business (B2B) e-commerce accounts for the dominant share of global e-commerce and is therefore also likely to be the most important component of cross-border sales online (UNCTAD 2015a)<sup>32</sup>. However, as data on B2B e-commerce are generally scarce, attention is also given to consumer-oriented shopping (i.e. Business to Consumer (B2C) and Consumer-to-Consumer (C2C) (see Box XX). One topic of interest is the measurement of cross-border e-commerce.
118. The measurement of e-commerce from the viewpoint of demand by households and individuals is considered in the framework of household surveys (see the ITU Manual on Measuring Access and Use of ICT by Households and Individuals).

### Box XX. Types of e-commerce

- Business-to-business (B2B). B2B involves the provision of goods and services to support other businesses, for example because of outsourcing and offshoring. There are various specialized B2B platforms, typically catering to certain industries or value chains.
- Business-to-consumer (B2C). B2C involves sales by "pure play" e-commerce enterprises to consumers and by traditional bricks-and-mortar retail or manufacturing firms that add an online sales channel. There is a wide range of channels to reach consumers, including social networks, crowdsourcing platforms, dedicated e-commerce websites, mobile applications and more. The products sold may be physical goods as well as digital products and services.
- Consumer-to-consumer (C2C). C2C e-commerce can be seen as a modern version of the classified advertising section in a newspaper or an auction. It covers online marketplace platforms (e.g. eBay or Taobao), and sales within online communities, consumer blogs and chat rooms.
- Business-to-government (B2G): B2G transactions are similar to B2B, except that the buyer in this case is a government entity, such as when it makes requests to bid through public e-procurement.

Source: UNCTAD, 2015a.

**\*\* end of Box \*\***

119. Countries wishing to further explore the extent of e-commerce can include questions on the type and value of goods purchased or sold via e-commerce. In order to overcome the difficulty of recording exact values, questionnaires could include a question on the percentage of total purchases and/or sales attributable to e-commerce, in intervals (e.g. less than 1 per cent, 1 per cent to 5 per cent, 6 per

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<sup>32</sup> [https://unctad.org/en/PublicationsLibrary/tn\\_unctad\\_ict4d06\\_en.pdf](https://unctad.org/en/PublicationsLibrary/tn_unctad_ict4d06_en.pdf)

cent to 10 per cent, 11 per cent to 25 per cent, more than 25 per cent). An alternative that enables aggregation of values for the business sector is to include questions asking for the percentage of value of e-commerce (purchases and/or sales) and the total value of all purchases and/or sales, so that e-commerce values are obtained, at the business level, by multiplication. The resulting values can then be aggregated for the business sector.

120. Ideally, survey enterprises including questions or modules on e-commerce would include the amount of sales broken down by B2B and B2C, as well as distinguishing between domestic and cross-border orders. Unfortunately, many countries that collect data on business e-commerce sales do not include questions about the share or value of cross-border transactions. This is especially the case among developing countries. Given that B2B accounts for the bulk of e-commerce worldwide and is likely to have the greatest impact on international trade, enterprise surveys may offer the greatest potential for improving the availability of more reliable estimates of cross-border e-commerce. See Box XX for an example of survey collecting such data.

#### Example: Eurostat and Statistics Canadas surveys on e-commerce

Commented [JLC14]: References to be provided

Eurostat disseminates every two years data on whether enterprises have carried out sales overseas using the Internet. The data refer to the proportion of enterprises that has conducted such sales (received such orders) The data include also total Internet sales, but do not distinguish between B2B and B2C. As regards the cross-border aspect, the e rest of the world.

The Survey of Digital Technology and Internet Use is an enterprise survey that provides data on the proportion of overseas Internet sales of all Canadian enterprises.<sup>3</sup> This refers to both B2B and B2C sales and is broken down by sales to the United States and to the rest of the world.

Source: <http://www.statcan.gc.ca/daily-quotidien/140708/dq140708b-eng.htm>

121. Enterprise surveys should offer the opportunity to compare data on cross-border ecommerce with data on enterprise exports (by all channels). This could be achieved by either including e-commerce-related questions in surveys on trade by enterprises or by including a question related to trade in existing e-commerce surveys.
122. For example, the Eurostat 2008 questionnaire presents alternative questions for measuring the purchases over computer networks (see **example ??** and annex 4), while the OECD model questionnaire distinguishes the value of physical and digitized products, as well as services ordered on line (but provided off line).
123. The types of indicators described above will not be fully explored in this *Manual*; **[to be discussed]** countries interested in their measurement should consider existing experiences, such as those of OECD and Eurostat countries and some developing economies with a particular interest in information economy measurement.

## **Chapter 5 - Data sources and data collection methods**

124. This chapter describes and compares potential statistical sources on the digital economy (including use of ICT by businesses, statistics on the ICT sector, on ICT-enabled services and on trade in ICT services, also referred to as “digital economy statistics”) and explores various data collection methodologies. The major topics covered by the chapter are:

- Presentation of the *General Statistic Business Process Model* (GSBPM), developed by UNECE as a useful conceptual framework that could support the countries to manage their statistical operations and generate data sources of the Digital Economy.
- Administrative data (such as, telecommunications regulatory information and customs data) and business registers;
- Ongoing economic surveys and censuses which may collect a small amount of ICT use data and often cover at least some of the ICT sector;
- Stand-alone ICT surveys, including on ICT-enabled services and substantial ICT modules included in other surveys; and
- New data sources and collection methods, such as Big Data, web scrapping and behavioural experiments.

125. Administrative sources and ongoing collections can be useful but are unlikely to completely satisfy policymakers’ needs (or deliver all of the core ICT indicators). This leaves stand-alone ICT collections or substantial ICT modules included in ‘host’ survey vehicles as the main sources of business ICT data (especially for the demand side). The choice of a particular source or survey vehicle for the collection of business ICT data should take into account international practices and standards, as well as national specificities (such as the functioning of the national statistical system), the needs of policymakers, and available technical and financial resources.

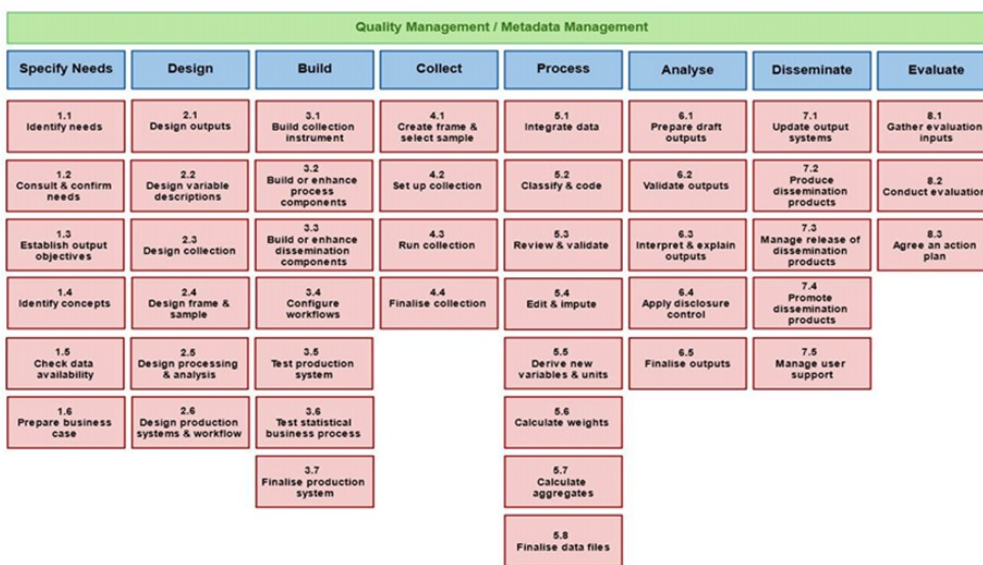
126. The activities in the digital economy produces large amounts of data that, properly captured and analysed, may become a relevant source for statistics. However, beyond technical issues coming from managing the amount, variety and rapid change of information, the use of these Big Data presents relevant challenges including data capture, data use regulation, availability and representativeness. Realising the synergies between these new Big Data and other type of sources (administrative registers, sample surveys or censuses) is a critical point in the agenda of NSOs of more advanced and developing countries.

127. The data collection methodologies presented in this chapter are based on country practices (in OECD countries as well as in developing economies) and on best practice recommendations that are broadly applicable to business statistics. A number of data collection methodologies are described and compared in terms of cost and effectiveness, from a development point of view. They include face-to-face interviews, personal telephone interviews, questionnaires sent by ordinary mail, forms posted on web pages, automatic data collection using web scrapping methods and behavioural experiments. Countries’ practices depend very much on the costs (of interviewers, transports and communication) and the existing infrastructure (call centres, regional or municipal offices, etc.).

## 5.1 The General Statistical Business Process Model (GSBPM)

128. The Generic Statistical Business Process Model (GSBPM, see Figure 7) proposed by UNECE is one of the cornerstones of the High-Level Group for the Modernization of Statistics (HLG-MOS). Its first full version was released in 2009 and has since been updated and adopted by the statistical offices of the most advanced countries in the field. It has proven to be very useful for laying out and describing all the phases to produce statistical information. The GSBPM is intended to guide the planning of surveys and other statistical operations by systematically considering all processes and the workflow from initial preparatory steps to dissemination, documentation and archiving. The model includes preparatory activities starting from the identification of information needs, to final activities such as the dissemination of statistics and evaluation of specific parts of the process whenever necessary. Most importantly, it allows to create a fully detailed strategy to produce such information.

Figure 7. Scheme of the Generic Statistical Business Process Model (GSBPM)



129. The general business processes identified by the GSBPM are:

- *Specify needs*: used when new statistics are identified or when feedback from current statistics requires a review of them. Its activities are related to precise identification of statistical needs (such as areas of ICT use not covered so far by surveys), preparation of solutions for them and proposals of business cases to meet those needs;
- *Design*: the statistical processes are related to development and design as well as research work to define outputs, methodologies and such. It includes all the design elements needed to define or redefine the metrics that the business case asks for. The metadata and procedures to be used in the following phases are specified at this point.
- *Build*: the outputs from the “Design” processes are assembled and configured in this case to

create the complete operational environment to run the process. New services are also created in response to gaps in the existing catalogue of services sourced from within the organisation and externally. These new services are constructed so that they can be reused when necessary or possible. For example, the dissemination of anonymised microdata from ICT surveys for further use by researchers.

- *Collect*: gathering all the necessary information and load it to the proper environment for further processing. This process may include validation of data set formats, but never the transformation of data, which is done in the process phase.
- *Process*: processing of input data and preparation of it for analysis. The processing of the data makes it so it can be not only analysed, but also disseminated as statistical outputs. The activities can be parallel to those carried out in the “Analyse” process and may commence before the “Collect” one.
- *Analyse*: statistical outputs are produced and examined in detail. Statistical content for publications, reports, etc. is prepared, and it ensures that outputs are adequate before the dissemination is done. It includes sub-processes and activities that enable statistical analysts to understand the data and the statistics produced.
- *Disseminate*: manages the release of statistical products to users. Activities related with assembling and releasing the products via different channels so that users can access them. This can include presentation of the results of ICT surveys to forums of users.
- *Evaluate*: in this last process, the purpose is to evaluate specific instances in the statistical process. It can be done at the end of it or it can be ongoing during the statistical production process. Once the evaluation of the specific instance is done, a range of qualitative and quantitative inputs is drawn as well as the identification and prioritising of potential improvements.

130. Applying this methodology to the statistical business processes in the field of ICT statistics (and other domains) has several benefits that cannot be overlooked. The first one is that the standardisation of terminology creates efficiency savings as well as it makes comparisons internationally much easier. Secondly, its implementation allows the adherence to the standard framework for benchmarking in statistics and hence, it facilitates the use of common tools and methods that again, result in more efficiency savings. Also, the GSBPM includes tools to manage the quality of the process much better, making for better and more reliable data. Finally, it provides a clear and easy way to understand information for data producers and users.

## 5.2 Sources for business ICT use data

131. There are various data sources used by countries that compile data on business use of ICT (see **Example ?**). They include administrative sources, business registers, questions or modules in host survey vehicles, stand-alone data collections and Big Data repositories. International organisations, such as the member institutions of the *Partnership on Measuring ICT for Development* and in particular UNCTAD, do also gather and harmonise data from different countries to create publicly available registers that can be used to estimate some Digital Economy indicators.

### **Example ?. Data sources for indicators on the use of ICT by businesses: country examples**

The stocktaking exercise on methods and sources for ICT indicators carried out for the WSIS meeting in Tunis (November 2005) identified the following types of data sources for indicators on the use of ICT by businesses in African countries:

economic censuses (Mauritius, Zimbabwe), general enterprise surveys (Rwanda), stand-alone ICT business surveys (Morocco, Tunisia, Benin, Madagascar) and information collected from the suppliers of ICT (Senegal, United Republic of Tanzania). In Central Asia and the Caucasus, the identified sources included general enterprise surveys (Kyrgyzstan) and stand-alone ICT surveys (Armenia, Kazakhstan).

Source: Partnership on Measuring ICT for Development (2005).

Commented [JLC15]: Example to be updated

132. These sources do not have equal potential for producing data on the use of ICT by businesses. The appropriateness of each source is largely determined by the balance between the type of information sought (reflecting users' needs) and available resources. Table ? presents different sources, the indicators for which they are likely to be most suited, and indications of their relative cost.

Table ?. Statistical sources for the collection of indicators on the use of ICT by businesses

Type of source	Indicators that may be collected	Indication of costs
Administrative sources	Limited number of indicators on the availability of basic ICT infrastructure  Foreign trade data (from customs administrations)	Not expensive (by-product of administrative activities)
Statistical business registers	Limited number of indicators on the availability of basic ICT infrastructure with selected breakdowns (size, sector)  Indicators on companies involved in foreign trade (from business registers built for Balance of Payment statistics)	Medium cost (for establishment and maintenance)
Module or questions on ICT embedded in existing sample surveys or censuses (these are often economic surveys, such as those of the manufacturing sector)	Indicators on the availability of basic ICT infrastructure with selected breakdowns (size, sector). Generally limited number of indicators on use of ICT.	Mainly only marginal costs with respect to the cost of the survey to which it is attached.
Stand-alone surveys	Indicators on the availability of basic ICT infrastructure with selected breakdowns (size, sector) Indicators on use of ICT Indicators on barriers to the use of ICT Indicators on costs, value of investments, etc. Indicators on trade in services	High cost for design, data collection (which could include fieldwork) and processing.



Big Data sources	Indicators on the use of ICT and e-commerce activities	Although data are in some cases publicly available, investment in automatic downloading, cleaning and harmonization is required. If strategic agreements with private partners (i. e. telcom operators) are established, big data sources can be obtained with no cost.
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133. It should be noted that official business surveys are routinely carried out in most developing economies but that total resources for statistical production are often scarce. Even so, it is unlikely that statistics on business ICT use can be produced efficiently outside the national statistical system. In particular, one-off surveys by unofficial agencies are unlikely to be efficient or sustainable over time. They should therefore be avoided and donor organizations that support the strengthening of statistical systems need to be wary of devoting resources to such surveys. The preferred alternative is that business ICT use surveys are included in national statistical programmes.

#### *Administrative sources*

134. In some countries, suppliers of ICT services (such as fixed and mobile telephone, and the Internet) compile information about their clients' businesses and supply such information to government regulatory bodies. As a by-product of this regulatory activity, it is possible to produce at a low-cost statistical information on access<sup>33</sup> to ICT by businesses.

135. However, the indicators that can be produced this way are likely to be limited in number and in other ways as well. For instance, they will usually be restricted in scope to legal entities that have contracted particular ICT services and such entities may not correspond exactly to a business as defined statistically. Additionally, unless the necessary information is required for the contracts, disaggregation by business size or industry is not possible.

136. In many countries, even this source of administrative information will not be available as ICT service providers do not distinguish business subscribers from household subscribers and so cannot provide data on business access to ICT.

137. In summary, administrative sources will usually be insufficient for collecting data on the use of ICT by businesses.

#### *Statistical registers*

138. Statistical registers, mainly business registers and trade registers, can play a relevant role to estimate Digital Economy indicators. Moreover, trade and business registers can be related to produce breakdowns of the foreign trade ICT indicators in terms of enterprises features, such as size or activity

<sup>33</sup> There is usually a distinction drawn between ICT access and ICT use. The former is whether entities have access to an ICT, and the latter is whether they actually use it. For businesses, the distinction is less important than it is for households. Surveys of business use of ICT tend to measure only use of ICT, whereas household surveys measure access (by the household) and use (by individuals of that household).

sector.

139. Business registers or directories are a key element of the statistical infrastructure of most NSOs. Their role is to maintain an updated record of a country's businesses (usually enterprises and their establishments), with information on the location, contact details and other characteristics such as industry and size. Business registers are used in the statistical process for the compilation of business demographic data and to generate population frames for business surveys. Most NSOs regularly update their business registers using administrative sources, such as tax or social security registers, and through their own statistical operations.

140. The main advantages of using a business register as a source to produce statistical indicators (besides its use as a population frame from which to draw samples) are that:

- Indicators can be quickly aggregated (no fieldwork is required); and
- The marginal cost of statistical production is very low.

141. The main disadvantage is that the number of indicators on the use of ICT that can be produced from statistical business registers is generally limited to basic indicators on the presence of certain technologies such as telephone (fixed and mobile), computers or the presence of email or a website (which may be present for contact purposes). Such indicators will only be feasible, of course, if the business register contains high-quality (complete and updated) information.

142. Administrative sources that are used to update a NSO's business register are usually good for identifying new businesses but less effective at detecting businesses that disappear from the population. The problem of having a high rate of "dormant businesses" (or "dead units") is generally more severe for small businesses.

143. In developing economies, the importance of the informal sector<sup>34</sup> implies that a big share of economic activity occurs outside the administrative framework (for example, activities of retail trade without licensing or tax control). The economic agents involved will usually be excluded from business registers.

144. Coverage problems such as those described above can produce biases in statistical data - for example, underestimation of the total number of businesses (if there is a large share of informal activity) or overestimation (if there is a large proportion of dormant businesses; see **Example ?**). Developing economies are often faced with both situations.

**Example ?. Activity ratios as a measure of quality of business registers in the Western Balkans**

The ratio of active to registered firms provides a measure of the quality of administrative business registers and their suitability for use as population frames for statistical surveys. The activity of firms can be monitored by investigating administrative files that record compulsory activities, such as paying taxes, social security or pension contributions for employees. According to recent statistics, the ratio of active to registered firms in Western Balkan countries is around 40 per cent: Albania (37 per cent in 2004), Croatia (42 per cent in 2004) and Montenegro (38 per cent in 2005). That means that, for those countries, around 60 per cent of units included in the business register are dormant or no longer in existence. Surveys that are selected from the register will therefore be inefficient and also suffer from a low response rate (because inactive businesses are unlikely to respond). Resulting estimates are therefore likely to suffer from significant non-response bias (as well as having relatively large standard errors).

<sup>34</sup> The coverage of the informal sector is not described in detail in this *Manual* and statisticians in countries where the informal sector has a relevant weight in the economy may refer to the OECD Manual "Measuring the Non-Observed Economy - A Handbook" (<http://www.oecd.org/dataoecd/9/20/1963116.pdf>). In some countries, informal sector is investigated through a combination of household surveys, surveys to small enterprises and to self-employed persons, which could serve as survey vehicles where questions on ICT access and use can be included.

Source: Statistical institutes and agencies for small and medium businesses of the countries mentioned.

Commented [JLC16]: Example to be updated

145. Trade registers are the usual source to compute ICT trade indicators ICT3 and ICT4. Trade registers are elaborated from the aggregation of the information of the Custom Authority of the country. In general, trade registers include the total volume and economic value of import and export transactions in a given period of time (usually, one year). Traded commodities are classified according to HS 2012 or 2016.

146. In addition to national trade registers, UN COMTRADE<sup>35</sup> can be used to compute the ICT foreign trade indicators. UN COMTRADE is a repository containing over 3 billion data, covering over 170 countries/areas since 1962. Reporting countries provide the United Nations Statistics Division (UNSD) with their annual international trade statistics data detailed by commodities/service categories and partner countries. These data are subsequently transformed into the United Nations Statistics Division standard format with consistent coding and valuation using the processing systems. Finally, data are made publicly available on the internet and can be easily acquired using the data acquisition API<sup>36</sup> provided by UN COMTRADE.

147. UN COMTRADE contains data on imports, exports, re-exports and re-imports, specifying annual data of each commodity by trading partner. The info includes the value of the transactions in US dollars, as well as net weight and secondary quantities. Commodities are reported in the current classification and revision (HS 2012 in most cases as of 2016) and are converted all the way down to the earliest classification SITC revision 1.

148. The information on ICT trade of goods from Customs Authorities can be completed with information for ICT services trade statistics from balance of payments (BOP) registers of service exporting firms. For the compilation of BOP statistics, countries compile registers of companies involved in foreign trade. Usually the BOP register is managed by the national central bank and it includes details about the exporting or importing resident enterprises. A BOP register should include not only the basic identification variables, such as name, postal address of the company, name of managers, but also key economic variables regarding, in particular, the nature and type of exports and imports performed over the last few years. In this register, firms are classified according to standard services categories and subcategories according to EBOPS 2010 classification. However, available data did not include in general comprehensive information by partner country or by mode of service supply.

149. The register for BoP usually includes companies that trade goods and services, useful to compile certain statistics on the trade in ICT products. However, the coverage of trade in digital products may be insufficient since digital products purchased over the Internet are intangible and often not declared to customs<sup>37</sup>.

150. The establishment of a link between the business register and trade register in a country<sup>38</sup> makes feasible to classify ICT trade indicators in terms of enterprises characteristics with no additional costs in data collection. The critical issue to link both registers is the existence of a common identifier between a

<sup>35</sup> Additional information on UN COMTRADE can be obtained in <https://comtrade.un.org/>

<sup>36</sup> The API and the instruction for data downloading are available at <https://comtrade.un.org/data/dev/portal/>

<sup>37</sup> See UNCTAD (2016). "IN SEARCH OF CROSS-BORDER E-COMMERCE TRADE DATA". UNCTAD Technical Notes on ICT for Development No 6. [https://unctad.org/en/PublicationsLibrary/tn\\_unctad\\_ict4d06\\_en.pdf](https://unctad.org/en/PublicationsLibrary/tn_unctad_ict4d06_en.pdf)

<sup>38</sup> Additional information on the linkage of business and trade registers can be found in UN (2018) "International Merchandise Trade Statistics: Supplement to the Compilers Manual" (<https://unstats.un.org/unsd/trade/IMTS%20Supplement%20to%20the%20Compilers%20Manual,%20final%2031%20Aug%2009.pdf>). This document includes a template of a questionnaire to check the feasibility of this linking for a country.

country trade and business register, making possible to relate the trade information coming from the customs data with the features of the enterprises collected in the business register.

151. Since the statistical units and the classification criteria may differ between the business and the trade registers proper correspondences need to be established. First, trade registers are recorded on the basis of transactions, that are assigned to a trade operator identified on the basis of the declaring unit. However, the statistical unit of the business register is the enterprise, usually identified on the basis of legal unit. The linkage of both registers requires then the identification of the potentially multiple trade operators of each enterprise. Second, a correspondence between the HS classification of commodities (as generally used in trade registers) and the ISIC classification (as generally used in business registers) is also required.

152. Countries may be interested in checking the feasibility of trade and business registers data linking. To this end, they are recommended to gather information on the existence and maintenance of a trade register, the correspondence between trade and business registers and the link between the customs declaration and the trade register through a questionnaire to be completed by the main stakeholders.

### *Economic censuses*

153. Economic censuses are exhaustive surveys of the business sector (or parts of it), with the objective to collect statistical information from all in-scope businesses in a country. In some countries, they include also the economic activities carried out by households. They are often used to construct population frames for sample surveys.

154. Because of exhaustiveness, economic censuses are expensive to conduct, due to the cost of collection (which may require a detailed cartography of the country), and therefore, their periodicity is usually very low (5 or 10 years). This may make them inadequate for continuous monitoring of fast-growing phenomena such as Internet access.

155. Countries that have used censuses to investigate the use of ICT have included some questions on the availability of certain technologies in the business (e.g. telephone, fax, computer). However, the number of questions that can generally be included in a census questionnaire is necessarily limited (see **Example ?**).

156. Because of the limitation on the number of ICT questions that can be included and their low periodicity, economic censuses are not generally well suited to monitoring ICT use by businesses.

#### **Example ?. Use of economic censuses for the collection of ICT indicators: country examples**

Egypt, Oman and Qatar have all included questions on the use of ICT in their economic censuses. Egypt, for example, conducted an exhaustive survey of establishments and recorded the presence of fixed telephone, mobile telephone, computers and access to the Internet.

The General Statistics Office of Viet Nam introduced several questions on access to ICT by businesses in the Establishment Census of 2002. The establishments recorded the presence of PCs, of a website, the existence of e-commerce activities, and the number of PCs connected to LAN and to the Internet. These indicators may be broken down by different classification variables such as industry, size, type of establishment (headquarters, branches, etc.), detailed geographical level and by any other variable recorded in the Census.

Source: Partnership on Measuring ICT for Development (2005) and General Statistical Office of Vietnam (data disseminated on 01/07/2002) <http://www.gso.gov.vn/>.

**Commented [JLC17]:** Example to be updated

### Big Data sources

157. In an increasingly digitized world, digital behavioural footprints generate large amounts of information known as big data. Big data are provided by different types of sources, including telecommunication operators, satellite companies, online platforms, social networks and Internet of Things (IoT). The volume, timeliness and heterogeneity of big data is very high compared to the kinds of datasets that have traditionally been used for the ICT statistics, opening new opportunities for new measurement methodologies with better timeliness and granularity at a lower cost. However, gathering and analysing big data requires is somewhat complex and requires specific methods, including web scrapping or data science techniques.
158. In particular, big data sources generated by telecommunications companies are of special interest for the estimation of the core ICT indicators and measurement of the digital economy in general. Telecommunication operators generate Call Detail Records (CDR) documenting the features of telecommunications transaction. CDR contain the relevant attributes of a call (source number and destination number, GPS localisation or duration). Telecommunication companies also registers the activity in the network, including for instance internet usage or mobile money transfers. A special mention should be made to the potential of non-Internet-related mobile network big data. Given the popularity of mobile phones, big data sets obtained from the mobile network seems to have the widest socioeconomic coverage among all data sources in developing countries, allowing the acquisition of information from microenterprises and SMEs, even in the informal economy.
159. A challenge for the use of big data to measure digital economy is that they are not in general exhaustive neither representative of the general population. For this reason, measurements obtained from this type of sources may exhibit relevant biases. The integration of big data with information obtained from registers or censuses or representative random-sampling surveys is required to analyse and correct these potential biases.

Example ?. TO BE DEVELOPED

### 5.3 Modules and stand-alone surveys on the use of ICT by businesses

160. Collecting data from businesses is usually a costly task that has to be undertaken to the highest technical standards to ensure quality of collected data (and resulting aggregates). The effectiveness and efficiency of a data collection system can be assessed from the viewpoints of different actors in the statistical system, namely data producers, data providers and data users:

- Data producers are interested in obtaining high quality data at the lowest cost and in the shortest possible time. Data collection costs include outlays for preparation of collection instruments (usually, questionnaires), training interviewers and other staff, and the costs of collecting and capturing data; beyond the data collection phases, there are additional costs for data processing and dissemination;
- Data providers (respondents) wish to minimize the burden of data collection in terms of their costs and time (for gathering requested data and completing questionnaires, see Example ?), and
- From the data users' point of view, a data collection system will be satisfactory if it ultimately provides relevant and reliable information, in an accessible way and in a timely manner.

Example ?. Measurement of response burden in the ICT survey in Kazakhstan

Commented [JLC18]: Example to be updated

The 2006 pilot survey on electronic commerce carried out in the Republic of Kazakhstan routinely recorded the time needed by respondents to fill in a self-administered questionnaire, via a question with closed answers in the form of time intervals: less than 1 hour, 1 to 4 hours, 4 to 8 hours, 8 to 40 hours and more than 40 hours. The same intervals are used in other Kazakhstan business surveys. This information allows comparison of the difficulty of completing the questionnaire on e-commerce with other business surveys.

Source: Survey questionnaire, Agency for Statistics of the Republic of Kazakhstan.

161. Respondents' and users' needs should always be considered when choosing a survey vehicle and data collection method. Mechanisms for consultation with respondents and users are described in Chapter 9.

162. There are several possible techniques for data collection: face-to-face interviews, mailed questionnaires, telephone-assisted interviews, computer-assisted interviews, or a combination of these. Country practice depends on the costs (of interviewers, transport and communication), and the existing infrastructure (call centres, regional or municipal offices, reliable business register, etc.). Advantages and drawbacks of each method from the developing country perspective, together with quality controls that can be applied to data collection, are reviewed later in this chapter.

163. The majority of OECD countries, as well as many developing countries, have collected data from businesses on the use of ICT through questions included in current business surveys (hereafter referred to as 'modules on the use of ICT') or through stand-alone surveys on the topic. The choice of one or other approach is related to several factors, including policy needs for information on use of ICT by businesses, and the resources and organization of the statistical system.

164. Developing economies may not be able to afford stand-alone surveys on ICT and instead may prefer to include questions in existing surveys that also include background information such as employment and industry. This can also be a useful way to estimate statistical parameters that may be needed later in the design of stand-alone surveys (as explained in detail in Chapter 7).

165. Stand-alone surveys on ICT use are generally necessary for countries that are interested in investigating more sophisticated ICT applications (such as e-business, e-commerce and IT security measures). The decision to carry out a stand-alone survey should take into consideration its inclusion in the current national statistical programme (the work programme of surveys, censuses and other statistical operations implemented by the public authorities in a country and usually established by a legal act). This aspect is examined in part C of this *Manual* (Institutional issues).

166. The next two sections discuss statistical issues relevant to modules on the use of ICT and stand-alone ICT surveys. Chapter 6 provides further guidance on the design of a module to be embedded in an existing survey by providing model questions to collect the data needed for the production of the core indicators. This is the option that will generally be chosen by developing economies that are starting to collect ICT data in order to produce the core ICT use indicators.

### *Modules on the use of ICT*

167. Many countries regularly carry out statistical surveys with the objective of investigating industry sectors of importance to their economy. Surveys on the manufacturing or trade sectors are two common examples for many developing economies. The maintenance of comparable statistical time-series is favoured by the use of the same or similar questions over several years. However, the introduction of new questions in the questionnaire enables an NSO to be responsive to new information needs, and to relate the newly introduced variables to the ones that are already investigated. Thus, the inclusion of specific

modules in existing business surveys is a practice followed by many countries in order to study new interest areas, such as the use of ICT by businesses.

168. The decision to include a module on the use of ICT in an existing survey has to take into account:

- The information needs that can be satisfied with such a module (variables that can be included and variables in the survey vehicle that can be used for analysing ICT data). If the survey vehicle records classification variables such as industry and size, it will be possible to break down ICT indicators by these classificatory variables (see [Example ?](#)) and
- The methodology of the candidate survey vehicle in terms of population scope and coverage, periodicity, sample design, sample size and distribution. Data collected via the module will reflect the statistical characteristics of the survey vehicle (population frame used, sampling method, factors to weight the observations, collection and processing methods, level of detail for economic activities, etc.). This may be a significant disadvantage if, for instance, the scope of the survey vehicle is narrower than that recommended for the ICT use core indicators, or the sample size is too small, leading to large sampling errors.

**Example ?. Inclusion of questions on ICT in the Manufacturing Survey in Thailand**

In Thailand, the inclusion of questions on the use of ICT in the questionnaire of the Manufacturing Survey of 2003 (which records economic and financial information about establishments), has enabled a research programme assessing the impact of ICT on productivity. Econometric models that include ICT variables (such as presence of computers and proportion of employees with access to computers) as explanatory variables for productivity measures can be estimated and interpreted in terms of gains in productivity due to the use of ICT (based on Cobb-Douglas-type models).

The ICT indicators for Thailand reflect the sample design of the Manufacturing Survey – the survey vehicle – which is a stratified random sample, where strata are defined by ISIC classes (4-digit level) and size (12 intervals defined in terms of number of employees). The questions on the use of ICT were included in a section on general information about the establishment (legal form, form of economic organization, registered capital, foreign investment, exporting and importing behaviour).

The questions are presented as yes/no questions or multiple choice questions and filters, as follows:

In 2002, did this establishment use a computer? (yes/no)

If yes, please fill in total number of computers: \_\_\_\_\_

Number of persons using a computer: \_\_\_\_\_

In 2002, did this establishment have access to the Internet? (yes/no)

If yes, how did this establishment access the Internet? (circle one or more choices):

- ISP subscriber
- Internet café
- Internet package
- Others (specify)

Which of the following Internet activities did this establishment use? (circle one or more choices)

- Email
- Information searches
- Shopping
- Business promotion such as advertising on website
- Others (specify)

In 2002, did this establishment have a web site presence? (yes/no)

If yes, please fill in:

Primary URL \_\_\_\_\_

Activities or services on website:

- Advertising of own business (yes/no)
- Selling goods and services (yes/no)

A total of 10 ICT questions are included on the questionnaire though several are answered only if the preceding filter questions are positive.

**Commented [JLC19]:** Example to be updated

Source: Questionnaire on the Thai Manufacturing Survey, 2003, National Statistical Office of Thailand.

169. Candidate survey vehicles that have been selected in different countries include:

- *Economy-wide business surveys*: the coverage of all economic sectors allows investigation of the use of ICT in different industries. These surveys are generally carried out to monitor the productive sector and have secondary uses such as the preparation of input-output tables and national accounts. Some countries conduct exhaustive economy-wide surveys (censuses) but the frequency is generally low;
- *Surveys on the Manufacturing Sector*: are implemented in the majority of countries. Some countries further investigate specific manufacturing industries for their relevance to the economy;
- *Surveys on the Services Sector*: in many developing economies, the services sector is investigated via a series of service industry surveys. Important service industries include: wholesale trade, transport and communications, tourism, and financial services; and
- *Innovation surveys and Research and Development (R&D) surveys*: many countries have implemented stand-alone innovation or R&D or surveys to understand the technological behaviour of businesses (see [Example ?](#)). The OECD and Eurostat have developed methodologies (described in the *Oslo* and *Frascati Manuals*) and a *Manual* for developing economies (the *Bogotá Manual*) has been prepared and is applied principally in Latin American countries. These surveys can be well suited to the inclusion of a module on ICT use, since the adoption of technology is often associated with innovative processes, especially in developing economies.

**Example ?. ICT questions in the Survey on Technological Behaviour of Industrial Businesses, Argentina**

The 'Survey on Technological Behaviour of Industrial Businesses' has been carried out by the National Statistical Institute of Argentina (INDEC) since 1993, in response to the information needs of the Federal Ministry of Science and Technology. It uses a methodology based on the OECD/Eurostat *Oslo Manual*.

In 2004, the survey was enlarged to include a module on the use of ICT and thereafter called the 'National Business Survey on Innovation, R&D and ICT'. The module on ICT was designed to produce indicators on the presence of computers, access to the Internet, presence of a website and of an intranet, proportion of employees with access to ICT, and purposes of use of the Internet (including receiving orders). Because ICT questions are included in the Innovation Survey, ICT indicators can be broken down by innovative behaviour of the firm, as well as by other classifications.

Source: Workshop on Measuring the Information Society in Latin America and the Caribbean, Panama (November, 2006).

Commented [JLC20]: Example to be updated

170. Once an existing business survey has been chosen to serve as a vehicle for an ICT module, the focus should be on the design of the module itself (wording of questions and definitions to be used). The sample design may boost the sample size in certain sectors and size classes in order to obtain more reliable estimates. It is important to recall that the methodological recommendations for the design of a stand-alone ICT use survey also apply to modules, in particular, those related to the requirement for a quality business register, definitions of statistical units and use of relevant industry classifications. However, control over the methodology of the survey vehicle may be limited.

171. Where modules on the use of ICT are implemented by developing economies, they generally include a small number of questions in order to limit costs and response burden. In terms of size, they generally consist of 10 to 20 ICT-related variables (see [Example ?](#)).

172. The cost of collecting ICT data via modules is generally marginal to that of the survey vehicle, since



the most important part of the survey cost is usually related to data collection (including fieldwork, where relevant). In addition, staff involved in data collection and processing are already trained and will require only complementary training on ICT questions. For countries with severe budgetary restrictions, the inclusion of a module should be more cost-efficient than the implementation of a stand-alone ICT survey of businesses (though this will depend on factors such as the size of the survey vehicle and the complexity of the ICT module).

173. The design of the module itself consists of choosing a limited number of relevant questions that can be easily interpreted by respondents. Suggested model questions to collect the necessary data for the production of the core ICT indicators are provided in Chapter 6.

### Stand-alone surveys

174. Stand-alone surveys on ICT allow for the collection of significantly more information than modules in other surveys. Stand-alone surveys are especially designed to collect information on different topics of interest in the measure of ICT use by businesses, such as access to ICT, purposes of use, e-commerce, security, skills, etc., that usually go beyond the possibilities of a module embedded in an existing business survey.

175. A number of developing economies have implemented stand-alone ICT surveys of the business sector (see **examples ? and ?**). These countries have relatively widespread access to ICT in comparison with other countries of their region or have an economy increasingly based on ICT. In general, in countries that have carried out stand-alone ICT surveys, there is a high demand for business ICT indicators from policymakers, the market and society.

#### **Example ?. The Survey on Information Technology Usage and Penetration in Hong Kong, China**

The Census and Statistics Department of Hong Kong, China (C&SD) conducts an annual *Survey on Information Technology Usage and Penetration in the Business Sector*. Apart from questions on computer and Internet usage, presence and use of a website and e-commerce, it includes items on the IT budget, IT security and use of wireless and mobile technologies, services and applications. C&SD also measures the ICT sector, with a stand-alone *Manpower Survey of the IT Sector* and compilation of ICT sector statistics from annual economic survey data.

Source: Leung (2004).

**Commented [JLC21]:** Example to be updated. Participants of the Working Group are invited to suggest examples.

#### **Example ?. Design of a stand-alone survey on the use of ICT by Brazilian enterprises**

In 2005 and 2006, the Brazilian Internet Steering Committee (a private institution that regulates Internet names and IP addresses) carried out stand-alone surveys on the use of ICT by Brazilian enterprises.

Quotas for the sample were calculated from the social security register (RAIS, *Relação Anual de Informações Sociais*) of the Ministry of Labor which includes information about the industry of firms based on the National Classification of Economic Activities (CNAE) that is approved by the National Commission of Classifications, officially adopted by the National Statistical System, and based on the international standard, ISIC.

The questionnaire is based on the OECD and Eurostat questionnaires, and data were collected from a sample of 2,700 enterprises (in 2006) by telephone interviews with the person in the business responsible for ICT. The questionnaire includes items organized in modules that allow collection of information on ICT usage (module A), Internet usage (module B), E-commerce (module C), E-government (module D), E-security (module E) and E-skills (module F), altogether totalling 46 questions in 2005 and 55 in 2006.

The increase in the number of questions is due to adding items on adoption of ERP and CRM systems, of Linux software, on restrictions to use by employees and on skills and training of ICT specialists and other employees. Questions on e-commerce via external computer networks other than the Internet were suppressed. Some questions were simplified, such as the types of access to the Internet, in order to allow for classification into narrowband, fixed broadband and mobile broadband.

Source: Country presentation at the Third Workshop on Measuring the Information Society in Latin America and the Caribbean, Panama

**Commented [JLC22]:** Example to be updated. Participants of the Working Group are invited to suggest examples.

(November 2006).

176. In some cases, the surveys have been carried out by organizations outside the statistical system and linked with ICT policymaking institutions. There is a risk in carrying out stand-alone ICT surveys outside the national statistical system, due to the limitations on the use of key statistical infrastructure such as business registers, data collection systems (call centres, trained interviewers in regional or municipal offices, etc.), sampling methodology and the possibility that methodologies are not harmonized with those of the national statistical system (which are usually linked to international statistical standards).

177. The coordination of stand-alone surveys on ICT use by businesses with other ongoing or planned work of the national statistical system must be considered from at least two perspectives:

- The first is related to the use of common methodologies. Methodological coordination with existing *business* surveys requires the use of coherent definitions of statistical units (enterprise, establishment, business, etc.), classifications (such as industry breakdowns) and common concepts (e.g. for income). Such harmonization will facilitate comparison of results on ICT use with those of other surveys (for example, those investigating production, financial results, labour costs, etc.).
- The second is related to minimizing the response burden of businesses participating in a large number of surveys. In some countries, the business sector is intensively surveyed by public and private organizations, and the response burden can be overwhelming. In particular, large businesses are usually included exhaustively (i.e. without sampling) in surveys, thereby having to answer a large number of questionnaires. In addition, some strata may contain a small number of businesses that are therefore surveyed particularly often (such as businesses in the telecommunications sector).

178. In relation to methodological coordination, a key issue is the use of comparable business registers from which samples are drawn. For instance, the implementation of stand-alone surveys based on a sample of businesses drawn from commercial directories (e.g. telephone directories such as 'yellow pages') and not statistical business registers can make it impossible to obtain breakdowns comparable to those that would be obtained by using a statistical business register that uses consistent unit concepts and classifies units to the national classification of economic activities.

179. Methodological coordination (between surveys and countries) requires the use of comparable definitions of concepts. In particular, for the calculation of the core indicators on the use of ICT by businesses, it is necessary that surveys adopt the same definition of a business (see Chapter 4) and of an employee (the definition proposed for the indicators proportion of employees using computers and the Internet includes all persons employed by the business (including working proprietors and employees)).<sup>39</sup>

180. Finally, coordination with existing business surveys is important if, for research purposes, it is required to link data at the micro-level (i.e. at the individual business level) in order to analyse the relationship between ICT and other variables, such as those related to performance (labour productivity, value added, etc.). It is of the utmost importance that the confidentiality of individual business

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<sup>39</sup> The ILO definition of an employed person is anyone who worked for remuneration or was self-employed or was a family worker for at least one hour in the one-week reference period. Also, persons formally having a job and not having performed that job only temporarily within the reference period are considered employed. In countries with a large informal sector, there is an interest in defining employees in the informal sector according to the recommendations of the International Conference of Labour Statisticians ([www.ilo.org/public/english/bureau/stat/download/guidelines/defempl.pdf](http://www.ilo.org/public/english/bureau/stat/download/guidelines/defempl.pdf)).

information be guaranteed and, if the survey on ICT use is not carried out by the statistical office, that the necessary legal arrangements be made according to national statistical legislation.

181. Ideally, stand-alone ICT surveys would be based on representative samples of the business sector, requiring a sample size that allows for estimation with sufficient precision. Logically, stand-alone surveys usually incur higher costs than modules included in an existing survey, since they require a specific design, dedicated fieldwork with specialized training for the interviewers (if used), independent data processing and dissemination.

182. It is important to recall that, in order to monitor effectively the rapid changes in the information economy, surveys should be conducted reasonably frequently. This will allow the compilation of time series data. One-off ICT surveys may quickly lose their relevance and should be avoided due to their high costs relative to the validity of results over time. International donors should consider the national statistical programme before funding such surveys, particularly because their sustainability cannot be guaranteed.

183. Surveys of the ICT sector In Chapter 4, the ICT sector was defined in terms of the international classification, ISIC. It includes classes (4-digit codes) in the manufacturing sector, as well as ICT services. Accordingly, surveys of the manufacturing and services sectors will partially cover the ICT sector and may provide useful data if the level of detail is sufficient (noting that much of the ICT sector is defined in terms of 4-digit ISIC classes). Data that are collected in other industry surveys are also useful for the ICT sector. They may include the number of enterprises and establishments, turnover and production, value added, labour force information, wages and salaries, capital expenditure, expenditure on R&D and innovation.

184. The level of detail to which the ICT sector is defined (that is, 4-digit ISIC codes of economic activity) may present challenges in terms of sample size for economy-wide surveys, or even surveys covering the whole manufacturing or services sectors (economic censuses would not present this problem). NSOs with a high demand for indicators on the ICT sector may therefore consider the possibility of increasing the sample size in some classes, if the current coverage does not allow offering accurate estimates for these classes, or running a stand-alone survey of the ICT sector (see **Example ?**).

**Example ?. Statistics on the ICT sector in Hong Kong, China**

The coverage of the information technology and telecommunications (IT&T) sector in Hong Kong, China is defined per the OECD definition of the ICT sector, with local adaptations. The Hong Kong Standard Industrial Classification (HSIC) is used to demarcate the IT&T sector, which covers establishments engaged in the manufacturing, distribution, installation and maintenance of IT&T products, and provision of IT&T services. Statistics on the characteristics of the IT&T sector have been collected in a series of annual economic surveys, recording the number of establishments, persons employed, vacancies, business receipts and value added.

*Source:* Presentation to the 2004 Asia Pacific Technical Meeting on ICT statistics (Wellington, New Zealand, 2004).

185. One way to improve coverage of the ICT sector is to collaborate with industry associations to identify ICT sector businesses. Further refinement of the classification of these businesses may be obtained by cross-checking with statistical directories and business registers. In some countries, there is a separate register for ICT businesses that helps to define the in-scope population.

186. In the questionnaire for the ICT sector survey, businesses may be asked a question on their activities or be invited to self-classify their activities with sufficient level of detail. This enables exclusion of businesses that are not part of the ICT sector as internationally defined and better classification of those that are. Questions on products offered by the business may also be of help in establishing the correct industry (using a correspondence between products and industries, such as the existing correspondence

**Commented [JLC23]:** Example to be updated. Participants of the Working Group are invited to suggest examples.

between the Central Product Classification, CPC, and ISIC<sup>40</sup>).

### Surveys on ICT trade

Commented [JLC24]: Split from section above

187. Some countries conduct sectoral trade surveys that may cover the wholesale trade of computers, peripheral equipment and software, as well as electronic and telecommunications parts and equipment (classes 5151 and 5152 of ISIC Rev. 3.1, or the corresponding classes 4651 and 4652 of ISIC Rev. 4). Statistical offices may consider increasing the sample size for these classes in trade surveys if the current coverage does not allow offering accurate estimates for these classes. Note that an increase in sample size entails an increase in the associated costs for collection and data processing and may not be sustainable over time for NSOs with scarce resources.

188. A good administrative source for ICT trade data are foreign trade registers, which are managed by customs authorities and are often used as a source to compile trade statistics – either by these institutions or by statistical offices. The regulations for declaring import and export transactions depend on national legislation, but there are international standards for compiling foreign trade statistics that are widely used, such as the classification of goods based on the HS. Data on exports and imports of ICT goods can be compiled using the OECD definition of ICT goods (see Annex ??) as it is based on the HS (1996 and 2002).

189. UNCTAD has developed a standard questionnaire on the export of ICT-enabled services. A model of questionnaire was tested during 2016 and 2017 in Costa Rica, India and Thailand and its final version was presented at the UNCTAD E-commerce Week 2018. The questionnaire comprises three parts. Part A aims at collecting basic information about the enterprise. Part B identifies exports of services that were delivered by the enterprise remotely over ICT networks (so-called ICT-enabled services) during the reporting period. Part C allows detailing these ICT-enabled exports by type of service, mode of delivery and partner economy. The questionnaire discriminated between eight categories of service, namely telecommunications; computer services; sales and marketing; information; management, administration and back office; licensing; engineering, related technical services and R&D; and Education and training.

190. The UNCTAD model questionnaire on trade of ICT-enabled services is included in Annex XX.

### *An alternative to surveys: observation of business behaviour in the digital economy*

191. Modules and stand-alone surveys are based in a self-assessments and self-reporting of each business on its activities on the digital economy. For this reason, the information provided by surveys may be affected by subjective factors such as the understanding of the items and definitions in the questionnaire, the cognitive biases of the respondents or the motivations to complete the questionnaire properly. As alternatives to surveys, the increasing traceability of digital activities recorded in Big Data sets and the recent developments in behavioural-experimental can be used for an active observation of digital behaviour where businesses self-reporting is not required. Digital activities of the companies, from the existence of a corporate website to e-commerce transactions, are recorded in Big Data sets, which can even be publicly available. An example of publicly available big data are the contents of company websites which can be freely accessed online and describing the potential e-commerce activities offered by the

<sup>40</sup> Available at the United Nations Statistical Division website on international economic and social classifications (<http://unstats.un.org/unsd/cr/registry/regs.asp?Ci=17&Lg=1>) and <http://unstats.un.org/unsd/cr/registry/regcst.asp?Ci=27>.

company. Publicly available Big Data sources can be automatically downloaded using methods of web scrapping or using the downloading functionalities provided by the source, such as Application Programming Interfaces (APIs) or direct downloading functionalities. Accessibility to publicly available big data may be compromised by technical challenges, since these sources are not in general structured, included textual information and do not apply classification systems. However, most of the Big data that can be used to observe digital behaviour are owned in general by private companies, such as telecom operators or online platforms, which compromises data availability for policy-makers or researchers. Cross-jurisdictional regulatory incompatibilities, as well as business models, privacy, confidentiality and security issues limit the use of Big Data for the measurement of the digital economy. New private-public business models and incentives are required to enhance Big Data.

**Example ? . Measuring government purchases of digital goods and services using publicly available data: the International Public Procurement Initiative (IPPI)**

The IPPI initiative, led by European Commission's DG TRADE, is a disruptive project aimed at measuring and characterizing public procurement market, including cross-border procurement flows and the economic assessment of barriers to public procurement. Using a combination of web crawling procedures and data downloading using APIs, IPPI acquired and harmonized publicly available data on 40 million contracts awarded by the central, subcentral government, as well as SOEs and other entities, from almost 1,000 big data sources (e-procurement and transparency portals) in Australia, Brazil, Canada, China, India, Indonesia, New Zealand, Thailand and the US. The harmonized dataset, after enrichment with data matching methods and integration with surveys and official information from National Accounts and Government Financial Statistics, made feasible a detailed analysis of public purchases in these countries, including ICT goods and services.

*Source:* Presentation to the 2019 IPPI event (Brussels, Belgium, 2019).

**Commented [JV25]:** Text and source to be agreed with DG TRADE

192. Companies behaviour in the digital economy can also be observed in controlled environments using experiments. This experimental approach is useful to quantify the impact of ICT policies on companies' digital behaviour and to provide policy-makers with sound empirical evidence to design effective policies. Roughly speaking, experiments compare how companies behave under different designs of policies (experimental treatments) and quantifies the impact in behaviour that can be actually attributed to the policy design, isolating the intervention from other stimuli to avoid confounding effects. The core of the experimental method is the random allocation of companies to the different treatment groups. Then, and assuming that randomisation makes of all the treatment groups perfectly comparable, the differences in the digital behaviour can be attributed to the exposition to the behavioural intervention in the treatment group.

193. Although the best way to run behavioural experiments is to do it in a real-world situation, in what is called a field experiment, the implementation of actual field behavioural experiments raises significant logistic and ethical concerns which limit their application. Behavioural Economics Experiments (BEEs) provide a more feasible alternative to observe digital behaviour. In a BEE, a responsible of a company is invited to make their decisions not in a real but in a gamified controlled environment. The central feature of a BEE is that the decisions made by the participants in the experiment has an actual impact, for instance by considering variable economic incentives depending in subjects' decision and random changes in the gamified environment. Application of variable incentives only increase the attention paid during the participation in the experiment and induces in the respondent a mental state similar to that of real decision-making.

**Example ? . Analysing cybersecure behaviour of SMES**

The EC research project Supporting Cybersinsurance from a Behavioural Choice Perspective (CYBECO) implemented a BEE to measure the impact of alternative behavioural interventions to promote cybersecure behaviour in European SMEs. In this experiment, the responsible persons of definition of the cybersecurity strategies of 2,000 SMEs in four European countries were provided with an initial endowment. This endowment could be optionally invested in protection measures and/or

cyberinsurance policies. At the end of the experiment, SMEs could suffer or not a random cyberattack and receive a payment, with a probability depending on their protection level and an impact depending on the cyberinsurance coverage. The experiment allowed for establishing relevant empirical evidence for policy making, such as the lack of risk aversion between cyberprotection and cyberinsurance or the efficacy of behavioural interventions based in social norm to increase the cybersecurity level of SMEs.

Source: XXX.

**Commented [JV26]:** Source to be referred

194. There is an increasing interest in the behavioural-experimental approach to analyse digital behaviour, as shown by the development of behavioural units in national government and multilateral organisations.

**Commented [JV27]:** References to behavioural units in UN, EC, WB to be included.

## 5.4 Data collection methods and quality control

### Data collection methods

195. There are several methods of data collection according to the nature of the contact between the data provider (respondent) and the data producer (statistical office). They are personal (face-to-face) interviews, personal telephone interviews, questionnaires sent by ordinary mail, forms posted on web pages, acquisition of big data and economic experiments. Combinations of the different data collection methods are also used in some countries, in order to select the most suitable method of contact for different kinds of businesses.

196. Table 8 describes the relative advantages and disadvantages of each data collection method. In developing economies, the selection of data collection method should take into account the transport and communications infrastructure of the country, including:

- Density and quality of roads and railways (especially if interviewers have to cover rural areas);
- Efficiency of the postal service (in particular in rural areas);
- Easy identification and accuracy of postal addresses, and
- Density of the telephone network.

197. Usually, the best approach is to have a mix of techniques, according to the location of businesses (urban/rural), their size and their industry.

198. For surveys on ICT use by businesses (be they modules of business surveys or stand-alone surveys), the use of a combination of personal and telephone interviews may be the best option. The fast evolution of ICT technology and uses (and the corresponding definitions referred in the ICT surveys) often necessitates helping respondents to provide accurate answers, and this is largely provided by interviewers and written instructions. Telephone interviews can complement a data collection, particularly with requests to complete missing data. Collection of data using methods based on behaviour observation, such as big data acquisition or economic experiments, is also a recommended option to avoid potential respondents' lack of understanding or motivation when completing surveys. Before choosing a particular collection method, pilot tests to measure the time needed to complete the questionnaire and the

understandability of questions should be carried out on a small sample of businesses from a variety of industries and size classes.

**Table 7. Data collection methods**

Method	Main advantages	Main disadvantages
Face-to-face personal interview	<p>This is the most direct method of collecting information. It facilitates direct interaction of 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. Because the interviewer is in view, s/he can use visual prompts such as prompt cards.</p> <p>In addition, face-to-face interviews are especially useful for questions about opinions or impressions, and for surveys that take a long time to complete.</p> <p>The technique usually produces lower non-response rates. Data collection can be managed efficiently with specific software (Computer Assisted Personal Interviewing – CAPI, see below).</p>	<p>Interviewers are part of the measurement tool and they can induce important biases if they have not received suitable training.</p> <p>High personnel costs may be incurred (for hiring and training interviewers). However, this could be a minor issue in developing economies where salaries of interviewers are low, or agreements are reached with certain institutions to provide part-time interviewers (such as university students).</p> <p>In developing economies with poor quality transport infrastructure, reaching businesses located in some country areas may prove difficult.</p>
Telephone personal interview	<p>Although to a lesser extent than the face-to-face personal interview, telephone interviewing allows direct interaction between the interviewer and interviewee.</p> <p>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 great number of interviews.</p> <p>The data collection can be managed efficiently with specific software (Computer Assisted Telephoning Interviewing – CATI, see below).</p>	<p>Correct and comprehensive telephone numbers may not be available, particularly in developing economies where mobile telephony may be more common than fixed telephone.</p> <p>Interviews must be relatively short, since a long telephone conversation can be perceived as an annoyance. Some people also feel that it is intrusive to be interviewed by telephone.</p> <p>Telephone interviews may not be suitable for collecting quantitative information, for which the interviewee may have to check business records.</p> <p>The non-response rate is usually larger than for face-to-face interviews (but lower than for mail-based surveys).</p>

<p>Interview assisted by computer (CAPI/CATI)</p>	<p>CAPI and 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.</p> <p>Questionnaires can possibly be customized based on available information about the business.</p> <p>Modern IT equipment such as PDAs or smartphones may present a cheap and comfortable tool for data collection.</p>	<p>CAPI and CATI techniques require interviewers with some technical skills.</p> <p>CAPI and CATI systems are usually based on commercial software that may be costly. Skilled staff are required to adapt the software to the questionnaire.</p> <p>CAPI requires that interviewers carry costly IT equipment, which can be damaged, stolen, etc. during field operations.</p> <p>In developing economies with poor road networks, there is a risk of damaging the equipment.</p>
<p>Mail survey</p>	<p>This method is relatively inexpensive and the statistical office can send the same measurement instrument (questionnaire) to a large number of businesses.</p> <p>It allows the respondent to complete the questionnaire at his or her convenience.</p> <p>It eliminates the problem of interviewer bias though note that:</p> <p>interviewer follow-up (e.g. for non-response or inconsistent answers) can potentially introduce bias if not managed properly, and if questionnaires are not properly designed and tested, they can introduce bias to the survey results.</p>	<p>Requires separate data entry unless advanced Optical Character Recognition (OCR) tools are available. It usually suffers from high non-response rates.</p> <p>It is not designed for detailed written responses, but for numerical questions or those that can be answered by selecting a limited list of choices (including yes/no responses).</p> <p>The lack of help from an interviewer can produce information of low quality. It therefore requires clear questions and instructions.</p> <p>Delays in mailing back questionnaires can induce delays in the survey. In developing economies with a low quality postal system, such delays may be prohibitive.</p> <p>Some of the problems inherent to a postal survey can be partially solved by, for instance, use of written or telephone reminders to reduce non-response rates. In addition, data quality can often be improved if a telephone helpline is available.</p>
<p>Electronic survey</p>	<p>With the growth in ICT skills and availability of ICT, possibilities for electronic surveys have increased. Data collection mechanisms can be of several types, but the most common are electronic questionnaires sent by e-mail or posted on web pages that respondents can access.</p> <p>This method has almost all of the advantages of mail surveys, but is usually faster and cheaper. Because respondents complete the questionnaire electronically, manual data entry is not required and edits can be applied at the time of data entry (and resolved by the respondent).</p>	<p>Businesses that can be surveyed this way do not cover the entire business population, in particular in developing economies with low ICT penetration. This will cause either biases in the data, or the necessity of using another method as well (e.g. mail out questionnaires) for data capture.</p> <p>There is an extra need for technology to ensure security and confidentiality of data and for staff with the training and skills to handle the data collection tools. Costs associated with this expertise can offset savings offered by electronic data capture.</p> <p>The technique is in general not suitable to be used as the only channel for collecting data. However, if complemented with other methods, it can be a useful tool.</p>



Big Data acquisition	<p>Establishing strategic agreements with private owners of big data sources could facilitate the acquisition of relevant data covering actual company behaviour with a reduced cost.</p> <p>Publicly available Big Data sources could be acquired by applying web scrapping methods and APIs , with no cost for the respondent and avoiding hypothetical response biases.</p>	Big Data sources are not in general representative of the corresponding populations and the estimations from these sources need to be corrected (calibrated) by applying results from representative samples or official sources.
Behavioural economic experiments (BEEs)	BEEs are flexible methods to observe actual digital behaviour, allowing the control of the conditions under which these observations are taken.	Observation of BEEs do not provide from real situations but from controlled artificial environments. The validity of the conclusion for real decision-making (ecological validity) needs then to be guaranteed by a sound experimental design and the use of economic incentives depending on the decisions made during the BEE.

#### *Quality control of the data collection*

199. The quality of the data collected will determine the quality of aggregate ICT indicators, whichever survey vehicle is used. Controls at data entry stage (whether by respondents or interviewers) are more effective than corrections at later stages. In this sense, computer-assisted personal interviewing (CAPI) or computer-assisted telephone interviewing (CATI) systems enable good quality control, since data

collection and entry are simultaneous. Note that controlling for data quality after data capture requires actions that can be costly or introduce bias to the results, for example:

- Re-contacting a business and asking it to respond to, or clarify, questions that were asked perhaps weeks or months before is not always feasible, annoys the respondent and gives a poor image of the statistical office; in addition, it can significantly increase the costs of the operation if the number of re-contacts is high;
- Estimating responses to individual questions that have not been answered, or amending answers which are not valid, can be a complex technical exercise (though should result in unbiased responses if done correctly), and
- Finally, ignoring an incorrect questionnaire, although sometimes the only solution, is an action with consequences, since the effective sample diminishes and bias may be introduced.

200. Although it is impossible to carry out a survey without errors in data collection, there are measures that can be put into practice by statistical offices, which will help to minimize the error rate. Examples of such measures are:

- Establishing good frames that include in-scope businesses and are free of coverage errors such as inactive businesses or erroneous addresses;
- Providing suitable training to interviewers on the questionnaire contents (especially required for complex technical concepts), and on dealing with respondents;
- Preparing questionnaires so that questions are worded in a correct, clear and unambiguous manner, and respondents can perceive a logical flow in the order of questions (especially in self-administered questionnaires);
- Filtering the collected data by a series of controls that are applied at the moment of data capture and in the data entry process;
- Giving wide publicity before the start of the survey, highlighting the relevance of data collection for national policies and therefore the need for respondents' collaboration. This may include a mention to the compulsory response required in countries where the statistical law grants this; and
- Establishing a policy of incentives and sanctions that encourage the provision of good answers to interviews or questionnaires.

## **Chapter 6 – Model questions and questionnaires for measuring ICT use**

### **6.1 Model questions for a module**

### **6.2 Model questions for a stand-alone ICT use survey**

### **6.3 Model questionnaires for ICT-enabled services**

## **Chapter 7- Designing ICT business surveys and processing data**

### **7.1 Business surveys on the use of ICT**

### **7.2 ICT sector surveys**

ICT-enabled services

### **7.3 Data processing**

## **Chapter 8- Dissemination**

### **8.1 Dissemination of metadata at the indicator level**

### **8.2 Dissemination of metadata for surveys**

### **8.3 Metadata reports**

## **PART C- Institutional Issues**

**Commented [SFG28]:** Chapter 6 will be updated after the Working Group meeting. This chapter presents model questions corresponding to the indicators identified in Chapter 4. It also discusses the structure of modules and questionnaires. The model questions and questionnaires will refer to the latest examples from OECD and Eurostat, to the model questionnaires proposed by UNCTAD, and to other model questions or questionnaires considered as best practices.

**Commented [SFG29]:** Chapter 7 will be updated after the Working Group meeting. This chapter focuses on the design of ICT use surveys, ICT sector surveys, and the processing of collected data. The technical issues of designing ICT business surveys and processing data are not expected to change significantly. There will be a new section on surveys to measure trade in ICT-enabled services, based on the UNCTAD Technical Notes 3 and 11 explaining this methodology, and on examples of pilot surveys and NSOs applying the definitions of ICT-enabled services.

**Commented [SFG30]:** Chapter 8 will be updated after the Working Group meeting. This chapter describes the statistical dissemination phase, which takes place once estimates for ICT indicators have been produced. The dissemination of data and metadata will refer to relevant Statistics Quality Assurance Frameworks.

**Commented [SFG31]:** Part C will be updated after the Working Group meeting. Part C will deal with issues of cooperation and coordination among stakeholders of the national statistical system, and among international organizations, as well as the inclusion of digital economy and e-commerce statistics in official statistical work programmes. Part C on institutional issues could be moved to the beginning of the Manual.

## Annex XX. Classification of ICT goods (OECD list of ICT goods based on HS 2017)

Extracted from the list of ICT products (UNCTAD 2018).

<b>A-Computers and peripheral equipment</b>	
844331	Printing, copying, and facsimile machines; machines which perform two or more of the functions of printing, copying or facsimile transmission, capable of connecting to an automatic data processing machine or to a network
844332	Printing, copying, and facsimile machines; single-function printing, copying or facsimile machines, capable of connecting to an automatic data processing machine or to a network
847050	Cash registers
847130	Automatic data processing machines; portable, weighing not more than 10kg, consisting of at least a central processing unit, a keyboard and a display
847141	Automatic data processing machines; comprising in the same housing at least a central processing unit and an input and output unit, whether or not combined, n.e.c. in item no. 8471.30
847149	Automatic data processing machines; presented in the form of systems, n.e.c. in item no. 8471.30 or 8471.41
847150	Units of automatic data processing machines; processing units other than those of item no. 8471.41 or 8471.49, whether or not containing in the same housing one or two of the following types of unit: storage units, input units or output units
847160	Units of automatic data processing machines; input or output units, whether or not containing storage units in the same housing
847170	Units of automatic data processing machines; storage units
847180	Units of automatic data processing machines; n.e.c. in item no. 8471.50, 8471.60 or 8471.70
847190	Magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included
847290	Office machines; not elsewhere classified
847330	Machinery; parts and accessories (other than covers, carrying cases and the like) of the machines of heading no. 8471
847340	Machinery; parts and accessories (other than covers, carrying cases and the like) of the machines of heading no. 8472
847350	Machines; parts and accessories (other than covers, carrying cases and the like) equally suitable for use with machines of two or more of the headings 8470 to 8472
852842	Monitors; cathode-ray tube, capable of directly connecting to and designed for use with an automatic data processing machine of heading 84.71
852852	Monitors; other than cathode-ray tube; capable of directly connecting to and designed for use with an automatic data processing machine of heading 84.71
<b>B-Communication equipment</b>	
851711	Line telephone sets with cordless handsets
851712	Telephones for cellular networks or for other wireless networks
851718	Telephone sets n.e.c. in item no. 8517.1
851761	Base stations
851762	Communication apparatus (excluding telephone sets or base stations); machines for the reception, conversion and transmission or regeneration of voice, images or other data, including switching and routing apparatus
851769	Communication apparatus (excluding telephone sets or base stations); machines for the transmission or reception of voice, images or other data (including wired/wireless networks), n.e.c. in item no. 8517.6
851770	Telephone sets and other apparatus for the transmission or reception of voice, images or other data, via a wired or wireless network; parts

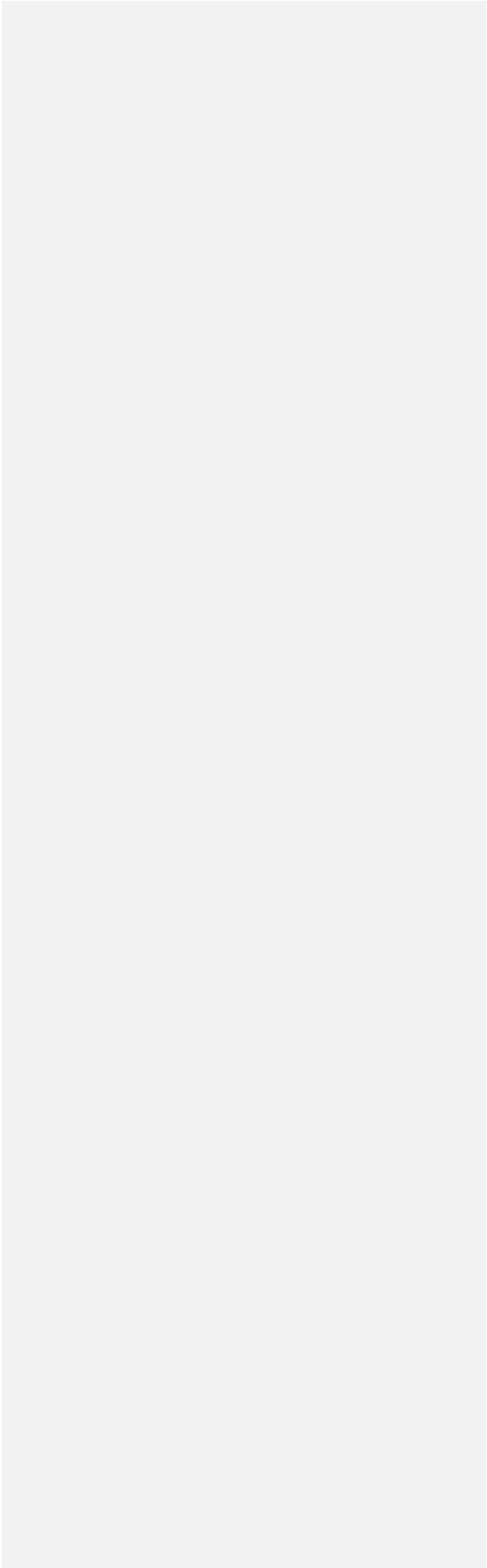
852550	Transmission apparatus for radio-broadcasting or television, whether or not incorporating sound recording or reproducing apparatus, not incorporating reception apparatus
852560	Transmission apparatus for radio-broadcasting or television, whether or not incorporating sound recording or reproducing apparatus, incorporating reception apparatus
853110	Signalling apparatus; electric, sound or visual, burglar or fire alarms and similar, other than those of heading no. 8512 or 8530
<b>C-Consumer electronic equipment</b>	
851810	Microphones and stands therefore
851821	Loudspeakers; single, mounted in their enclosures
851822	Loudspeakers; multiple, mounted in the same enclosure
851829	Loudspeakers; not mounted in their enclosures
851830	Headphones and earphones, whether or not combined with a microphone, and sets consisting of a microphone and one or more loudspeakers
851840	Amplifiers; audio-frequency electric
851850	Amplifier sets; electric sound
851890	Microphones, headphones, earphones, amplifier equipment; parts of the equipment of heading no. 8518
851981	Sound recording or reproducing apparatus; using magnetic, optical or semiconductor media, n.e.c. in item no 8519.20, 8519.30 or 8519.50
851989	Sound recording or reproducing apparatus; n.e.c. in heading no8519
852110	Video recording or reproducing apparatus; magnetic tape-type
852190	Video recording or reproducing apparatus; other than magnetic tape-type
852210	Sound recording or reproducing apparatus; parts and accessories thereof, pick-up cartridges
852290	Sound or video recording or reproducing apparatus; parts and accessories thereof, other than pick-up cartridges
852580	Television cameras, digital cameras and video camera recorders
852712	Radio broadcast receivers capable of operating without an external power source; pocket-size radio cassette-players
852713	Radio broadcast receivers capable of operating without an external power source; apparatus (other than pocket-size radio cassette-players), combined with sound recording or reproducing apparatus
852719	Radio broadcast receivers capable of operating without an external power source; n.e.c. in item no. 8527.1
852721	Radio-broadcast receivers not capable of operating without an external source of power, of a kind used in motor vehicles; combined with sound recording or reproducing apparatus
852729	Radio-broadcast receivers not capable of operating without an external source of power, of a kind used in motor vehicles; not combined with sound recording or reproducing apparatus
852791	Radio-broadcast receivers n.e.c. in heading no. 8527; combined with sound recording or reproducing apparatus
852792	Radio-broadcast receivers n.e.c. in heading no. 8527; not combined with sound recording or reproducing apparatus but combined with a clock
852799	Radio-broadcast receivers n.e.c. in heading no. 8527; not combined with sound recording or reproducing apparatus and not combined with a clock
852849	Monitors; cathode-ray tube, n.e.c. in subheading 8528.42, whether or not colour
852859	Monitors other than cathode-ray tube; n.e.c. in subheading 8528.52, whether or not colour
852862	Projectors; capable of directly connecting to and designed for use with an automatic data processing machine of heading 84.71
852869	Projectors; n.e.c. in subheading 8528.62, whether or not colour
852871	Reception apparatus for television, whether or not incorporating radio broadcast receivers or sound or video recording or reproducing apparatus; not designed to incorporate a video display or screen

852872	Reception apparatus for television, whether or not incorporating radio- broadcast receivers or sound or video recording or reproducing apparatus; incorporating a colour video display or screen
852873	Reception apparatus for television, whether or not incorporating radio- broadcast receivers or sound or video recording or reproducing apparatus; incorporating a monochrome video display or screen
950450	Games; video game consoles and machines, other than those of subheading 9504.30
<b>D-Electronic components</b>	
852321	Magnetic media; cards incorporating a magnetic stripe, whether or not recorded, excluding products of Chapter 37
852352	Semiconductor media; smart cards, whether or not recorded, excluding products of Chapter 37
853400	Circuits; printed
854011	Tubes; cathode-ray television picture tubes, including video monitor cathode- ray tubes, colour
854012	Tubes; cathode-ray television picture tubes, including video monitor cathode- ray tubes, monochrome
854020	Tubes; television camera tubes, image converters and intensifiers, other photo- cathode tubes
854040	Tubes; data/graphic display tubes, monochrome; data/graphic display tubes, colour, with a phosphor dot screen pitch smaller than 0.4mm
854060	Tubes; cathode ray, n.e.c. in heading no. 8540
854071	Tubes; microwave, magnetrons, excluding grid-controlled tubes
854079	Tubes; microwave (for example klystrons, travelling wave tubes, carlinotrons), excluding magnetrons and grid-controlled tubes
854081	Valves and tubes; receiver or amplifier
854089	Valves and tubes; n.e.c. in heading no. 8540
854091	Tubes; parts of cathode-ray tubes
854099	Valves and tubes; parts of the valves and tubes of heading no. 8540, excluding parts of cathode-ray tubes
854110	Electrical apparatus; diodes, other than photosensitive or light-emitting diodes (LED)
854121	Electrical apparatus; transistors, (other than photosensitive), with a dissipation rate of less than 1W
854129	Electrical apparatus; transistors, (other than photosensitive), with a dissipation rate of 1W or more
854130	Electrical apparatus; thyristors, diacs and triacs, other than photosensitive devices
854140	Electrical apparatus; photosensitive, including photovoltaic cells, whether or not assembled in modules or made up into panels, light-emitting diodes (LED)
854150	Electrical apparatus; photosensitive semiconductor devices n.e.c. in heading no. 8541, including photovoltaic cells, whether or not assembled in modules or made up into panels
854160	Crystals; mounted piezo-electric
854190	Electrical apparatus; parts for diodes, transistors and similar semiconductor devices and photosensitive semiconductor devices
854231	Electronic integrated circuits; processors and controllers, whether or not combined with memories, converters, logic circuits, amplifiers, clock and timing circuits, or other circuits
854232	Electronic integrated circuits; memories

854233	Electronic integrated circuits; amplifiers
854239	Electronic integrated circuits; n.e.c. in heading no. 8542
854290	Parts of electronic integrated circuits
<b>E-Miscellaneous</b>	
852351	Semiconductor media; solid-state non-volatile storage devices, whether or not recorded, excluding products of Chapter 37
852359	Semiconductor media; other than smart cards, whether or not recorded, excluding products of Chapter 37
852380	Media n.e.c. in heading 8523, whether or not recorded, excluding products of Chapter 37
852910	Reception and transmission apparatus; aerials and aerial reflectors of all kinds and parts suitable for use therewith
852990	Reception and transmission apparatus; for use with the apparatus of heading no. 8525 to 8528, excluding aerials and aerial reflectors
901320	Lasers; other than laser diodes

Source: UNCTAD 2018.

**Annex XX. Classification of ICT services**





## Annex XX. Potentially ICT-enabled services sub-groupings with the corresponding CPC Ver.2.1 products codes

### 1.1 ICT services - Telecommunications

841	Telephony and other telecommunications services
842	Internet telecommunications services
84631	Broadcasting services

### 1.2 ICT services - Computer services (including computer software)

8313	IT consulting and support services
8315	Hosting and IT infrastructure provisioning services
8316	IT infrastructure and network management services
8434	Software downloads
8713	Maintenance and repair services of computers and peripheral equipment
73311	Licensing services for the right to use computer software
83141	IT design and development services for applications
83142	IT design and development services for networks and systems
83143	Software originals
84391	On-line games
84392	On-line software
92919*	Other education and training services, n.e.c.

### 1.3 Sales and marketing services, not including trade and leasing services

836	Advertising services and provision of advertising space or time
837	Market research and public opinion polling services
8596	Convention and trade show assistance and organization services
83812	Advertising and related photography services

### 1.4 Information services

844	News agency services
845	Library and archive services
931	Human health services
961	Audiovisual and related services
8394	Original compilations of facts/information
8432	On-line audio content
8433	On-line video content
8461	Radio and television broadcast originals
84311	On-line books
84312	On-line newspapers and periodicals
84313	On-line directories and mailing lists
84393	On-line adult content
84394	Web search portal content
84399	Other on-line content n.e.c.
84632	Home programme distribution services, basic programming package
84633	Home programme distribution services, discretionary programming package
84634	Home programme distribution services, pay-per-view
96921	On-line gambling services
8399*	All other professional, technical and business services, n.e.c.
8462*	Radio and television channel programmes

### 1.5 Insurance and financial services

712	Investment banking services
714	Reinsurance services
715	Services auxiliary to financial services other than to insurance and pensions
717	Services of holding financial assets
7119	Other financial services, except investment banking, insurance services and pension services
7132	Accident and health insurance services
7161	Insurance brokerage and agency services
7162	Insurance claims adjustment services
7163	Actuarial services
7164	Pension fund management services
7169	Other services auxiliary to insurance and pensions
71311	Life insurance services

71312 Individual pension services  
71313 Group pension services  
71331 Motor vehicle insurance services  
71332 Marine, aviation, and other transport insurance services  
71333 Freight insurance services  
71334 Other property insurance services  
71335 General liability insurance services  
71337 Travel insurance services  
7111\* Central Banking services  
7112\* Deposit services  
7113\* Credit-granting services  
7114\* Financial leasing services  
71336\* Credit and surety insurance services  
71339\* Other non-life insurance services

#### 1.6 Management, administration, and back office services

821 Legal services  
822 Accounting, auditing and bookkeeping services  
823 Tax consultancy and preparation services  
824 Insolvency and receivership services  
851 Employment services  
852 Investigation and security services  
855 Travel arrangements, tour operator and related services  
8311 Management consulting and management services  
8312 Business consulting services  
8319 Other management services, except construction project management services  
8591 Credit reporting services  
8592 Collection agency services  
8593 Telephone-based support services  
8594 Combined office administrative services  
8595 Specialized office support services  
8599 Other information and support services n.e.c.

#### 1.7 Licensing services

7333 Licensing services for the right to use R&D products  
7335 Licensing services for the right to use mineral exploration and evaluation  
7339 Licensing services for the right to use other intellectual property products  
73312 73312 - Licensing services for the right to use databases  
73340 Licensing services for the right to use trademarks and franchises  
7332\* Licensing services for the right to use entertainment, literary or artistic originals

#### 1.8 Engineering, related technical services and R&D

811 Research and experimental development services in natural sciences and engineering  
812 Research and experimental development services in social sciences and humanities  
813 Interdisciplinary research and experimental development services  
832 Architectural services, urban and land planning and landscape architectural services  
833 Engineering services  
891 Publishing, printing and reproduction services  
8342 Surface surveying and map-making services  
8343 Weather forecasting and meteorological services  
8382 Photographic processing services  
8392 Design originals  
8393 Scientific and technical consulting services n.e.c.  
8395 Translation and interpretation services  
83815 Restoration and retouching services of photography  
83819 Other photography services  
83911 Interior design services  
83912 Industrial design services  
83919 Other specialty design services  
814\* Research and development originals  
8344\* Technical testing and analysis services  
8399\* All other professional, technical and business services, n.e.c.

#### 1.9 Education and training services

921 Pre-primary education services

- 922 Primary education services
- 923 Secondary education services
- 924 Post-secondary non-tertiary education services
- 925 Tertiary education services
- 9292 Educational support services
- 92911 Cultural education services
- 92912 Sports and recreation education services
- 92919\* Other education and training services, n.e.c.

## Annex XX. UNCTAD model questionnaire on use of ICT in businesses

UNCTAD Model Questionnaire for core indicators on use of ICT by businesses, 2019

Module A: General Information about use of ICT by your business		
<p><b>A1. Did your business use computer/s during &lt;reference period&gt;<sup>a</sup>?</b></p> <p><i>A <u>computer</u> 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 (PDA) or TV sets.</i></p>	<input type="checkbox"/> Yes	<input type="checkbox"/> No → Go to B1
<p><b>A2. How many persons employed in your business routinely used a computer at work during &lt;reference period&gt;?</b></p> <p>If you can't provide this value,</p> <p><b>Please indicate an estimate of the percentage of the number of persons employed that used computers during &lt;reference period&gt;.</b></p> <p><i>Persons employed refers to all persons working for the business, not only those working in clerical jobs. They include short-term and casual employees, contributing family workers and self-employed persons, who may be paid or unpaid.</i></p>	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"> <span>(Number)</span> </div>  <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <span style="margin-left: 5px;">%</span> </div>	
<p><b>A3. Did your business have an intranet as at &lt;reference date&gt;<sup>b</sup>?</b></p> <p><i>An <u>intranet</u> refers to an internal communications network using Internet protocols and allowing communication within an organization (and with other authorized persons). It is typically set up behind a firewall to control access.</i></p>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<p><b>A4. Did your business have a local area network (LAN) as at &lt;reference date&gt;?</b></p> <p><i>A <u>LAN</u> refers to a network connecting computers within a localized area such as a single building,</i></p>	<input type="checkbox"/> Yes	<input type="checkbox"/> No

<i>department or site; it may be wireless.</i>		
<b>A5. Did your business have an extranet as at &lt;reference date&gt;?</b>  <i>An <u>extranet</u> is a closed network that uses Internet protocols to share securely a business' information with suppliers, vendors, customers or other business partners. It can take the form of a secure extension of an intranet that allows external users to access some parts of it. It can also be a private part of the business' website, where business partners can navigate after authentication.</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No

**Module B: How your business uses Internet in its operations**

<b>B1. Did your business use the Internet during &lt;reference period&gt;?</b>  <i>The <u>Internet</u> is a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries email, news, entertainment and data files, irrespective of the device used (not assumed to be only via a computer - it may also be by mobile phone, games machine, digital TV, etc.). Access can be via a fixed or mobile network.</i>	<input type="checkbox"/> Yes (in business)  <input type="checkbox"/> Yes (outside the business) - go to B4	<input type="checkbox"/> No → Go to C1
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<b>B2. Did your business have a web presence as at &lt;reference date&gt;?</b>  <i>A <u>web presence</u> includes a website, home page or presence on another entity's website (including a related business). It excludes inclusion in an on-line directory on any other webpages where the business does not have control over the content of the page.</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
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<b>B3. How many persons employed in your business routinely used the Internet at work during &lt;reference period&gt;?</b>  If you can't provide this value,  Please indicate an estimate of the percentage of the number of persons employed that used the Internet at work during <reference period>.	<input type="text" value="(Number)"/>  <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> %
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<b>B4. How did your business connect to the Internet during &lt;reference period&gt;?</b>	<i>Multiple responses allowed</i>	
Narrowband	<input type="checkbox"/> Yes	<input type="checkbox"/> No

<p><i>Narrowband includes analogue modem (dial-up via standard phone line), Integrated Services Digital Network (ISDN), Digital Subscriber Line (DSL) at speeds below 256 kbit/s, and mobile phone and other forms of access with an advertised download speed of less than 256 kbit/s. Narrowband mobile phone access services include CDMA 1x (Release 0), GPRS, WAP and i-mode</i></p>		
<p><b>Fixed broadband</b></p> <p><i>Fixed broadband refers to technologies such as DSL, at speeds of at least 256 kbit/s, cable modem, high speed leased lines, fibre-to-the-home, powerline, satellite, fixed wireless, Wireless Local Area Network (WLAN) and WiMAX.</i></p>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<p><b>Mobile broadband</b></p> <p><i>Mobile broadband access services include Wideband CDMA (W-CDMA), known as Universal Mobile Telecommunications System (UMTS) in Europe; High-speed Downlink Packet Access (HSDPA), complemented by High-Speed Uplink Packet Access (HSUPA); CDMA2000 1xEV-DO and DCMA 2000 1xEV-DV. Access can be via any device (mobile cellular phone, laptop, PDA, etc.)</i></p>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<p>Do not know</p>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<p><b>B5. Did your business receive orders for goods or services (that is, make sales) via the Internet during &lt;reference period&gt;?</b></p> <p><i>Orders received include orders received via the Internet whether or not payment was made online. They include orders received via websites, specialized Internet marketplaces, extranets, EDI over the Internet, Internet-enabled mobile phones and email. They also include orders received on behalf of other organizations – and orders received by other organizations on behalf of the business. They exclude orders that were cancelled or not completed.</i></p>	<input type="checkbox"/> Yes (web) <input type="checkbox"/> Yes (email)	<input type="checkbox"/> No
<p><b>B6. Did your business place orders for goods or services (that is, make purchases) via the Internet during &lt;reference period&gt;?</b></p> <p><i>Orders placed include orders placed via the Internet whether or not payment was made online. They include orders placed via websites, specialized Internet marketplaces, extranets, EDI over the Internet, Internet-enabled mobile phones and email. They exclude orders that were cancelled or not completed.</i></p>	<input type="checkbox"/> Yes (web) <input type="checkbox"/> Yes (email)	<input type="checkbox"/> No
<p><b>B7. For which of the following activities did your business use the Internet during</b></p>	<p><i>Multiple responses allowed</i></p>	

<reference period>?		
Sending and receiving e-mail	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Telephoning over the Internet/VoIP, including video conferencing <i>VoIP refers to Voice over Internet Protocol</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Getting information about goods and services	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Getting information from general government organizations	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Interacting with general government organizations <i>Includes downloading/requesting forms online, making online payments and purchasing from, or selling to, government organizations. It excludes getting information from government organizations.</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Internet banking <i>Includes electronic transactions with a bank for payment, transfers, etc. or for looking up account information.</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Accessing other financial services <i>Includes electronic transactions via the Internet for other types of financial services such as purchasing shares (stocks), financial services and insurance.</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Providing customer services <i>Includes providing online or emailed product catalogues or price lists, product specification or configuration online, after-sales support, and order tracking online.</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Delivering products online <i>Refers to products delivered over the Internet in digitized form, e.g. reports, software, music, videos, computer games; and online services, such as computer-related services, information services, travel bookings or financial services.</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Internal or external recruitment <i>Including providing information about vacancies on an intranet or website, and allowing online applications</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Staff training	<input type="checkbox"/> Yes	<input type="checkbox"/> No

<i>Includes e-learning applications available on an intranet or from the World Wide Web.</i>		
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<b>Module C: Other information about your business<sup>41</sup></b>	
<b>C1.</b> Main activity of your business (please describe)	
<b>C2.</b> Number of persons employed at <reference date>	
<b>C3.</b> Total purchases of goods and services (in value terms, excluding VAT)	
<b>C4.</b> Total turnover (in value terms, excluding VAT)	

- a. <reference period> refers to a period up to 12 months before the data collection or whatever considered most appropriate by the NSO.
- b. <reference date> would usually be at the end of the reference period, or shortly after.

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<sup>41</sup> Questions regarding total purchases and total turnover (value), as well as other financial questions, would allow carrying out certain types of ICT impact analysis.

## Annex XX. UNCTAD model questionnaire: exports of services that can be delivered over ICT networks

Questionnaire on exports of services that can be delivered remotely over ICT networks  
Period covered: YYYY

Reference number
Enterprise name

### Preliminary Information

**Collection authority:** The *Statistics Act of [...]* requires that a representative of the enterprise to which this form is addressed complete and return this form to [...].

**Confidentiality:** The *Statistics Act of [...]* also guarantees the confidentiality of the information provided via this form.

**Purpose of collection:** This form collects information that will be used in compiling balance of payment statistics and trade statistics, specifically on exports of services delivered remotely over ICT networks (so-called ICT-enabled services).

**Due date:** Please return the completed form by MM DD, YYYY.

**How to file:** Please submit the form by mail (address) or e-mail ([...]).

**Estimates:** Some of the data requested may not be readily available from your records. In these cases, **careful estimates** will suffice.

**Assistance:** For queries or assistance regarding this form, please call (XXX) XXX-XXXX or e-mail [...].

**Thank you:** Your cooperation is greatly appreciated. Accurate balance of payments and trade statistics research depend upon it.

**After you complete this form, please retain a copy for your records.**

---

Person who should be contacted if any queries arise regarding this form:

Name:

Title:

Telephone number: ( ) Email

address: ( )



### Instructions for completing the form

#### **Reporting Instructions**

This form should be completed for the enterprise listed on page 1 of the form—unless different arrangements have been made.

Definition of enterprise: use the definition of reporting unit currently in use by the statistical office implementing the survey. The preferred statistical unit is the enterprise.

#### **Residents and Non-residents**

A **non-resident** is any individual, enterprise, or other organization ordinarily domiciled in an economy other than [Country].

Subsidiaries of non-resident enterprises in [Country] are **residents** of [Country]. Similarly, foreign subsidiaries of [national] enterprises are non-residents.

#### **Conversion to [National currency]**

All values should be reported in thousands of [National currency]. Foreign currencies should be converted to [National currency] at the **midpoint** of the buy and sell rates applicable on the date of the transaction.

#### **Partner economy**

The partner economy is defined as the country where the non-resident importer resides.

#### **Services included**

The survey deals exclusively with **services that can be delivered remotely over ICT networks**, the so-called **ICT-enabled services**, which consist of the following nine categories:

1. Telecommunications;
2. Computer services (including computer software);
3. Sales and marketing services, not including trade and leasing services;
4. Information services (including audio-visual services and on-line content);
5. Management, administration and back office services;
6. Licensing services;
7. Engineering, related technical services and R&D;
8. Education and training services.

These categories of services are defined in detail in the annex to this questionnaire.

#### **Exports of services**

Exports of services are sales of services **provided to non-resident importers**. They correspond to services for which payment is made directly to your enterprise by a non-resident entity (including a foreign affiliate of your enterprise). Exports include services provided by your enterprise or its employees working abroad, or some other resident entity on whose behalf your enterprise receives payment. Exports exclude services that are provided to non-residents by your enterprise and paid for through other unrelated resident entities.

#### **Modes of supply**

Services can be exported in four different ways. First, your enterprise may remotely deliver services to a customer abroad through the Internet, phone, postal mail or email (this mode of supply is called cross-border supply). Second, you may deliver these services to a non-resident customer temporarily present in your country (this mode is called consumption abroad). Third, your enterprise may have established a commercial presence in a foreign country to deliver services in the country of the consumer (this mode is called commercial presence). Finally, these services can be delivered by one of your employees temporarily working abroad (this mode is called presence of natural persons). Below are more detailed definitions and examples of these four possible modes of supply.

**Cross-border supply**, takes place when the service is remotely supplied to a customer abroad. This is similar to trade in goods where the product is delivered across international borders and the consumer and the supplier remain in their respective countries. For example, a law firm may deliver legal advice by phone to a foreign enterprise or individual, a physician may provide a medical diagnosis to a patient via e-mail or a financial services supplier may supply portfolio management or brokerage services across an international border via the Internet.

#### **When identifying cross-border exports, please exclude sales to non-residents of the kind described below:**

**Consumption abroad**, takes place when the service is provided to a non-resident customer travelling to [Country]. This also applies to services performed on the property of a non-resident customer. Tourist activities such as in-person visits to museums and theatres and travel abroad to receive medical treatment or attend language courses are typical examples. Services such as ship repair or aircraft refurbishment abroad, where only the property of the customer moves, or is situated abroad, are also covered.

*Presence of natural persons*, takes place when a person employed by your enterprise temporarily travels abroad to provide services to non-resident customers. Natural persons under consideration include:

- Contractual service suppliers, employed by your enterprise;
- Intra-corporate transferees and foreign employees directly recruited by your enterprise;
- Service sellers who travel abroad to establish contractual relationships for a service contract, or persons responsible for setting up commercial presence.

This survey deals only with resident/non-resident transactions and thus does not cover commercial presence-related transactions. Thus, please exclude services provided to non-residents by non-resident companies owned by your enterprise. Include services provided by your enterprise to related companies abroad (related party trade).

In addition, this survey also requires you to identify exports of services that specifically relate to cross-border supply.

**Structure of the form**

The form collects annual information on selected international service transactions of this enterprise.

*Part A* aims at collecting basic information about the enterprise.

*Part B* identifies exports of services that were delivered by the enterprise remotely over ICT networks (so-called ICT-enabled services) during the reporting period.

*Part C* allows detailing these ICT-enabled exports by type of service, mode of delivery and partner economy.

**A. General information**

**A. 1. Name of the enterprise:** \_\_\_\_\_

**A. 2. Reference number:** \_\_\_\_\_

**A. 3. Address:** \_\_\_\_\_

**A. 4. Name of the person who fills out the questionnaire and contact details:** \_\_\_\_\_

**A. 5. Was your enterprise controlled by another enterprise at the end of YYYY?**

An enterprise is controlled when a different unit owns directly or indirectly, more than 50 per cent of the equity or shareholders' voting rights.

Yes (please go to question 6)

No (please go to question 7)

**A. 6. What was the location of the controlling unit of your enterprise at the end of YYYY?**

[Name of country]

**A. 7. How many persons were employed in your enterprise at the end of YYYY?**

*The number of persons employed includes all persons who are on the payroll of the enterprise, whether they are temporarily absent (excluding long-term absences), part-time, seasonal or home workers, apprentices, etc. The number of persons employed excludes manpower supplied to the unit by other enterprises and persons carrying out repair and maintenance work in the enquiry unit on behalf of other enterprises.*

**A.8. What proportion of persons employed by your enterprise at the end of YYYY were:**

Male (%): \_\_\_\_\_

Female (%): \_\_\_\_\_

**A.9. What was the principal activity of the enterprise at the end of YYYY?**

[International Standard Industrial Classification of All Economic Activities, Rev.4, two digits]

**A. 10. What was the total value of turnover made by your enterprise during YYYY?**

*This includes only turnover of your enterprise; do not include affiliates or other group-related enterprises.*

*Turnover comprises the totals invoiced by the enterprise during the reference period; this corresponds to market sales of goods or services supplied to third parties; include all duties and taxes on the goods or services invoiced by the unit with the exception of value-added tax invoiced by the unit to its customer and other similar deductible taxes directly linked to turnover; include all other charges (transport, packaging, etc.) passed on to the customer. Price reductions, rebates and discounts as well as the value of returned packing must be deducted. Exclude income classified as other operating income, financial income and extraordinary income in company accounts; as well as any operating subsidies received from public authorities.*

	Value (in thousands national currency)
TOTAL turnover	
Of which turnover from services sold	

**A. 11. What was the total value of exports of services of your enterprise at the end of YYYY?**

*Export of services is defined as the provision of services by your enterprise to a non-resident unit. Please exclude sales through a foreign subsidiary of your enterprise domiciled abroad.*

	Value (in thousands national currency)
TOTAL exports of services	
Of which intra group trade	

**A. 12. At the end of YYYY did your enterprise have a subsidiary or any other commercial presence in an overseas country?**

Yes  No

Do not know

**A. 13. During YYYY did your enterprise deliver services abroad by one of its employees, temporarily working abroad?**

Yes  No

Do not know

**A. 14. During YYYY did your enterprise deliver services to overseas customers, temporarily in [Country]?**

Yes  No

Do not know

**B. Filter question on services exports to be included**

For which of the following broad categories has your enterprise exported services during the reporting period (simply indicate yes or no)?

*Export of services is defined as the provision of services by your enterprise to a non-resident unit. Please exclude sales through a foreign subsidiary of your enterprise domiciled abroad.*

Category of service	Yes/ No	If yes, please complete the corresponding section in Part C
Telecommunications	<input type="checkbox"/>	1
Computer services (including computer software)	<input type="checkbox"/>	2
Sales and marketing services, not including trade and leasing services	<input type="checkbox"/>	3
Information services (includes among others telemedicine/health services, as well as audiovisual services, on-line content and recordings of live performance)	<input type="checkbox"/>	4
Management, administration and back office services (includes among others online reservation services for accommodation, online staffing services, telephone call centre services and other telephone-based support services)	<input type="checkbox"/>	5
Licensing services	<input type="checkbox"/>	6
Engineering, related technical services and R&D	<input type="checkbox"/>	7
Education and training services	<input type="checkbox"/>	8

Note:

*In case of doubt about the content of these categories, please refer to the explanations given at the beginning of each corresponding section.*

**C. Details of services exports that can be delivered remotely over ICT networks**

**1. Telecommunications**

*Including:*

- *Telephony and other telecommunications services;*
- *Internet telecommunications services;*
- *Broadcasting services.*

**C.1.1. Total value of exports in thousands national currency**

*Please include services provided by your enterprise to non-resident units. Exclude services provided through a foreign subsidiary of your enterprise domiciled abroad.*

	Exports
Telecommunications	

**C.1.2. Exports delivered remotely from [Country] across international borders to customers overseas over ICT networks (%)**

*Include receipts from international telephone calls and any other telecommunications services delivered remotely across the border through ICT networks. Also include receipts from international roaming charges. Exclude on-site services delivered by employees travelling to clients' offices as well as services delivered in-person to a client travelling to meet the service supplier.*

	Proportion of total telecommunications exports (%)
Exports delivered remotely, not on-site or in-person	

**C.1.3. Exports by main trading partner country (%)**

	Proportion of total telecommunications exports (%)	Proportion of cross-border telecommunications exports (%)
Major trading partner (1): please specify country		
Second major trading partner country: please specify		
Third major trading partner country: please specify		

Fourth major trading partner country: please specify		
Fifth major trading partner country: please specify		
Rest of the world		
Total		100%

(1) the major trading partner should be understood as the country to which the largest share of exports was bound.

## 2. Computer services (including computer software) (same questions as in C1)

Computer services (including computer software) include :

- Licensing services for the right to use computer software ;
- Software downloads ;
- Software originals ;
- On-line games ;
- On-line software ;
- IT consulting and support services ;
- Hosting and information technology (IT) infrastructure provisioning services ;
- IT infrastructure and network management services ;
- Maintenance and repair services of computers and peripheral equipment ;
- IT design and development services for applications ;
- Other education and training services n.e.c.

## 3. Sales and marketing services, not including trade and leasing services (same questions as in C1)

Sales and marketing services, not including trade and leasing services, include :

- Advertising services and provision of advertising space or time;
- Market research and public opinion polling services;
- Advertising and related photography services;
- Convention and trade show assistance and organisation services.

## 4. Information services (same questions as in C1)

Information services include :

- Audiovisual and related services;
- On-line audio content;
- On-line video content;
- Radio and television broadcast originals;
- Home programme distribution services, basic programming package;
- Home programme distribution services, discretionary programming package;
- Home programme distribution services, pay per view;
- Radio and television channel programmes;
- On-line books;
- Human health services;
- On-line gambling services;
- News agency services;
- Library and archive services;
- Original compilations of facts/information;
- On-line newspapers and originals;

- On-line directories and mailing lists;
  - On-line adult content;
  - Web search portal content;
  - Other on-line content n.e.c.;
  - All other professional, technical and business services n.e.c..
- 

#### **5. Management, administration and back office services (same questions as in C1)**

*Management, administration and back office services include :*

- Legal services;
  - Accounting, auditing and bookkeeping services;
  - Tax consultancy and preparation services;
  - Insolvency and receivership services;
  - Management consulting and management services;
  - Business consulting services;
  - Other management services, except construction project management services;
  - Employment services;
  - Investigation and security services;
  - Travel arrangements, tour operator and related services;
  - Credit reporting services;
  - Collection agency services;
  - Telephone-based support services;
  - Combined office administrative services;
  - Specialized office support services;
  - Other information and support services n.e.c..
- 

#### **6. Licensing services (same questions as in C1)**

*Licensing services include :*

- Licensing services for the right to use trademarks and franchises;
  - Licensing services for the right to use R&D products;
  - Licensing services for the right to use entertainment, literary or artistic originals;
  - Licensing services for the right to use mineral exploration and evaluation;
  - Licensing services for the right to use other intellectual property products;
  - Licensing services for the right to use databases.
- 

#### **7. Engineering, related technical services and R&D (same questions as in C1)**

*Engineering, related technical services and R&D include :*

- Research and experimental development services in natural sciences and engineering
- Research and experimental development services in social sciences and humanities
- Interdisciplinary research and experimental development services
- Industrial design services
- Research and development originals
- Design originals
- Technical testing and analysis services
- Architectural services, urban and land planning and landscape architectural services
- Engineering services
- Surface surveying and map-making services
- Weather forecasting and meteorological services
- Scientific and technical consulting services n.e.c.
- Publishing, printing and reproduction services
- Photographic processing services



- *Translation and interpretation services*
  - *Restoration and retouching services of photography*
  - *Other photography services*
  - *Interior design services*
  - *Other specialty design services*
  - *Drafting services, n.e.c..*
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#### **8. Education and training services (same questions as in C1)**

*Education and training services include :*

- *Pre-primary education services;*
  - *Primary education services;*
  - *Secondary education services;*
  - *Post-secondary non-tertiary education services;*
  - *Tertiary education services;*
  - *Educational support services;*
  - *Cultural education services;*
  - *Sports and recreation education services;*
  - *Other education and training services, n.e.c..*
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